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9. ABSTRACT

A compilation of materials presented at a "package" seminar designed for joint presentation by the Georgia Institute of Technology and the University of the Philippines during the week of June 23-27, 1975. The purpose of the seminar was to furnish orientation, professional training, and the exchange of information between university, governmental, and development organization personnel involved in project development, analysis, appraisal, or implementation. The seminar was designed to (1) make personnel involved in development work more sensitive to the generation, identification, and screening of venture ideas; (2) train personnel involved in development work so that they may assist entrepreneurs in the analysis of venture opportunities and preparation of investment proposals; and (3) train personnel involved in development work to be able to conduct appraisals of proposed investments. Topics addressed in the seminar, and in the materials in this publication, include the investment proposal, an overview of the process for industrial project analysis, generation and screening of venture ideas, market analysis and pricing policies, technical analysis, financial analysis, appraisal of investment proposals, and a bibliography.

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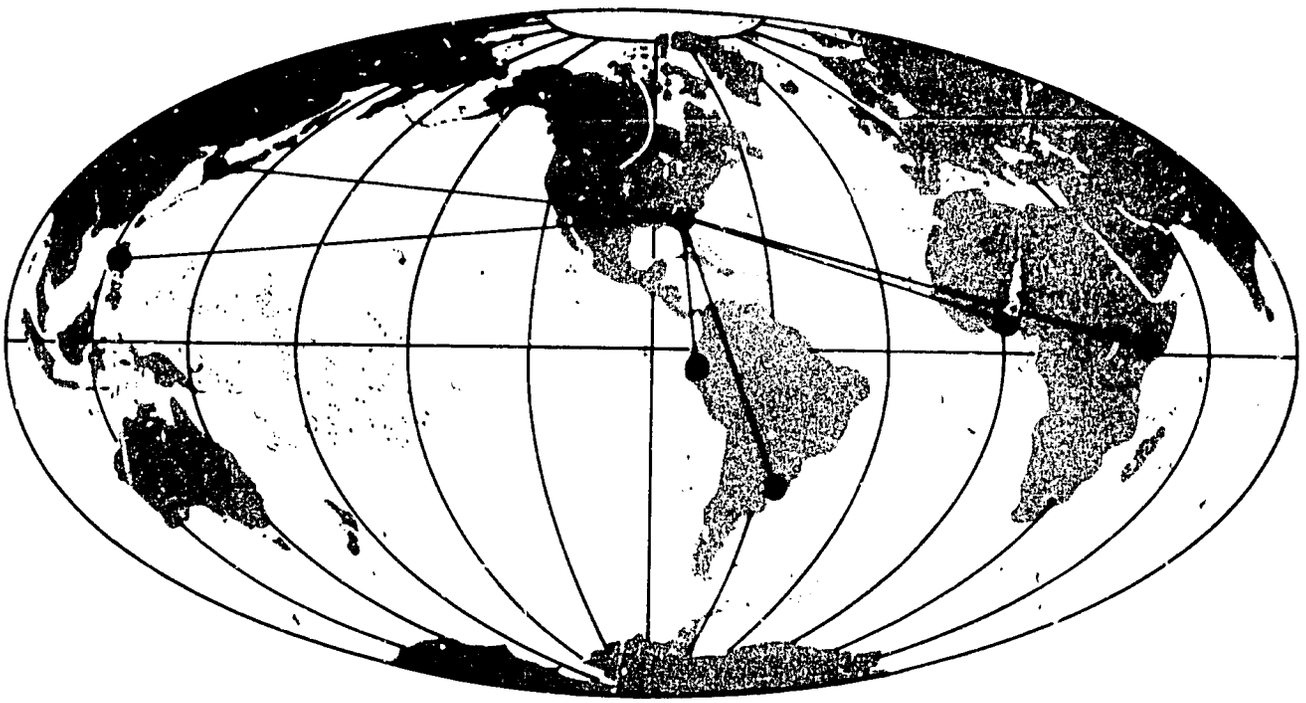

ANALYSIS AND EVALUATION OF INDUSTRIAL PROJECTS

— A SEMINAR —

GEORGIA INSTITUTE OF TECHNOLOGY
ATLANTA, GEORGIA

ANALYSIS AND EVALUATION OF INDUSTRIAL PROJECTS

a seminar conducted jointly by

THE UNIVERSITY OF THE PHILIPPINES

and

THE GEORGIA INSTITUTE OF TECHNOLOGY

June 23-27, 1975

Project B-414

A TRAINING PROGRAM ON THE ANALYSIS AND EVALUATION OF INDUSTRIAL PROJECTS

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June 1975

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PROGRAM CONCEPT

The Georgia Institute of Technology is conducting a five-year (1973-1978) program in industrial research, training, and linkages under an institutional grant from the Agency for International Development. This program, titled "Employment Generation through Stimulation of Small-Scale Industry," is being conducted to strengthen and broaden Georgia Tech's existing capability in employment generation and small-scale industry development, primarily in rural areas, through activities involving counterpart institutions in developing countries.

The importance of small industries in industrial development is widely recognized. Because of this importance, most countries have a number of organizations which provide development assistance. Among other activities, these organizations (1) attempt to identify and analyze opportunities for new industrial ventures and (2) provide assistance to entrepreneurs in the analysis of venture ideas and the preparation of investment proposals for projects which appear to be commercially profitable. This course will be useful to these professionals.

The entrepreneur will find the course useful in his efforts to analyze the potential profitability of the enterprise which he would like to start. According to loan officers, entrepreneurs frequently approach them with requests for funds and little except their own enthusiasm to support the request. They are, of course, convinced that their proposed project has potential for huge profits and feel that obtaining financial backing should be an easy task. Unfortunately, they have no data or analysis to back up their starry-eyed claims. Moreover, according to the loan officers, they do not know how to prepare the necessary feasibility analysis and present the results in a form which would convince a lender.

Finally, the loan officer who must appraise investment proposals and pass judgment on their commercial worthiness also will find the program helpful. He will learn what goes into a feasibility analysis, what assumptions to question, and where he may find information to verify the claims which are made.

BACKGROUND

The development process is one of continuous interaction among many interested groups and organizations. It requires the integration of many disjointed and often conflicting concerns into an overall strategy. The process also requires that "planning" be related to "action," and involves certain procedural steps. Industrial progress in developing countries, as well as developed countries, involves entrepreneurial investment in new enterprises and investment in the expansion and diversification of existing industry. Funds for industrial investment may come from the entrepreneur or from external sources. In any event, the analysis and evaluation of industrial projects is an essential step in the industrial development process.

PURPOSE

The purpose of the seminar, "Analysis and Evaluation of Industrial Projects," is to furnish orientation, professional training and the exchange of information between university, governmental and development organization personnel who may be involved in project development, analysis, appraisal and implementation. Specifically, this seminar is designed to:

- o Make personnel involved in development work more sensitive to the generation, identification and screening of venture ideas
- o Train personnel involved in development work so that they may assist entrepreneurs in the analysis of venture opportunities and the preparation of investment proposals
- o Train personnel involved in development work to be able to conduct appraisals of proposed investments

SCOPE

Although it is recognized that the methodologies involved in the analysis and evaluation of industrial projects are common to a variety of industrial projects, this seminar is concerned primarily with small-scale industry. Thus, a pragmatic approach will be utilized which should be useful to entrepreneurs as well as governmental and lending agency officials. Personnel attending the seminar will receive instruction, analyze cases, and participate in the following subjects:

- The scope and role of project analysis, evaluation and appraisal in the investment proposal
- The generation and screening of venture ideas
- Market analysis
- Technical analysis
- Financial analysis
- Appraisal of investment proposals
    - Governmental policies
    - Feasibility studies
    - Management capabilities

PROGRAM FOR ANALYSIS AND EVALUATION OF INDUSTRIAL PROJECTS

DAY	A.M.	P.M.
1	INTRODUCTION AND LECTURE 1. The Investment Proposal 2. Overview of Process for Industrial Project Analysis 3. Generation and Screening of Venture Ideas	UNIVERSITY SPEAKER Group Work Session - Task Oriented 4. Market Analysis
2	GROUP REPORTS, DISCUSSION AND LECTURE 4. Market Analysis	UNIVERSITY SPEAKER Group Work Session - Task Oriented 5. Technical Analysis
3	GROUP REPORTS, DISCUSSION AND LECTURE 5. Technical Analysis	UNIVERSITY SPEAKER Group Work Session - Task Oriented 6. Financial Analysis
4	GROUP REPORTS, DISCUSSION AND LECTURE 6. Financial Analysis	UNIVERSITY SPEAKER Group Work Session - Task Oriented 7. Appraisal of Investment Proposals
5	GROUP REPORTS, DISCUSSION AND LECTURE 7. Appraisal of Investment Proposals	8. General Discussion

THE INVESTMENT PROPOSAL

I. Introduction

People involved in advertising firmly believe that "nothing happens until someone sells something to somebody." In the development game, nothing much happens until someone proposes an investment which is determined to be economically feasible, funds are made available, and a new business or industrial concern is established, or an existing one is expanded or diversified.

It seems that most will agree that there are no fundamental differences among various problem-solving approaches, either traditional or scientific. in the logic of what has to be accomplished. The differences are in the application of methods -- how to get problems solved -- and, to some extent, in emphasis. The preparation, evaluation, and appraisal of an investment proposal is a problem-solving affair. By and large, the basic logic used and the general methodology employed are the same for almost all types of ventures. Differences are in specific methodological applications and in emphasis, based on scale and complexity of the proposal.

Investment proposals are developed for or by individuals or by public or private organizations willing to provide financial support to entrepreneurs or for expansion. The key element in the investment proposal answers this question: "Is the proposed investment idea economically feasible?" The analytical study involved in this determination is often called an economic feasibility study. The principal thrust of this seminar involves the economic feasibility study. However, it is necessary that the feasibility study be considered in its proper universe together with the life cycle involved in the actual emergence of a new business or the expansion of an existing one.

Again recognizing the universal applicability of investment proposals and related economic feasibility studies, it is necessary to view these studies in the kind of environment in which an organization operates most of the time, that is, medium and small-scale industries must be considered in a "development environment." The state of Georgia, which is located in the southeastern part of the United States, has been in a continuing state of development and redevelopment since it was settled some three hundred years ago.

In placing the investment proposal and its related feasibility study in proper perspective, one should examine first various strategies that may be employed in the development process. In defining the development process, several procedural steps may be identified, including:

- o Identification of problems requiring development effort
- o Targeting goals in relation to total problem-solving effort
- o Establishment of priorities among programs and public/private efforts directed towards such problem solving
- o Activation of those programs through specific efforts
- o Evaluation of program effectiveness through appropriate follow-up

Generally speaking, strategies involved in the development process include job development, resource development, manpower development, community development, and management development. While examining these strategies one should keep in mind that these strategies and what they produce, if employed in the development process, will strongly influence the investment proposal.

When preparing the feasibility study and its related investment proposal for small-scale industry, it is necessary that one understand the basic nature of small-scale business and industry and the inherent problems of this type business. These characteristics and problem areas will not only affect the development of the study and proposal, but they may provide leads that will assist in the evaluation and appraisal of such studies and proposals.

Finally, take a brief look at the marketing of the feasibility study through the investment proposal. What is the purpose of the investment proposal; who prepares, reviews, appraises, and implements?

II. Developing Strategies

To achieve the long-range goal to create a base for stable economic growth, the development of job opportunities through industrial growth is most often the first strategy to be identified. As studies show how success might be achieved in arriving at the job development goal, other strategies are developed that appear complementary or are interrelated with the ultimate goals.

The major strategies that usually emerge in the development program to strengthen the economic base include:

A. Job Development: create employment opportunities to generate personal income through wages and salaries.

1. Upgrade and expand existing employment opportunities.
   - o Identify employment opportunities in growing industries in the area which produce wages sufficient to raise the local income average.
   - o Work with industries which have potential for upgrading or expansion.
   - o Identify new technology which will assist in expanding or upgrading existing industry.
   - o Participate in upgrading and expansion through information dissemination, research, and development.
2. Attract new industry employment opportunities.
   - o Identify major industry sectors and companies that are growing or are expected to grow.
   - o Study location criteria used by companies.
   - o Correlate location criteria with area resources and facilities.
   - o Develop locational information for industry decision making appropriate to the area.
   - o Disseminate results of analysis and information to appropriate industry sectors.
   - o Identify and/or control industrial sites, buildings, or industrial parks.
   - o Provide location assistance to industry.
3. Establish new employment opportunities (homegrown industry).
   - o Gather information on new products, services, processes, and technology from all available sources.
   - o Identify those which constitute an opportunity and seek local implementation.
   - o Assist new entrepreneurs with potential by performing research and development on manufacturing, securing venture capital, market analysis, and management development.

B. <u>Resource Development</u>: efficient use of natural resources to generate forms of personal income.

1. Identify and develop markets for area resources and products.
   - o Identify resources now being exploited.
   - o Determine products with highest potential for developing markets outside the area.

- o Determine those resources which will contribute most significantly to income generation.
- o Identify underutilized resources and evaluate potential for future use.
- o Implement program to bring about earliest and highest use of resources compatible with long-range goals.

C. Development Investment/Venture Capital Resources within the Area

1. Collect current information on availability of venture capital.
   - o Data on major investment bankers in nation.
   - o Data on all sources of capital in the area.
   - o Criteria used by sources of capital for decisions on investment.
2. Determine policies of investors operating in the area.
3. Encourage capital ventures by:
   - o Possibly obtaining the financial support of a development bank.
   - o Obtaining authority to act as a financial agent in state and federal programs.
   - o Attempting to establish bank lending policies to promote local growth.

D. Manpower Development: educate and train local people to increase their earning power.

1. Develop and coordinate educational programs directed toward meeting future needs for employees in professional positions within the area.
   - o Identify current educational level of area population.
   - o Determine capacity and quality of existing post-high school institutions.
   - o Estimate future requirements for various disciplines related to employment development and resources development.
   - o Communicate relevant data to states for incorporation into planning for higher education.
   - o Assist state planners in establishing goals and objectives for higher education.
2. Develop and coordinate training programs directed toward relevant skills for production of future employees in skilled jobs.

- o Estimate skill requirements based on employment and resources development.
- o Determine current and projected labor availability and need.
- o Determine training required to produce required number of skills.
- o Assist in selection, counseling, testing, and placement of persons trained.

E. Community Development: improve services and increase efficiency of local public sector and enhance the environment for economic development.

1. Determine existing conditions in community facilities, such as housing, health care, water and sewer facilities, public education, as key factors in improving the development base.
   - o Identify relative importance of environmental conditions in industrial location decisions and relate to community attitudes.
   - o Estimate future requirements for community facilities, housing, health care, school facilities, etc.
   - o Identify services that could be operated more efficiently.
   - o Communicate relevant data to responsible agencies for incorporating into investment and other plans.

F. Management Development: provide leadership, institutions, procedures, coordination, planning, research, and promotion to achieve economic growth.

1. Establish attitudes and institutions to support established goals.
   - o Develop communitywide acceptance of job development programs.
   - o Obtain institutional support for development programs; i.e., equitable taxes, services, and facilities to support programs.
   - o Institute external promotion of area advantages for industrial locations.
   - o Encourage and support area planning programs.
   - o Identify state and federal resources to support and implement community development programs.
   - o Secure funds to operate industrial development organizations and obtain professional staff or assistance.

III. Small-Scale Industry Characteristics That Influence the Preparation, Evaluation, and Appraisal of Feasibility Studies and Investment Proposals

As previously indicated, there are no fundamental differences in the processes involved in preparing various economic feasibility studies and related investment proposals. However, the size and complexity of the project determine the level of effort which can be appropriately expended on project studies and proposals. The inherent nature of small-scale business, and the problems that arise from the operations of small-scale business and manufacturing concerns, will certainly affect the "tailoring" of the various studies involved in the proposal and of the proposal itself.

A few minutes is required to examine some of the basic characteristics that appear to be common among industries in this size category. At this time we do not want to get involved in the definitions of small-scale industry; however, some of the more apparent inherent characteristics of small-scale industry are as follows:

- o Local Market Orientation. Certainly in developed countries, the market orientation of small-scale industry is toward local or subregional markets. There are, of course, variations in market orientation. For example, a small company involved in the manufacture of products under a subcontract situation, or even as a primary contractor, may produce a specialized product which is really a part of a larger end product. We have many examples of this in the United States, such as the small manufacturer who produces one component to be shipped to an automobile plant several thousand miles away for assembly into automobiles.
- o Specialized Production. Small-scale production tends to be of a specialized nature. Probably one of the main reasons for this approach is that usually only limited technical and management talent is available in small industrial concerns; consequently, product diversification may be somewhat restricted.
- o Low-Volume Production in Small-Scale Industry. Since management and technical talents are restricted, there may be a disinclination to expand operations beyond the level which can be reasonably supervised and managed. However, the major limiting factor usually will be the lack of capital and operating funds. Small-scale

industry usually just does not have sufficient funds for high-volume operations. If a particular industry does expand its operations, it will probably move into a medium or large-scale industry classification.

- Utilization of Simple and/or Inexpensive Production Means. Lack of management and technical skills and lack of capital will usually cause small-scale industry to use the simplest and least expensive production means available. Also, since small-scale industry tends to be labor intensive and since large labor forces usually have a high percentage of untrained and unskilled workers, it follows that simple machinery will be utilized in production.

- Limited Capital and Credit. Small-scale business is characterized by the lack of credit and capital available to those contemplating establishing new firms. Frequently this situation is not fully recognized, or the principals underestimate the need for sufficient operating funds to carry the enterprise along until it becomes profitable.

- Lack of Management Skills. The operator or prospective operator of a small firm may not possess, or fails to acquire, a high degree of management skill and an intimate knowledge of the manufacturing field in which he operates. He may enter a field that appears to be lucrative rather than one in which he has knowledge and experience. If he is familiar with the field in which he operates, he may fail to take proper advantage of the knowledge and skill that can be acquired by hiring qualified assistants or by utilizing outside assistance as particular problems or needs arise.

- Lack of Technical Skills and Knowledge. In developed countries, many entrepreneurs of small industrial concerns evolved from the technical side of a business. That is, they were involved in production and when they decided to go into business for themselves they brought their technical know-how into the new business. Also in developed countries, basic technology is commonplace and the average individual is confronted with the technical from birth. Thus, the lack of management skills may be more of a problem than the lack of technical skills. In developing countries, on the

other hand, the lack of technical knowledge may outweigh a lack of management knowledge. In any event, these two factors are of utmost importance in the establishment and in the operation of an industrial concern.

There are other characteristics of small business; however, the foregoing ones appear to be most common and their effects on small business are such that they should be given full consideration when investment proposals and related studies are undertaken.

IV. Marketing the Economic Feasibility Study through the Formal Investment Proposal

A. Purpose of the Investment Proposal. The primary purpose of the investment proposal is to attract capital for a new business venture or the expansion or diversification of an existing one. In the most simple terms, the investment proposal is a complete outline of the proposed business. The proposal should demonstrate its realistic potential in terms of:

- o The market potential.
- o Manufacturing requirements.
- o Financing requirements.
- o General management requirements.

B. Format. One of the major obstacles to be overcome by the developer of a new product, process, or venture involves the method of presenting his idea to prospective investors. It sometimes happens that an individual becomes so familiar with his idea that he fails to present it in meaningful and concise terms. For this reason, a very basic sort of background document is needed to describe the background, potential, and requirements of the new product or process venture. This form calls for all or part of the following information:

- o Descriptive title of product or process.
- o Names and addresses of developers.
- o Background of the developers.
- o Background of the product or process.
- o Description of the product or process.
- o Advantages of the product or process over similar products or processes.
- o Market for the product or process.
- o Estimated selling price and proposed method of distribution.

- o Consumer or industry reaction.
- o Patent status.
- o Availability of blueprints or working model.
- o Estimated capital investment and operating capital requirements, preferably including a cash flow projection and pro forma profit and loss statement.
- o Additional information.

This form is not intended to be used to describe in detail all of the features of the new product or process. The form serves two very useful functions, however. It requires the developer to reduce his idea to its basic elements and to determine if he needs to secure additional information before proceeding.

As previously indicated, there must be some reasonable correlation between the level of sophistication and detail of the proposal and the size and complexity of the proposed project. Cost of preparation of the investment proposal must be given serious consideration.

The investment proposal for small-scale industry may be rather simple, yet should answer all the questions posed in the format outlined above. The sample format for evaluating small-scale industry project proposals is an illustration of this approach.

C. Who Prepares the Investment Proposal. Generally speaking, the investment proposal should be prepared by or under the direction of the person or group seeking to attract capital for a venture. Parts of the proposal, such as the economic feasibility analysis, may be prepared by others, such as development agencies, to be acted on by entrepreneurs or groups desiring to undertake new ventures. For example, development groups can conduct studies relating to manufacturing opportunities for certain products within certain regions. These are generally broad in scope and require additional economic feasibility analysis prior to determining whether a particular venture is a feasible one. In any event, since the organization making the loan, be it public or private, will look to the individual or group seeking capital funds for project implementation and pay-back, the investment proposal must relate directly to that individual or group.

D. Who Reviews. Although elements of the investment proposal, such as the economic feasibility study, can be reviewed by development organizations or other groups or by consultants, the investment must be appraised by the

lender of the funds for which the proposal was developed. Later in this program, considerable attention will be given to the details of the appraisal of investment proposals.

E. Who Implements the Proposal. If the appraisal indicates to the satisfaction of the lender that the venture will be a profitable one and a loan is made, then the persons listed in the proposal are the ones that will implement the proposal. However, many approved loan applications will provide for some type of monitoring or servicing of the loan over a period of years.

V. Summary

This introductory presentation has been designed to illustrate the environment or universe within which the economic feasibility analysis or study is an important component, if not the most important single aspect, of the evaluation of industrial prospects. If a venture idea cannot be shown to be potentially profitable, then serious consideration should be given to dropping it. However, it is recognized that although some types of ventures may not be profitable initially, from a national policy viewpoint, it is worthwhile to subsidize such undertakings.

During this period, some of the strategies that may be employed to create a basis for stable economic growth have been discussed. This was followed by an examining of some small-scale industry characteristics that influence the preparation, evaluation, and appraisal of feasibility studies and investment proposals. While recognizing that the basic methodology of and approach to economic feasibility studies and investment proposals are essentially the same for most ventures, it was also noted that the size and complexity of the proposed venture will influence the amount of effort that can be expended on an individual project. Finally, some of the factors involved in the marketing of the investment proposal were discussed.

With this broad concept in mind, for the next few hours, details of economic feasibility studies and related studies that are the fundamental basis upon which the investment proposal will be further developed.

OVERVIEW OF THE PROCESS FOR INDUSTRIAL PROJECT ANALYSIS

I. The Nature of Feasibility Studies

In the broadest sense, every rational decision to make a new investment is preceded by an investigation of the economic feasibility of the project, whether or not this is carried out in a formal manner. The larger the project and the greater the investment, the more formalized will be the investigation. The investor will want to assure himself that the market exists or can be developed, that raw materials can be obtained, that sufficient labor supply is available, that local services vital to the project can be assured, that the overall costs for plant equipment, labor, and raw material inputs will be of a certain order. Most importantly, he will seek assurance that income will exceed costs by a margin sufficient to reinforce the inclination to undertake the project.

On the other hand, if the project is small, the study format may be quite informal. Perhaps, there will be no formal study at all and little accumulation of actual data. Nonetheless, the feasibility calculations will have to be computed and reviewed by the investor before the ultimate step of actual investment is taken.

II. The Purpose of the Economic Feasibility Study

A feasibility study can serve a multitude of purposes, depending upon the point of view taken in the study. An individual will be interested in making a profit; financiers in project liquidity, particularly in terms of repayment of loans; and government in benefits to the national economy, particularly in the framework of a coherent economic development program. And, as such programs take much of their physical form through the execution of individual projects, most governments -- with capital scarcity -- must allocate capital to projects in the manner which will most effectively accomplish national objectives.

III. Feasibility Analysis from the Government and Private Viewpoints

A feasibility study which results in the determination of social profitability is one which has been conducted from the government viewpoint. Such a feasibility study, which is frequently referred to as a cost-benefit study, becomes necessary when profits fail to be a good measure of a project's contribution to society. If the costs and prices used in calculating the profits do not

accurately reflect the real costs to the society and their real benefits, then adjustments must be made to correct the divergencies between market prices and social values. Basically the techniques involved in cost-benefit analysis entail procedures for making these adjustments to market prices. The difference, then, in determining profitability in a feasibility study from the firm's viewpoint and the government's viewpoint is that the firm uses the price structure it faces in the market while the government constructs an artificial price structure to use for project evaluation.

These artificial prices are sometimes referred to as "shadow prices" or "accounting prices," and they depend to a certain extent on the objectives of the government. For example, in countries where peasant agriculture is important and underemployment is a problem, it is possible for the marginal product of labor to be less than the wage, which causes a distortion between the cost of labor and its price. The government, if employment is an objective, might use a "shadow wage rate" which would be lower than the actual market wage rate. Hence the cost of projects which involve the employment of labor would be lower and their social profitability would be higher than their commercial profitability.

IV. The Stages in Evaluation of a Project

The evaluation of a project undergoes a certain number of stages during which its various elements are prepared and examined in order to reach decisions. The preparation of a project, therefore, can be seen as a series of activities culminating in establishment of a certain number of studies and documents which permit decision making.

Projects are developed in a given institutional frame which determines their nature and the number of economic agencies likely to be interested in them. Thus, the nature and sequence of decisions concerning viability of the project, its location and financing, etc., will be determined by various institutional policies. Also, the range and accuracy of information necessary for decision making in different stages of a project will depend on its inherent characteristics: size, degree of complexity, sector, type of final product, etc. Therefore, our attempt to describe a typical procedure for the preparation of an economic feasibility study is general because the decisions to be made and the information required will vary between institutions and types of projects.

Attachment A shows the format suggested for a feasibility study by the University of the Philippines Institute for small-scale industries.

The process of preparation and execution of a project, following the determination of the objective to be attained, can be divided into stages and steps. Figure 1 illustrates the main stages in project analysis and the corresponding flow of types of studies needed to evaluate the project. For purpose of clarity in the presentation, no feedback loops are shown on the feasibility study flow chart. For example, instead of termination if the market analysis was unfavorable, the data might indicate the objectives of the study be redefined (i.e., redefine the product line).

These steps have the following characteristics:

A. Identification. The starting point of an industrial project is the setting of the objective to be attained, i.e., the belief that it is possible and desirable to manufacture a certain product or group of products, or to utilize certain resources. This belief can result from survey of existing industrial establishments, sectoral or interindustrial analysis, geological surveys, market studies, etc. It is often a response to a need that appeared within the framework of industrial development planning.

B. Preselection. A decision must be made as to whether it is advisable to conduct detailed economic feasibility study of the project and, if so, to define the scope of subsequent studies. This requires ensuring that:

- The project is of sufficient interest on the technical economic plane to justify detailed study, i.e., a feasible solution can be anticipated;
- The project conforms with the objectives of governmental strategy and plans.

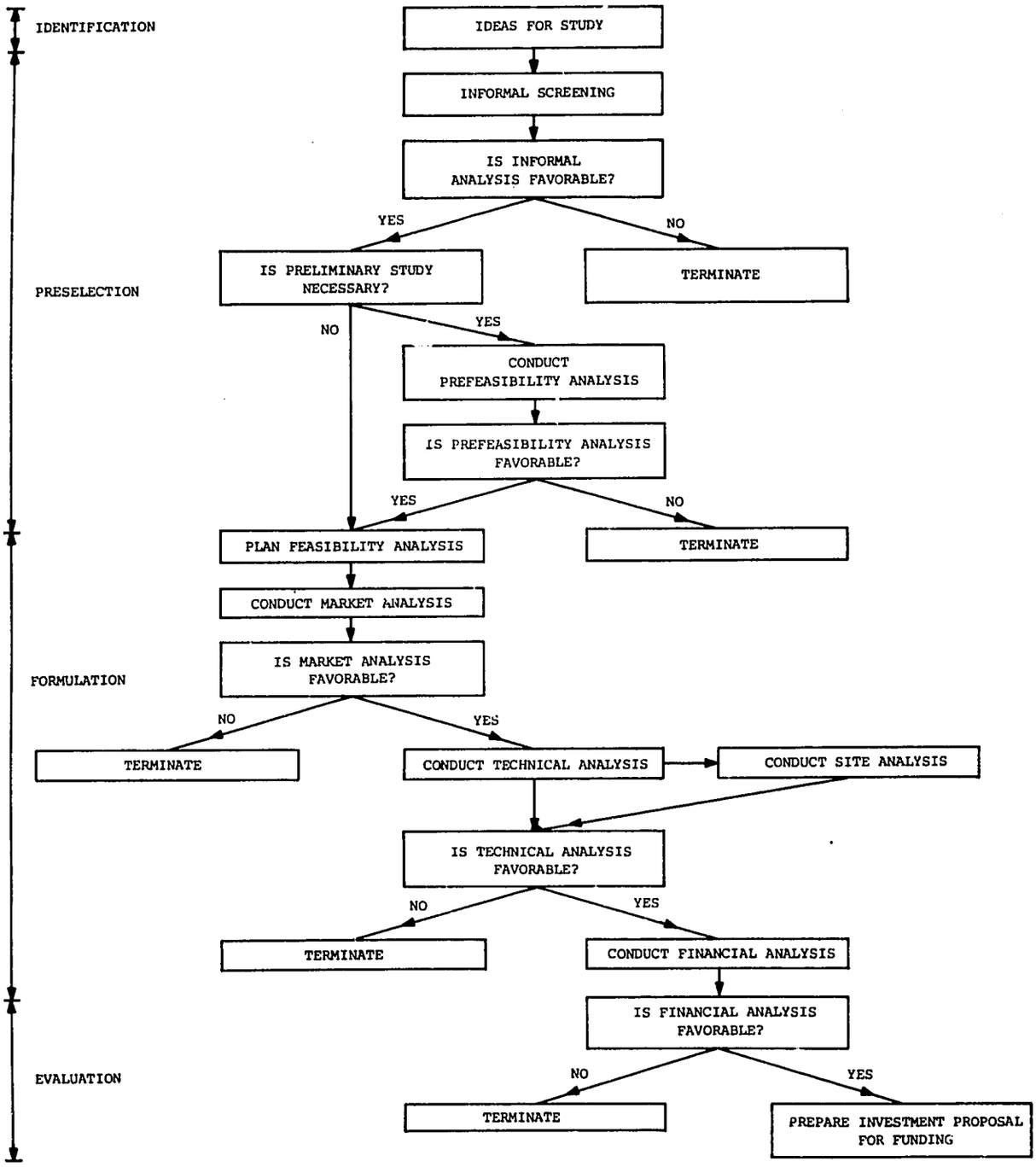
The results obtained during this stage are compiled in a preliminary feasibility study. Inquiries are conducted by the investor himself or by a "fictitious investor" (promoter); the latter can be a development body, ministry, etc.

Once it has been ascertained that the project deserves study in detail, an investor must be found who is willing to carry it out (if promoter and investor are not one and the same).

C. Formulation. At this stage, the various alternative solutions (technical, economic, and financial) must be studied and the conclusions and

Figure 1

ECONOMIC FEASIBILITY STUDY FLOW CHART



supporting data presented in a systematic form. This is achieved by partial studies (of techniques, markets, etc.) or complete studies (of economic feasibility) entrusted to a consulting engineering company, supplier, or potential foreign investor.

D. Evaluation and Decision. A decision must be taken at this stage as to whether the project will be implemented, and to define its essential economic and technical characteristics. If an order of priorities exists, the project must be quantitatively assessed in terms of its ranking and priority.

Although formulation of the project already implies an assessment, the feasibility study and other preliminary investment studies also must be evaluated by the investor or the body upon whose approval execution of the project will depend.

V. The Prefeasibility Study

This study is usually conducted in the preselection stage of the evaluation of a project. Its purpose is to determine:

(a) Whether the objectives of the project conform with governmental policy;

(b) Whether the project, at first sight, seems to justify detailed study, and estimated cost of study;

(c) What aspects of the project deserve special attention during subsequent research (market surveys, laboratory tests, etc.).

To permit decision on the merit of the project, the study must include:

- o A description of the market (estimate of consumption, trends, present supply, price);
- o An outline of technological variants and information concerning availability of main production factors (mainly raw materials);
- o A provisional estimate (a profile) of necessary investment and cost of operation;
- o An approximate estimate of profit.

VI. The Market Component of an Economic Feasibility Study

In the market section of a feasibility study, future demand for the product(s) should be assessed as accurately as possible, at least for the expected amortization period. The study must include:

(a) Analysis of past and present demand (consumption, in quantity and value, price trends, etc.);

(b) Analysis of sources of supply (local production, main producers, cost trends, imports, distribution channels and marketing);

(c) Estimate of future domestic demand (based on trend projections, analysis of end uses and technical coefficients, international comparisons, expected elasticity in demand, etc.) and export possibilities (information on absorptive capacity of the market of some countries, trade agreements in existence or likely to be concluded, etc.);

(d) Estimate of future production (projects in construction, projects in preparation);

(e) Projection of trends in effective demand per year (domestic and export) and an estimate of the project's share in these markets;

(f) Steps to take in order to ensure the forecast share of each market.

VII. The Technical Component of an Economic Feasibility Study

The technical section of a feasibility study should contain a review of techniques (processes) that could be applied. This study involves:

(a) Description of applicable technological variants and conditions for their implementation (site, raw materials, power, water, public utilities, labor and management, patents);

(b) Study of availability of necessary production factors (physical and chemical properties of raw materials and possibility for using them in certain technological processes; availability of other essential production factors) with indication, if necessary, of location of sources of supply;

(c) Selection of technologically viable variants, including the following:

- o Main characteristics of the necessary equipment and machinery;
- o Labor needs;
- o Possible locations;
- o Forecast expense on equipment for each variant.

VIII. The Site Study in an Economic Feasibility Study

The site study is needed to evaluate comparative advantages to the investor and the national economy of the suitable sites from a technical viewpoint,

and to recommend the most appropriate location. The study comprises the following:

(a) An estimate of equipment expense and operation costs entailed in the selection of certain sites (site acquisition and development, transportation of raw materials, fuel and finished products, water supply and sewage treatment, power supply, labor recruitment, etc.);

(b) For every location, an assessment of costs and advantages for the national economy. Costs: housing, expansion of tertiary sector and public services, environmental conservation. Advantages: creation of jobs, regional distribution of income.

IX. The Financial Component of an Economic Feasibility Study

The financial section of a feasibility study consists of an assembly of the market, technical, and site data into a financial format so that the project's desirability can be evaluated. This study involves:

(a) Preparation of an earnings estimate so that the project's commercial profitability can be evaluated.

(b) Analysis of cost and benefits (i.e., social profitability) of the project, in terms of the national economy.

(c) Preparation of cash flow estimates for years of construction and operation before reaching the normal year.

(d) Preparation of balance sheet estimates for the pertinent years.

(e) Evaluation of the project's suitability from a financial viewpoint.

X. Conclusion

In concluding, the feasibility format discussed above is a suggested format, since no standard exists. Every feasibility study is different, tailored to the subject area as well as to the potential audience. However, we have identified basic items which are usually contained in an economic feasibility study. In any given instance, one or more of these may be omitted, due to special considerations.

Attachment A

FORMAT FOR PROJECT FEASIBILITY STUDY

I. Summary of Project

A. Name of Firm

B. Location: Head Office Factory

C. Brief Description of the Project

1. History of Business
2. Nature or kind of industry
3. Type of Organization
4. Organization chart
5. Offices of the business and their qualifications

II. Economic Aspects

1. Market description - A brief description of the market to include the following:

   (a) Areas of dispersion
   (b) Methods of transportation and existing rate of transportation
   (c) Channels of distribution and general trade practices

2. Demand -

   (a) Consumption for past ten (10) years
   (b) Major consumer of the products
   (c) Projected consumption for the next five (5) years

3. Supply -

   (a) Supply for past ten (10) years, broken down as to source whether imported or locally produced.

   For imports, specify form in which goods are imported, price and brand.

   For locally produced goods, the companies producing them, their production capacities, brands and market shares shall be specified.

   (b) Factors affecting trends in past and future supply.

4. Competitive position -

   (a) Selling prices - includes a price study indicating the past domestic and import prices, the high and low prices within the year and the effect of seasonality, if any.

Source: University of the Philippines Institute for Small-Scale Industries.

(b) Competitiveness of the quality of the product.

(c) Marketing Program

1. Description of present marketing practices of competitors.
2. Proposed marketing program of the project describing the selling organization, the terms of sales, channels of distribution, location of sales outlets, transportation and warehousing arrangements and their corresponding costs.
3. Promotions and advertising plans, including costs.
4. Packaging.

(d) Projected Sales

1. Expected annual volume of sales for the next five (5) years considering the demand, supply, competitive position and marketing program.
2. Sales contracts, if any.

(e) Contributions to Philippine Economy

1. Net annual amount of dollars earned or saved, and basis used.
2. Labor employed.
3. Taxes paid.

III. Technological Feasibility

A. Project(s)

1. Description of the product(s) including specifications relating to their physical, mechanical and chemical properties.
2. Uses of the product(s).

B. Manufactured Process

1. Description of the process showing detailed flow charts indicating material and energy requirements at each step, and the normal duration of the process.
2. Alternative processes considered and justification for adopting said process.
3. Technological assistance used and contacts, if any.

C. Plant Size and Production Schedule

1. Rated annual and daily capacity per shift, operating days per year, indicating factors used in determining capacity.
2. Expected production volume for the next five (5) years considering start-up and technical factors.

D. Machinery and Equipment

1. Machinery and equipment lay-out, indicating floor plan.
2. Specifications of the machinery and equipment required indicating rated capacities; and
3. List of machinery and equipment to be purchased and origin as to local or imported.
4. Quotations from supplies, machinery guarantees, delivery dates, terms of payment and other arrangements.
5. Comparative analysis of alternative machinery and equipment in terms of cost, reliability, performance and spare parts available.

E. Plant Location

1. Location map showing plant location.
2. Desirability of location in terms of distance from the source of raw materials and marks and other factors. Comparative study of different locations indicating advantage and disadvantage (if a new project).

F. Plant Layout

Description of the plant layout, drawn to scale.

G. Building and Facilities

1. Types of building and costs of erection.
2. Floor area involved.
3. Land improvement such as roads, drainage, etc., and their respective costs.

H. Raw Materials

1. Description and specifications relating to their physical, mechanical and chemical properties.
2. Current and prospective costs of raw materials; terms of payment and long term contracts, if any.
3. Availability, continuity of supply and current and prospective sources.
4. Materials balance or material process chart.

I. Utilities

Electricity, fuel, water, steam and supplies indicating the uses, quantity required, balance and utilities, availability, sources and tentative sources and costs.

J. Waste Disposal

1. Description and quantity of waste to be disposed of.
2. Description of the waste disposal method.
3. Methods used in other plants.
4. Costs of waste disposal.
5. Clearance from proper authorities or compliance with legal requirements.

K. Production Cost

Detailed breakdown of production costs, indicating the elements of cost per unit output.

L. Labor Requirements

Detailed breakdown of the direct and indirect labor and supervision required for the manufacture of the product(s) indicating compensations including fringe benefits.

IV. Financial Feasibility

A. For Existing Projects

1. Audited financial statements (balance sheets, income statements, cash flow) for past three (3) years to reflect the following:
   (a) Aging receivables
   (b) Schedule of fixed assets showing capitalized cost, estimated useful life, and depreciation method used.
   (c) Schedule of liabilities, tax assessments and other pending claims or litigations against the applicant, if any.
   (d) Financial trends and ratio analysis.
   (e) Elements of production, selling and administrative and financial expenses.
2. Financial projections for the next five (5) years (income statement, cash flow, balance sheets).
3. Supporting schedules to the financial projections, stating assumptions used as to:
   (a) Collection period of sales
   (b) Inventory levels
   (c) Payment period of purchases and expenses
   (d) Elements of production cost-selling, administrative and financial expenses

4. Financial analysis to show rate of return on investment, return on equity, break-even volume and price analysis

B. <u>For New Projects</u>

1. Total project cost (fixed and working capital)
2. Initial capital requirements
3. Pre-operating cash flows relative to the project time-table.
4. Financial projections for the five (5) years of operations to include balance sheets, income statements, cash flows
5. Supporting schedules to the financial projections to include:
   (a) Collection period on sales
   (b) Inventory levels
   (c) Payment period for purchases and expenses
   (d) Elements of production cost, selling, administrative and financial expenses.
6. Financial analysis showing return on investment, return on equity, break-even volume and price analysis

GENERATION AND SCREENING OF VENTURE IDEAS

Any would-be entrepreneur and any practical industrial development program must identify industrial investment opportunities as a first step toward a prosperous economic venture. In almost every country, potential entrepreneurs and industrial development professionals are constantly looking for new venture opportunities. In some countries, government planners have determined "priority lists" which guide (or perhaps direct) the type of industries which may be started. For the most part, such governmental action provides incentives for entrepreneurs and investors to establish firms on the favored list but does not prohibit other ventures.

I. Objectives

How can industrial investment opportunities be identified? The primary objective of the entrepreneur is personal economic gain. He is looking for a situation in which he can invest his capital and his talent for profit. The industrial developer, on the other hand, is likely to have multiple objectives. In addition to profit for the entrepreneur, other objectives which may guide his search are the following:

- o Generate employment
- o Support existing or planned industry
- o Upgrade employment opportunities
- o Improve balance of payments (import substitution or export)
- o Improve tax base

II. Product Selection Criteria

Regardless of the objectives of the industrial developer, the new venture must compete profitably in some market in order to survive. It follows, then, that in the search for venture ideas, both the entrepreneur and the industrial developer are looking for a product (or service) which meets one of the following criteria:

1. The product serves a presently unsatisfied need. This implies a new product for which a demand must be developed.

2. The product can successfully compete with similar products because of some "advantageous situation" such as one of the following:

- o Improved Design -- Design innovation resulting in special features, improved performance, lower costs, better appearance, improved quality or reliability may provide a competitive advantage.
- o Lower Price -- The ability to underprice competitive products and still make a profit depends on cost advantages in production distribution and/or selling. Such cost advantage may arise from input material costs, labor costs, tax advantages, transportation costs, capital costs, or process innovations.

3. The market is now served by imports.

4. The market is now inadequately served. This implies that existing producers cannot serve the entire demand.

III. Venture Idea Generation

These criteria may serve both as a preliminary screen to indicate the potential for success and as a guide for venture idea generation. The following checklist may be helpful for venture idea generation:

1. Investigate Local Materials and Other Resources

   If local materials are now being shipped to distant plants for processing, it is likely that the local market, at least, can be served more economically by a local processing plant.

   If local raw materials are not now utilized, study possibilities of applying new technology to produce new products or reduce production costs of existing products. Scientific advances and new technology create new opportunities for industrial projects.

2. Study Existing Industries

   A study of existing industries may reveal opportunities for expansion or diversification. Also examine the service and support needs of existing industry. Can any of these be supplied at a lower cost than that of the present suppliers?

3. Examine Import Substitutions

   Local manufacture of goods which are presently imported is attractive for several reasons:

   (a) Generates employment.

   (b) Keeps capital at home and thus improves balance of payments.

(c) Provides market for supportive goods and services.

(d) Increases local industrial base.

If local raw material resources are available, locally produced goods may have lower cost than imports since transportation costs will be avoided.

4. Examine Inter-Industry Relationships

Analyze input needs of existing industry to determine if required goods and services could be produced locally at less than their current costs. Also, analyze the outputs of existing industry to determine if opportunities exist for further processing.

5. Study Local Skills

The skills of local artisans or industrial employees may suggest products which could be profitably produced.

6. Analyze Development Plans and Population Growth Trends

Industrial development and demographic changes often produce markets for goods and services when none existed previously. Such changes should be studied in order to determine how they will affect markets. Population age shifts, for example, may change youth-oriented markets (toys, youth clothing, etc.) to household-oriented market (home furnishings).

7. Analyze Economic Trends

"Changing times" may create new public needs which can provide business opportunities. The current inflationary trend and the emerging recognition that material resources are finite are both good examples. Already new business are emerging to "recycle" products or material or to produce "energy conservation" products. Economic forces are having a profound influence on markets.

8. Analyze Social Problems and the Resulting Needs

In the U. S., for example, increases in crime have resulted in new markets for such things as guard dog services, attack repellants, and burglar alarms.

9. Use Industry Lists

Industry lists such as the Standard Industrial Classifications of the United Nations may serve as a helpful checklist to stimulate ideas and avoid overlooking an attractive possibility.

IV. Preliminary Screening

Using the preceding checklist, it is possible to develop a long list of potential venture opportunities. Obviously, it would not be realistic to conduct a detailed feasibility analysis or even a prefeasibility analysis for each idea on the list.

A preliminary screening may serve to eliminate a sizable portion of the list. Factors to be considered in such a screening by the entrepreneur are the following:

1. Are all required factors of production available at reasonable cost? (Examples are scarce skills, energy, special materials or equipment, processes and technology.)

2. Are the capital requirements excessive? If the project requires large amounts of unavailable capital, there is no point in further consideration.

3. Are environmental effects contrary to government regulations or good public relations?
(Examples are air pollution, noise, water pollution.)

4. Is the project consistent with national policies, goals and restrictions? (Examples are import restrictions, foreign exchange requirements, employment generation, industrialization plans.)

5. Is the project dependent on factors with high risk?
(Examples are raw material availability and price, political actions such as special tax considerations or allowances, uncertain market, unproven technology.)

In addition to the above factors, the industrial developer also will consider factors related to his development objectives, such as:

6. Does the project support existing or planned industry?

7. Will the project serve to upgrade employment opportunities, or will it commit human resources to unskilled, low-paid jobs?

V. The Prefeasibility Study

The preliminary screening may leave in a number of ideas for further study. Since a complete feasibility study is time consuming and expensive, it may be desirable to perform "prefeasibility analysis" in order to further screen the possible projects.

The prefeasibility study can be viewed as a series of steps culminating in a document which permits a decision to be made on whether to accept, reject, or postpone a complete detailed feasibility study.

These steps have the following characteristics:

1. Gather Preliminary Data. This step involves the collection of the necessary data, usually in an informal manner. For example, information may be obtained by the following means:
   - o Interview sales people
   - o Interview individuals in government
   - o Interview purchasers as they are identified
   - o Perform a literature search (state directories, census, indices, association publications)
   - o Check with trade associations

2. Identify Key Plant Location Factors. The key plant location factors for the product should be identified and ranked in order of their relative importance.
   - o Market
   - o Labor (quantity, special skills)
   - o Raw materials
   - o Transportation facilities and costs
   - o Water (quantity, quality, temperature)
   - o Other (personal preference, foreign competition, present productive capacity, plant obsolescence)
   - o Combination of factors

3. Analyze Information Collected. The market, technical, and financial data are brought together and analyzed to obtain the following types of information: conformity of project with government objectives;

description of the market; outline of technological variants; availability of main production factors; etc.

4. Estimate Cost of Study. The collection of preliminary data will usually indicate what aspects of the proposed project deserve special attention during subsequent research (market surveys, laboratory tests, etc.). With such special research requirements identified, a study plan detailed by task can be constructed from which manpower requirements by skill needed, the project's duration, and actual dollar cost can be estimated.

5. Evaluate Project. The preliminary feasibility study should provide enough information so that a decision can be made on the merit of the project, that is, whether to accept, reject, or postpone the detailed feasibility project.

VI. Data Required for the Prefeasibility Study

To permit a decision on the merit of the project, the study should include certain types of data, for instance, market information and data on availability of raw materials. The types of data that will be important and should be emphasized will vary according to the nature of the project as well as country involved. In the United States, the prefeasibility study usually emphasizes primarily the market, with technical considerations being of secondary importance.

1. Product Description. The product's characteristics should be briefly described, along with possible substitutes which exist in the marketplace. Also, allied products should be identified that can or should be manufactured with the product under study.

2. Description of Market. The competitive nature of the market should be examined, as well as the present and future markets.
   - o Where is the product now manufactured?
   - o How many companies exist and how specialized are they?
   - o What are the national production, imports and exports?
   - o Are there government contracts or incentives?
   - o What is the estimated consumption?
   - o What is the estimated product longevity or future consumption?
   - o What is the price structure?

3. Outline of Technological Variants. A brief description of the choices of technology which exist for the manufacture of the product should be included.

4. Availability of Main Production Factors. Production factors such as raw materials, water, power, fuel, and labor skills should be examined briefly to insure availability.

5. Investment Requirements. An estimate should be made of the necessary instrument costs and cost of operation.

6. Estimate of Profit. The data gathered should include estimates of profits of firms manufacturing similar products or, if the preliminary data are extensive, an actual estimated profit for the product under study.

7. Other Data. In certain cases, the following factors may be the most important in the evaluation of the suitability of a product, especially in the case of the establishment of a new firm.
   - o Local attitudes toward industry
   - o Educational, recreational, and civic data
   - o Availability of local sites

MARKET ANALYSIS

Introduction

The shoemaker in a small and isolated village can display his handiwork to the local townspeople. He is in close contact with their needs and can customize his production techniques in order to satisfy each customer's needs. The shoemaker is acquainted with his market. He can judge what type, size, style, and color of shoes his customers want because their pace of living is slower and their needs change less frequently. This stability helps the shoemaker to determine how many shoes to produce, how many people to hire, and what production equipment is needed. These decisions are based upon his knowledge of what the market (customers) wants and upon his ability to forecast the market needs in the future.

If the shoemaker decided to produce only a special type of shoe, he would have to measure the size of his specialized market in order to determine the market's potential. Knowing that he could not capture the entire market, he would have to determine the size of the market segment for the specialized shoe.

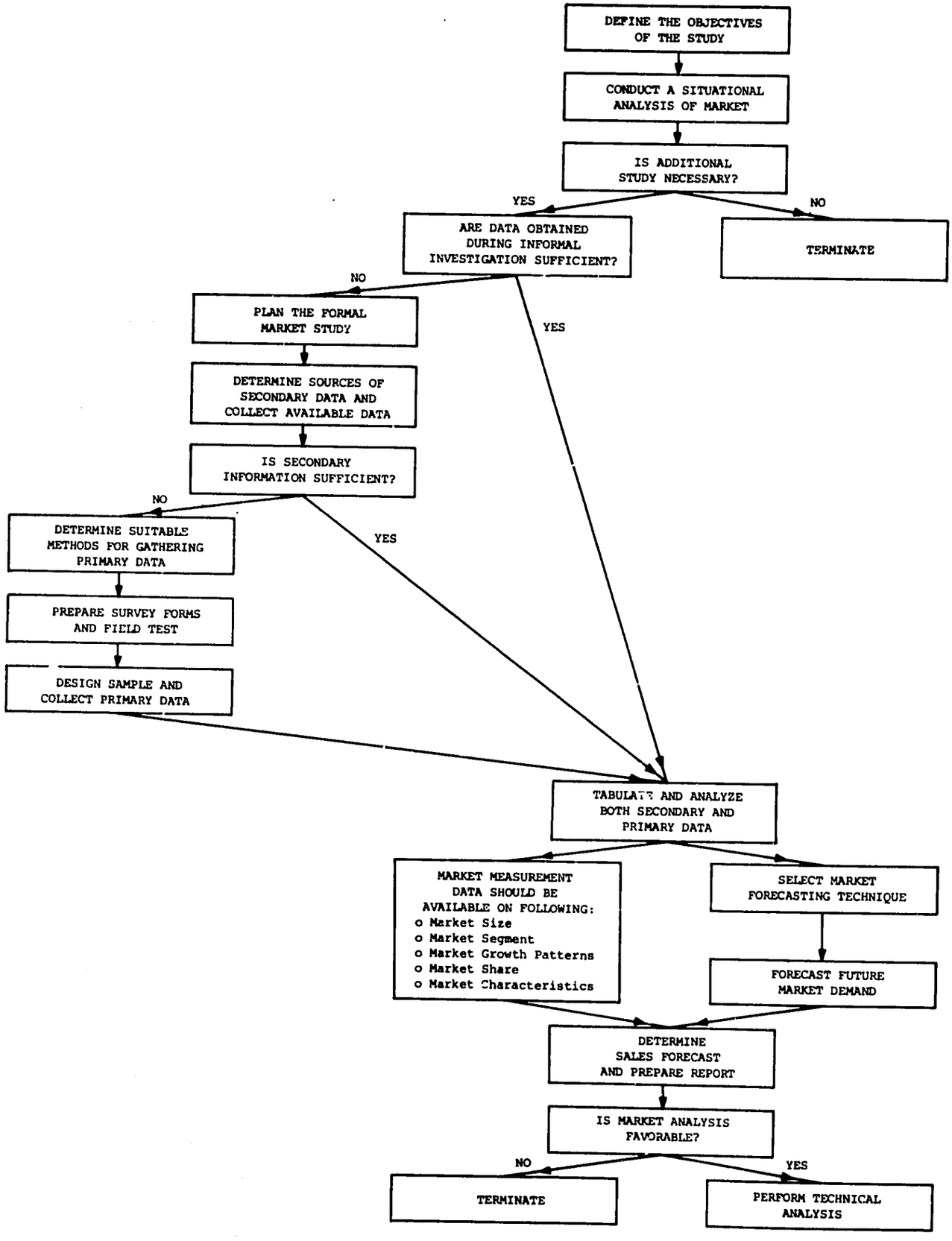
The analysis the shoemaker probably conducts in an informal manner in his head illustrates the type of market information and analysis required to evaluate a project's market. The market analysis will, of course, increase in complexity for a product with a regional, national, or international market. Basically, however, the market analysis must determine if the proposed project will produce the right product at the right time for the right market at the right price.

Steps of the Market Analysis

A market analysis involves the search for, and analysis of, data that can be used to identify, isolate, describe, and quantify a given market. The size, characteristics, and direction of market movement are the basic areas of interest. In compiling the market data, an orderly procedure is helpful in order to be as efficient as possible. No one procedure for conducting a market study is really the best, but the following represents a general procedure that you will find helpful as you analyze your way through the market. The process of market analysis can then be outlined by specifying the main steps which are shown in Figure 1.

Figure 1

MARKET ANALYSIS FLOW CHART



(1)

Define the Objectives of the Study

The first step in approaching the study of a problem such as whether to introduce a new product is to set down in writing a preliminary statement of objectives in as much detail as possible. Obviously, the overall objective of the market analysis is to measure and forecast the market. These are general questions, however, and the objectives must be spelled out in more detail in order to accomplish a useful analysis.

For example, a small industrial manufacturer had developed an improved pump based upon a new principle of pumping that appeared to offer many advantages over the machinery then in use. The new pump could handle a wider range of materials. However, the president of the firm lacked information about where and how to market the new pump.

It immediately became necessary to answer the following questions:

- What is the market area?
- What size and capacity pump should they manufacture?
- What models should be offered and to what industries?
- How many could they expect to sell to each industry annually?
- What price would assure acceptance?
- What channels of distribution would prove most efficient?
- What individuals, by name, would be actual buyers?
- Who are the immediate sales prospects?

(2 & 3)

Conduct a Situational Analysis of Market

↓

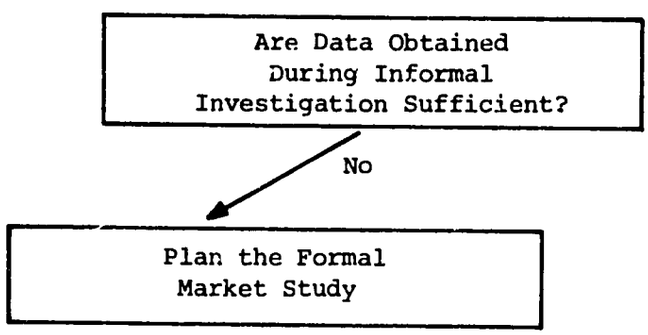
Is Additional Study Necessary?

This step involves the analysis of the project's product relationship with its market by using background information. If the project involves an existing firm, then examination of company records and questioning people within the

firm can assist in this step. Also involved in this stage is an informal investigation which involves talking to people in wholesale firms, outlets, competitors, customers, and men in the industry. Each question asked will give the researcher a "feel" for the situation surrounding the problems.

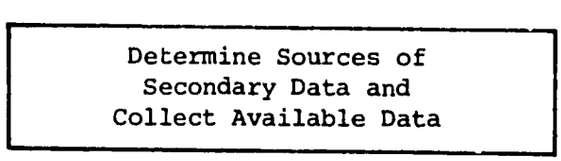
If this informal investigation has produced enough data so that you can adequately measure the market, the analysis need proceed no further. Also, in some instances where time is critical or where the budget is a problem, the data gathered during the informal market analysis may be all that will be available on which to base decisions. However, a more extensive formal investigation is usually necessary.

(4 & 5)



Seldom do the data obtained during the situational analysis answer all the necessary questions. This informal phase of the analysis provides the basis for a revision in the objectives, if needed, and frequently indicates the most fruitful methods by which the problem can be studied. With a precise statement of objectives, it is possible to plan in detail the types of information needed, the sources from which it is to be gathered, and in general, a comprehensive program of study. This plan will include not only a timetable, but also an estimate of costs likely to be incurred. The plan will contain a description of the method by which each type of information is to be gathered.

(6)



Market analysis is mainly a formal search for and analysis of data that will be useful in accomplishing the objectives. The sources of information may be primary or secondary. In many instances, neither the research skills nor the budget needed to collect and use primary data will exist. Heavy

reliance will be placed upon using secondary data in measuring both present and future markets.

Secondary sources are published materials which are available in company files, in libraries, government agencies, universities, trade and professional agencies, etc. Secondary information sources may provide enough data that the market analysis need proceed no further. If not, then the researcher must obtain new data.

The availability of secondary data sources will vary for different countries and products. Caution should be used with secondary data because it has been prepared by different individuals for many different purposes. Therefore, it varies in impartiality, validity, reliability, and homogeneity. Listed below are the different types of secondary information sources available for the United States.

6.1 Internal Company Records

Information available within an existing firm is often a good source of data.

6.2 Government Publications

Federal, state, and local governments publish material useful in market research. In the United States, the census publications, state manufacturing directories, etc., are examples of the type of information available.

6.3 Registration Data

Federal, state, and local government offices routinely collect as part of their legal and administrative procedures a class of data collectively known as "registration data." Much of this information is publicly available.

6.4 Trade and Professional Associations

In the United States, virtually every product, industry, and profession has one or more trade or professional associations. Some of these either publish or make available to members specialized market and other data. A number also publish trade or professional magazines and journals.

6.5 Private Business Research Firms

Certain firms exist for the purpose of collecting certain types of marketing or other business data on a continuing basis and selling it (e.g., A. C. Nielson Company; F. W. Dodge Corporation).

6.6 Private Directories

National directories are published for specific types of business (e.g., Thomas Register of American Manufacturers; Dun and Bradstreet Middle Market Directory).

6.7 University Research Organizations

Some universities have set up organizations to conduct business research and to collect and publish market and other kinds of business data.

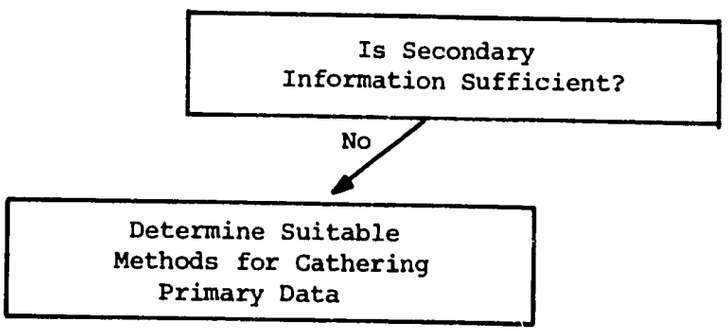
6.8 Foundations and Institutes

There are private foundations, institutes, and other nonprofit organizations involved in business, market, and economic research that publish material useful in market measurement (e.g., Resources for the Future, Inc.; Ford Foundation).

6.9 Investment and Brokerage Firms

The larger investment and brokerage firms maintain research staffs. These firms prepare and distribute special reports on specific industries and on specific companies. Also, annual reports of publicly owned corporations should not be overlooked as a possible information source.

(7 & 8)



If secondary data sources do not provide the data necessary to accomplish the objectives, primary data must be collected. Primary sources are new data that the researcher must obtain from observation of the activity (watching a buyer's behavior), or firsthand survey of data or people concerned (i.e., competition, government officials, buyers, users, etc.).

The collection of primary market data can be accomplished utilizing several survey techniques either in conjunction or separately: mail questionnaire, telephone interview, and personal interview. The time, budget, and research skills available, along with the type of market data required, are factors which help determine the selection of the appropriate technique. A questionnaire must be designed and field tested, a sample selected, and tabulation forms prepared, no matter which technique is selected.

8.1 Mail Questionnaire

There is general agreement that the mail survey technique is most effective when specific, limited answers are needed. Mail surveys have not proved useful for extensive probing.

In circumstances where it can be used effectively, the principal advantage of the mail survey is its low cost -- and speed. Our experience has shown that the response rate is between 20%-30% for the first mailing; this can be increased to 50%-60% if there are three mailings. The total time needed to conduct a mail survey naturally depends to some extent on the survey size; however, the minimum time needed for one mailing is usually two weeks, while the total time needed for three mailings probably would be two to three months. When the market data needed can be obtained from a few simple, easily understood questions and the number of firms to be surveyed is large, the most appropriate survey instrument usually would be the mail questionnaire.

8.1.1 Advantages of Mail Surveys

- o Wider distribution
- o Less distribution and interviewer bias
- o Better likelihood of thoughtful reply
- o Time saving
- o Centralized control
- o Cost saving

8.1.2 Disadvantages of Mail Surveys

- o Usable mailing lists sometimes are unavailable.
- o The subject matter or nature of the research may require the presence of a specially trained interviewer.
- o The questionnaire may be too long.
- o The questionnaire may be too difficult.
- o Time available may not be sufficient to conduct a mail survey.
- o The respondent may not be the addressee.

8.2 Telephone Interviews

The telephone interview offers the speediest means of obtaining market data from respondents. It is an excellent survey technique to use when one wishes to supplement data developed earlier through mail questionnaires or personal interviews. The market data which can be obtained from a telephone interview sometimes are limited because the respondents are reluctant to release certain types of company information over the phone.

8.2.1 Advantages of Telephone Interviews

- o Cost saving
- o Speed and efficiency
- o Special universes (e.g., electrical contractors)
- o Unreachable people (e.g., town ordinances)
- o Imperativeness
- o Uniformity
- o Control

8.2.2 Disadvantages of Telephone Interviews

- o Incomplete universe
- o Unlisted telephone numbers
- o Directory obsolescence
- o Interview length
- o Shorter comments

8.3 Personal Interviews

The personal interview survey technique is especially well suited for in-depth exploration of the market. Often useful unsolicited

information may be revealed during interviews about the market situation, comparative products, and the like. However, even using personal interviews does not ensure that all the necessary market data will be supplied.

It is generally agreed that the following requirements have to be met to ensure a successful interview: a thoroughly briefed interviewer; a well-laid-out plan for coverage of the subject matter; and careful selection of proper respondents.

The most serious drawbacks to personal interviews are the required time for contact, travel, and the interview, as well as the cost. Personal interviews are the most expensive of the different survey techniques.

8.3.1 Advantages of Personal Interviews

- o Most flexible method of data collection
- o Interview length
- o Response rate
- o Elaboration when questionnaire is difficult
- o Visual or mechanical props are part of survey design

8.3.2 Disadvantages of Personal Interviews

- o Required speed of response
- o Scheduling requirements
- o Speed of completion
- o Cost
- o Geographic spread of sample
- o Control

(9) **Prepare Survey Forms and Field-Test**

Whatever the technique used to obtain the market data, a survey instrument has to be developed. The questionnaire should be kept as short as possible and still allow the collection of the necessary information. The structure of the questionnaire will depend to some extent on the survey technique utilized. Once a questionnaire has been designed, it must be field-tested. Field-testing the questionnaire is especially useful in that the terminology used in the

questionnaire can be tested to ensure that it conforms with that used by the individuals being interviewed. It is also advantageous when developing the questionnaire to design the tabulation forms. This ensures that the questions on the survey instrument will provide the information they were intended to answer.

For example, points to remember when designing a questionnaire, especially a mail questionnaire in the United States, are:

- The average American adult has a reading ability approximately equal to the ninth grade.
- The comfortable reading level for the average American is two years less, that is, the seventh grade.
- Reading level has little to do with intelligence.
- The longer the sentence, the less the reader will get out of it.
- The more short words, the more the reader will get out of it.
- Some sentences must be long and some words must be long, but if they are varied with short sentences and short words, overall readability improves.
- Where possible, request yes, no, or one-word answers.
- Keep your verb-adjective ration low (e.g., do not use too many adjectives).
- Don't avoid repeating a word.
- Edward L. Thorndike, Twentieth Century Dictionary, gives the 30,000 most-used English words and gives their meanings in order of public understanding.
- Edward L. Thorndike, The Teacher's Word Book of 30,000 Words, lists the most-used words and tells who knows them.

No matter how good a researcher thinks his questionnaire is, it still should be pretested. The researcher must test in three areas:

- To make sure that the questions are clear and in proper order;
- To find out whether the instructions to the interviewers are adequate;
- To uncover any problems which may arise in the course of editing, coding, and tabulating the questionnaires.

The method used in pretesting consists simply in trying out the questionnaire on a small sample of people similar to those who will be interviewed. It

is wise to let the research man himself do some interviewing. By observing the reaction of a few respondents, he may be able to catch a number of unforeseen problems.

(10)

Design Sample and Collect Primary Data

To design a sample implies listing the users of a product. Such lists can be gathered from a number of sources, depending upon the product. Telephone directories, association lists, industry directories, and government documents are sources for the construction of users' lists. A list's completeness will depend on the product and market area covered.

After the universe of the users has been established, a sample for the survey must be selected. The sample size will depend on a number of considerations. In general, the data to construct a sample along scientific lines does not exist. The size of the sample also will depend upon the budget and research skills available.

(11)

Tabulate and Analyze Both Secondary and Primary Data

The tabulation formats should be constructed at the same time as the survey instruments. In the tabulating process, strict procedures should be instituted in order to keep tabulation errors to a minimum.

The objective of the analysis is to answer the questions formulated at the beginning of the market analysis. In general, the analysis of the primary and secondary data can be divided into two areas: market measurement and market forecasting.

(12)

Market Measurement Data Should Be Available on Following:
o Market Size
o Market Segment
o Market Growth Patterns
o Market Share
o Market Characteristics

In most instances, markets may be classified in several different ways. The classification of the market is important because it may indicate which of several measuring techniques is most suitable. Almost any given market can be described in terms of one or the other element from *each* of the following pairs:

- o Present or future market
- o Total market or the firm's share of the total
- o Consumer goods or industrial goods market
- o Established product or new product

12.1 Measurement of Present Markets

Market measurement is the development of quantitative estimates of demand. In measuring any kind of market, it is important to specify the conditions surrounding the activity: the product or product classes; the geographic area; the customer group being investigated; the units of measurement being employed; the time period covered; and any environmental assumptions made.

It is necessary to measure present markets as a base for forecasting future markets. Ordinarily, the researcher starts with the present total market before considering a particular firm's share. The researcher then may or may not have reason or be able to forecast the future total market.

Estimating present total markets is done largely through the collection and analysis of published data. If published data on total sales are scarce or incomplete, the researcher may have to supplement this with opinions and information from primary data sources. Measuring the present markets is analogous to putting together a jigsaw puzzle. It consists of collecting bits and pieces of information from many sources and combining them until a complete picture emerges. Imagination and judgment are required.

So far, no mention has been made of the role of price in the determination of present market size. In the majority of feasibility studies, the time, data, and funds are insufficient to allow a sophisticated analysis of the relationship between price and demand. Therefore, the market size is quantified and price information is usually limited to the presentation of the current and historical

price structure for the product. However, if a more sophisticated analysis is desired, the price elasticity of the product can be determined or price calculations made such as those shown in Attachment A.

12.2 Market Segment

A market segment refers to a subsegment of a total market which can be identified by specific characteristics. This concept is important in the study of the market of a product in that the researcher must be careful to include all those market segments which constitute the total demand for the product.

For a great many products there is not a single demand, but a number of demands for varying qualities of the item at different prices. Peter Kilby has pointed out in his book, Industrialization in an Open Economy: Nigeria 1945-1966, several examples of such "product differentiation." An armchair made in a small-scale Nigerian workshop sold in 1964 for £2, while the same model chair -- but constructed from seasonal wood, squarely joined, and perfectly flush with the floor -- sold for over £6.

12.3 Market Growth Patterns

Examination of the history of past sales plotted against time reveals that the resulting sales curves often show certain typical characteristics in their growth patterns. It is helpful in market measurement, and especially in forecasting, to be able to recognize which type of growth pattern a specific product or service is following. Hopefully, the product or service will continue to follow this pattern -- a help in selecting the forecasting technique. Somewhat idealized versions of three typical growth patterns are illustrated below.

Pattern 1-a represents one extreme (i.e., products or services whose sales move in a steady pattern). Forecasting is relatively easy, with comparatively smooth growth (or decline) characteristics.

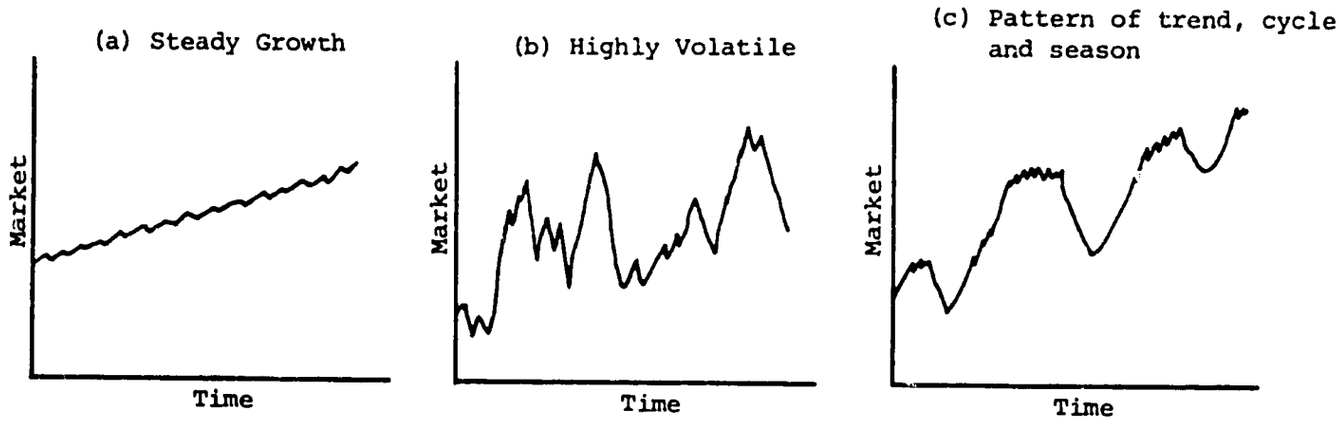
Pattern 1-b represents the other extreme. This highly volatile growth pattern indicates the influence of erratic and/or nonrecurrent

forces in the marketplace. Products showing these characteristics are the most difficult to forecast.

Products with growth patterns similar to 1-c fall between the two extremes. Sales of these products may vary appreciably, but in a systematic manner. There is recognizable regularity in the forces acting on the sales of these products. Systematic forces may be broken down into components of trend, cycle, and season. Trend forces contribute to the long-term shift (up or down) in sales. The major wave-like forms in the pattern are the result of cyclical forces. The smaller "sawtooth" effects indicate seasonal forces at work. Incidentally, the term "season" has come to refer to any pattern of recurring movement with a periodicity of less than one year, and not to the effect of weather alone. Erratic or irregular forces also may be present, but may not be obvious at first glance. The trend-cycle-season patterns of growth are amenable to forecasting techniques.

Figure 1

THREE PATTERNS OF MARKET GROWTH



12.4 Determining the Market Share

After the total market for the product has been quantified, the researcher has to evaluate the firm's share of the present total market or, in the case of a new firm, estimate its market share. For the existing firm, its sales during the current period are known. Dividing this by the total market gives us the percentage share of

the total. Knowing this percentage, the researcher then can proceed to forecast the firm's future sales by forecasting the total market and then taking the percentage share. However, market share changes.

If the project involves the establishment of a new firm or product, then the knowledge of the competitors' share of the market and the total market allows the researcher to estimate market penetration for the firm.

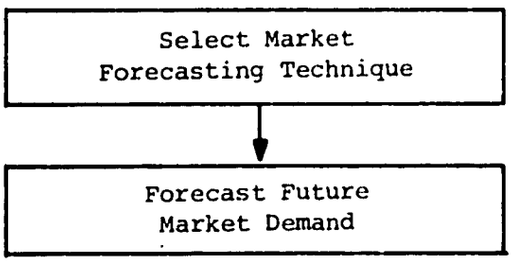
12.5 Other Important Market Characteristics

The primary emphasis in the market analysis has been on how to determine the present market size. Care should be exercised when conducting a market study not to overlook other important aspects of the market. For example, it might be revealed during the study that a large part of the total sales are due to a captive supplier. That is, the buyer of the product may own the firm which is producing the product. Such information must be incorporated into the market analysis.

Other items which should be covered in the market analysis are:

- o Profile of competition
- o Channels of distribution
- o Transportation
  - (a) Availability -- geographic size or "width" of market
  - (b) Costs -- influence the volume or "depth" of market

(13 & 14)



If the data are adequate and time or budget do not offer constraints, it is sometimes possible to utilize sophisticated techniques to project future markets. Often, however, due to inadequate data, the general direction of the market will be all that can be ascertained.

A number of different techniques are in use for forecasting future demand for goods and services. These range from very simple to highly complex methodologies. Each has variations to suit particular situations. Market forecasting techniques can be classified as follows:

- o Polling Techniques
  - (a) Survey of buyer intentions
  - (b) Composite of sales-force opinion
  - (c) Outside expert opinion
- o Market Testing
- o Statistical Analysis
  - (a) Trend analysis
  - (b) Correlation analysis

13.1 Survey of Buyer Intentions

Surveys of this type can be time consuming and expensive, depending on the complexity of the forecasting problem. If the number of potential buyers is large (usually the case with consumer market studies), then a representative sample must be selected. The use of telephone or mail questionnaires is less costly than personal interviews but introduces other problems of percentage response and flexibility. Phrasing of questions is a science, and professionals or suitable textbooks should be consulted.

The chief difficulties affecting the accuracy of surveys of this type are: some buyers refuse to disclose their intentions; some buyers do not know their future intentions; some buyers do not carry out their intentions because of later changes in personal or business conditions.

It has been pointed out that the appropriateness of this method increases to the extent that: the buyers are few in number; the cost of effectively reaching them is small; they have clear intentions; they follow out their original intentions; they are willing to disclose their intentions.

This method, then, is of value for industrial products, for product purchases where advanced planning is required on the part of the buyer, and for new products where past data do not exist. Also

surveys of consumer buying intentions have proved useful for short-range consumer durables sales forecasting.

13.2 Composite of Sales-Force Opinion

If the project evaluation involves a firm in existence, then the firm's sales forecast may be made by taking the composite of the sales force's opinion. Such forecasts usually are made for a one-year period, and, of course, are applicable only to the territory actually served by the firm.

Adjustments to the salesman's forecast frequently are necessary because of biases inherent in the job. Individual salesmen may tend to be either overly optimistic or overly pessimistic. They may be unaware of broad economic developments affecting total business conditions, and some may fear that too high a sales quota may be set as a result of their estimates.

13.3 Outside Expert Opinion

Another quite useful polling approach to forecasting is to canvass the opinions of experts outside the firm for assessments of future demand. Such experts may be found in the firm's distribution channels, appropriate government agencies, trade and professional associations, and private institutions. Personal interviews with these people are best, if possible.

Assessments of demand based on expert outside opinion are particularly appropriate for new products or for existing products when data are scarce or lacking entirely. The development and balancing of different points of view is a desirable feature. It is surprising how accurate considered opinion can be when made by men with years of experience in a given field. This type of forecast can be made relatively quickly and inexpensively.

13.4 Market Testing

Market testing, as the name implies, consists of setting up a small-scale market test in a limited geographical area and under conditions as realistic as possible. Buyers' acceptance of, or response to, the product or service thus may be determined. In

general, the method is more applicable to consumer products than to industrial products.

This technique is especially applicable as one tool to be used in forecasting the market for a new product where historical data are not available and expert opinion may have no background upon which to draw.

13.5 Trend Analysis

Trend analysis by extrapolation is the simplest form of statistical analysis forecasting. However, even this form has several variations which differ in complexity. Trend analysis treats the past and future market of the product in question as a function of time alone without considering any other possible factors influencing past or probable future fluctuations in demand. Since other factors besides time *do* influence demand, this is a weakness of the technique which normally limits its usefulness to short-range forecasts of, say, up to one year.

Less sophisticated techniques employ either of two simple variations in trend analysis which do not necessarily require the plotting of curves. These two variations are most appropriate for conditions of steady growth patterns and short-range forecasts.

- It is assumed (forecast) that the market during the next time period will equal the market during the most recent past period.
- The rate of change in the market between the last two time periods is calculated and the rate of change then is applied to the most recent period to obtain a forecast for the next (future) period.

One way to treat trend analysis is to plot on graph paper the past history of the market against time. The resulting graph or curve should be examined to see whether it falls into the steady, highly volatile, or trend-cycle-season pattern of market growth, as discussed previously. It is a good idea, in fact, to go through this same exercise as a preliminary to any other forecasting technique employed.

The desired objective is to establish a trend line based on the past data and extend this line a reasonable distance into the future. The difficulties are in developing a straight trend line that gives a good "fit" with the plotted market. Some people merely "eyeball" the line.

Another more sophisticated trend analysis is called "least squares." The use of the "least squares" method to fit a trend line to plotted data points is superior to "eyeballing," since mathematical precision is used. Also, additional mathematical tools are in use to smooth out market curves in order to extrapolate and project trend lines, such as "exponential smoothing," which can be described as a weighted moving average in which the heaviest weight is given to the most recent data.

13.6 Correlation Analysis

Correlation analysis goes a step further than trend analysis. It is more objective than any of the techniques discussed previously. Correlation analysis in forecasting attempts to discover and then to measure the direct relationships between the market and other economic time series. In so doing, it provides an estimating equation that permits predictions.

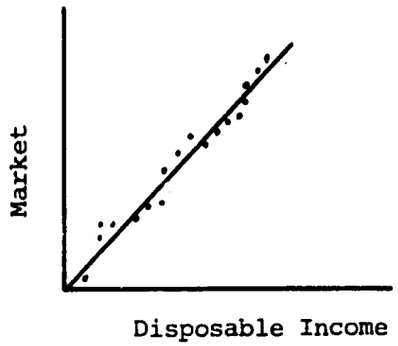
Correlation is well suited to long-range forecasting where emphasis is on trends. It is not as appropriate for short-range work because cyclical or seasonal factors can distort the correlation over a short time span.

If the researcher can discover one or more factors that he strongly believes do influence the product's demand, determine the quantitative relationship between these factors and the product, and then forecast the determinative factor or factors -- he has a tool with which he can forecast the product.

The initial approach to single, linear correlation analysis is to prepare a scatter diagram plotting the market against the determinative factor for each time period in the series. A typical scatter diagram for a condition of high correlation is shown below. The

Figure 2

SCATTER DIAGRAM ILLUSTRATING HIGH CORRELATION



scatter diagram is examined for indications of stability of relationship between the data. If a straight line (regression line) can be drawn such that all of the points are fairly close to it, then a high degree of correlation exists. This appears similar to the trend analysis previously discussed, except that here the comparison is between two sets of data rather than one set of data against time. The farther the points are from the regression line, the poorer the correlation. If the points are widely dispersed or plotted in an irregular fashion, poor or no correlation exists and the factor is rejected from use in the study.

Mathematical approaches to measuring the degree and nature of the relationship also can be used. The equation for measuring the degree of correlation yields "r," which is the coefficient of correlation. The degree of correlation value indicates the extent to which the determinative factor explains the market. The value of "r" will range between plus one and minus one. Any value close to plus or minus one indicates good correlation. Any value near zero indicates poor correlation.

Multiple correlation, or multiple regression, is similar in principle to single correlation. The difference is that market is correlated concurrently with two or more determinative factors.

(15)

Determine Sales Forecast and Prepare Report

15.1 Sales Forecast

A sales forecast is an estimate of what sales are expected to be for the product, given existing economic conditions and competition. There are two general approaches to the forecasting problem. If the product under study involves a new firm or a new product for an existing firm, then the sales forecast for the firm can be obtained, based on the collected data on the total market size and assumptions on what part of this market could be captured.

However, if the project under consideration involves the expansion of an existing firm, then the sales forecast can be built upon a sales analysis study of past history compiled with the forecasted total market.

15.2 Final Report

The levels of effort with respect to budget, time available to conduct the market analysis, and data availability are factors which influence the type of final report presented. Market research reports can vary from very short (6-10 pages) to lengthy studies, depending on the depth of analysis conducted.

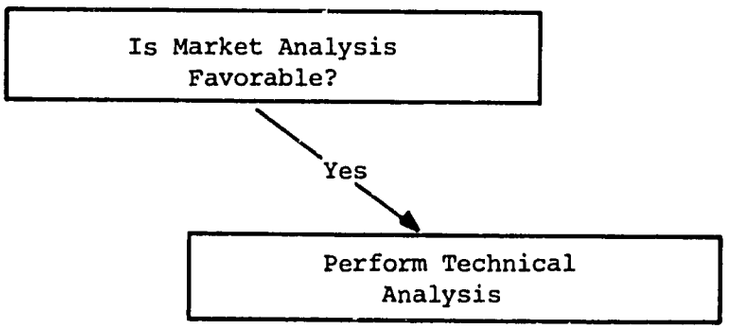
Whatever the length, the market study should cover the following points:

- Statement of objectives -- Clearly state the background of the research project, indicate the problem area being researched, and point out advantages which are expected to materialize from study.
- Explanation of research -- For the benefit of those who are expected to take action based on your report, as well as those who may not be too well versed in marketing research procedures, outline the various steps taken in gathering and interpreting it. Survey forms,

questionnaires, and other tools may be referred to here, but should be placed in the appendix.

- o Findings -- The actual material you have gathered should be presented skillfully without bias of word. Be thoroughly objective and accurate. Edit the findings until you feel sure that you are presenting the pertinent facts as they were found.
- o Conclusions -- This should contain a brief summary of the most significant conclusions for which you have built up supporting evidence in your findings.
- o Appendix -- The exhibits, such as survey forms, together with charts and statistical tables, belong in the appendix, marked for easy reference.

(16 & 17)



A decision can be made at this stage as to whether the remainder of the project analysis should be conducted. If the market study reveals an inadequate demand for the product or other characteristics of the market which would severely hamper the product's chances of success, then the feasibility analysis can be terminated.

Attachment A
PRICING POLICY

The "margin of profit" formula

How to price for maximum profits

Want to take the gamble out of pricing? Then get out of the game of "follow the leader" that your competitors are probably playing. Here's a pricing method that will beam your operations to optimum production, optimum sales—and maximum profit. Key to the formula: exclude fixed costs.

by Jules E. Anderson
Anderson & Gassenheimer, New York

If your profits are slipping, the odds are that pricing is the crux of your problem.

A recent survey by the National Industrial Conference Board reveals that only four out of 155 leading manufacturers follow clear-cut, written procedures in setting prices. And many companies that adhere to a formalized pricing pattern use faulty formulas that do not present a true cost picture. Unless prices are based on true costs, pricing often becomes a businessman's version of the numbers game. If he's lucky, he makes adequate profits. Frequently, though, he's unlucky. For without a knowledge of true costs, every management decision is a wild gamble.

As a case in point let's consider the International Hand Drill Co., a hypothetical firm but typical of many that are in business. Founded just before World War II, the company had always produced to capacity. And it sold every drill it made. The selling price was determined as follows:

Costs per month:	
Materials	$ 9,000
Labor	1,000
Selling and marketing (figured at 8% of materials and labor)	800
Overhead (rent, depreciation, salaried employees, etc.)	3,000
Total costs	$13,800
Expected profit (figured at 20% of costs)	2,760
Estimated income	$16,560

Division of the estimated income by the 1,000 units produced each month came to $16.56 a unit, the factory price of an International hand drill.

As long as profits stayed at a consistently high level, International was well satisfied with its formula. But when profits began to dip seriously, the firm's president called in a pricing specialist.

The pricing specialist pointed out that the measure of a pricing method is its ability to determine the optimum selling price—the price that will realize the greatest amount of total dollars over and above those required to replace the goods sold during an operating period. Then he explained that, under the International Hand Drill Co.'s formula of pricing, this goal was unattainable.

First of all, the pricing specialist said, International's formula included overhead as a cost in determining price.

To the president's objections that overhead has to be paid for somewhere along the line, the specialist agreed. Overhead *is* a cost incurred in running a business. It *isn't*, however, a cost in producing a product.

"Put it like this," said the consultant. "Suppose International decided tomorrow to stop producing hand drills. Remember, the company *is* still in business. The salaried employees still come to work every day. The building still depreciates. The cost of running a business continues. But, by manage-

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ment decision, production of hand drills stops. Now, what will you charge overhead to?"

The president decided it would have to be paid for out of profits.

"Exactly. Overhead comes out of profits. In setting up a pricing formula, the total margin of profit, which is the unit margin of profit times volume, has to be enough to cover your overhead. But, you determine your margin of profit before you deduct overhead. The only costs that can be considered in determining price are the costs of producing the product."

Margin of profit concept

The pricing specialist recommended that International base its pricing formula on the margin of profit concept, which he described as follows. MP (the Margin of Profit) applies the principle of direct costing to pricing, taking into account the interrelationships of cost, volume and profit. It specifically distinguishes between variable costs and fixed costs. In determining the true cost of a product—and the cost on which price must be based—only variable costs are considered. Margin of profit is the difference between the net realization (selling price less direct sales variables—discounts, commissions, provision for bad debt, etc.) and the total variable costs (material, direct labor and similar costs) applicable to the products sold.

The breakeven point, which is a much used and little understood business term, occurs when the total margin of profit equals the total fixed costs. If the MP exceeds fixed costs, the business operates at a profit. If the MP is less than fixed costs, it operates at a loss. Single products or a product line in multi-product or multi-division companies do not have individual breakeven points. However, their sale is either a profit contribution or an out-of-pocket loss.

Pricing formula

The president, under the guidance of the pricing specialist, set up a new pricing formula, as shown in *Figure 1*.

Proposed unit selling prices	**$18.00**	**$16.00**	**$15.00**	**$14.00**
Direct variable selling costs—				
Sales commission 3.5%				
Cash discount 2.0				
Provision for bad debts .5				
Total 6.0%	**1.08**	**.96**	**.90**	**.84**
Freight-delivery	**.50**	**.50**	**.50**	**.50**
Direct variable replacement cost (labor, materials, other variables)	**7.00**	**7.00**	**7.00**	**7.00**
Total direct variable costs	**$ 8.58**	**$ 8.46**	**$ 8.40**	**$ 8.34**
Margin of profit per unit	**$ 9.42**	**$ 7.54**	**$ 6.60**	**$ 5.66**
Estimated sales volume	**400 units**	**600 units**	**800 units**	**900 units**
Total Margin of profit dollars	**$3,768**	**$4,524**	**$5,280**	**$5,094**
Fixed costs at 100% capacity	**$3,000**	**$3,000**	**$3,000**	**$3,000**
Operating profits	**$ 768**	**$1,524**	**$2,280**	**$2,094**

Figure 1

In estimating the potential sales volume at each suggested price, the president draws on past history and current marketing facts, including the firm's competitive position and competitive pricing.

Now the president has the pricing arithmetic on which to base his decision as to production and price. Assuming that 100% capacity is 1,000 units and that the overhead is $3,000 when the plant operates at capacity, what calculations does the president make to arrive at his price decision?

First, he looks at the possibilities offered by the plant's idle capacity. Assuming that 1,000 units can be produced at a fixed cost of $3,000, there is an idle capacity of 200 units when the product sells at $15. This idle capacity represents a margin of profit of $6.60 a unit, a total of $1,320. The president must decide if this margin of profit can be realized in whole or in part by producing the additional 200 units and 1) offering them at a special price, 2) using the potential added profit as the basis of special inducements to the sales force, 3) using it for additional advertising or sales promotion expenditures.

Then the president examines fixed costs to see if they can be reduced. Although 800 units sold at $15 a unit yield the greatest operating profit—$2,280—the plant has unused capacity. If fixed costs can be reduced by renting or selling idle production areas or in some other way that is not disadvantageous to the over-all profit picture.

the possibility should be considered.

Finally, it may be to the firm's advantage to produce only 600 units, with a resultant reduction of fixed costs, to be sold at $16 a unit. The president uses this pricing arithmetic to help him arrive at a decision:

800 units sold at $15 each = $5,280 margin of profit dollars.
600 units sold at $16 each = $4,524 margin of profit dollars.

The sale of 800 units at a lower price yields $756 additional MP dollars. However, if fixed costs can be reduced by more than $756 when production is limited to 600 units, greater profits would result. So the president works out how fixed costs can be reduced by $1,000. If this can be done, 600 units sold at $16 each will have a profit advantage of $244 over 800 units sold at $15 each.

To be on absolutely safe ground the president must now determine how many units must be sold at $16 each to make an operating profit of $2,280, equal to the amount earned when 800 units are sold at $15 each. The operating profit is the margin of profit minus overhead. So the marketing director uses this pricing arithmetic:

Operating profit required	$2,280
Fixed costs (600 units)	2,000
Total margin of profit	$4,280

The total margin of profit divided by the margin of profit per unit ($7.54) equals 567.6 units. This is the number that must be sold at $16 to equal the operating profit made when the selling price is $15.

Now the president knows that, if sales drop only 29% or less, even though the price is raised, his margin of profit will remain favorable. If sales volume drops more than 29%, he'll be better off to sell 800 units at $15.

Horizontal and vertical costs

From the foregoing, it is apparent that to determine the optimum selling price of a product, the president must know how to use fixed and variable costs before he can apply these simple but accurate arithmetical pricing formulas.

Many businesses today not only do not know how to use fixed and variable costs, but actually use cost figures that are inaccurate by as much as 20 to 30%. The problem is not that their adding machines are faulty, or even that their sources of information are necessarily erroneous. The problem is simply that too many business executives use figures which conceal rather than reveal the true costs of production and of maintaining a business.

Basic to this misunderstanding is a failure to realize that there are two kinds of expense dollars, and that they behave differently and must be treated differently. There are horizontal expense dollars, or fixed costs, and vertical expense dollars, or variable costs—*but only vertical dollars should be included in determining prices.* Here's why:

Horizontal dollars are expended with the passage of time, regardless of production output. Horizontal dollars pay for such fixed costs as salaries, depreciation, rent, maintenance, insurance, taxes.

Horizontal or fixed costs are contracted by management decision in terms of dollars per period of time. They can be increased by management decision, or they can be decreased. Property can be bought or sold, rented or leased out. Salaried employees can be hired, compensation increased. Fixed costs do not vary with production or sales volume, and they are not a part of the product in terms of material or direct production labor.

On the other hand, vertical dollars are those that increase or decrease in direct ratio to the number of units produced. They are not controlled by management decision. They are independent of passage of time, and are dependent on sales volume. The value of vertical dollars represented by the manufactured product remains as an asset until the product is sold or scrapped.

Examples of variable costs which are paid for by vertical dollars are raw materials including freight-in expenses, direct production labor, packaging and freight-out of finished products, royalties and all other direct expenses that would not exist without production.

As shown earlier in the margin of profit concept pricing formula, overhead is a cost incurred in running a business, but it is not a cost incurred in producing a product. For this reason, horizontal dollars expended on overhead should not be included in making pricing decisions. Prices must be based on vertical dollars only. To mix these two kinds of expense dollars is misleading, and is frequently disastrous.

Replacement costs

Once a company recognizes that only vertical dollars should be included in working up costs for pricing purposes, the next step is to understand that vertical replacement dollars—or the vertical costs of replacing the product being priced—are the ones on which to base a pricing decision. Knowledge of what it

Figure 2

	Company A	Company B
January Sales	$ 9,000	None
February Sales	12,000	$12,000
Total Two-Month Sales	$21,000	$12,000
Cost of Product—January	$ 7,000	$ 7,000
February	10,000	None
Total Cost of Product	$17,000	$ 7,000
Margin of Profit	$ 4,000	$ 5,000
Fixed Costs—Two Months	2,000	2,000
Operating Profits	$ 2,000	$ 3,000

will cost a company to produce the product at today's—or better still, tomorrow's—replacement cost provides the most effective insurance of profitable operations in times of fluctuating costs. This is especially true in industries where there are frequent cost fluctuations, as in those using many raw materials. The following case history shows what happens when one company bases its prices on standard costs (that is, what the product cost them to produce), and its competitor uses replacement costs as a pricing base.

Company A and Company B each sell a processed food. On January 1 each had an inventory of 1,000 units, produced at a cost of $7 a unit. Fixed expenses for each are $1,000 a month.

In January Company A sells its inventory at $9 a unit. Meanwhile the replacement cost has risen to $10 a unit.

Company B, recognizing that replacement costs are rising higher than the current selling price, cannot compete at $9 a unit without violating its replacement cost pricing policy. Consequently it makes no sales.

At the end of the second month, both companies sell their inventories at $12 a unit. Comparative statements for the two-month period are shown in *Figure 2*.

Replacement cost is frequently a prediction of what costs will be, rather than an actuality. Consequently the judgment of the decision-making executive must determine whether replacement costs will rise, drop or remain the same.

MP as measuring device

Management must continually engage in making decisions that affect the profitability of the enterprise. The margin of profit concept is an accurate measuring device to determine potential profit effects of these decisions and their relationship to the breakeven point.

With every management decision on production and prices, the decision-making executive must ask himself: *What does this do to the breakeven point? What price will give us the greatest margin of profit? What sales volume will return the greatest operating profit? Will this be sufficient to cover contemplated expenditures, buy new machinery, contract for new buildings needed?*

If the decision-making executive believes that added expenditures will result in substantially increased sales volume, with a comparable increase in total margin of profit, his decision will probably be yes. However, if he believes that the required sales goal is out of reach, his decision is likely to be negative.

For example, consider this situation. The marketing director of a farm equipment company is considering adding two men to the company's sales force and increasing advertising expenditures. These new costs would amount to $7,000 a month. The increase in unit sales per month might be as high as 50% or as low as 10%. The company now sells 5,000 units a month at a margin of profit per unit of $11.06, or a total margin of profit of $55,300.

Knowing these facts, the marketing director can calculate that the proposed expenditure will produce an additional margin of profit in the amount of $5,530 to $27,650 ($11.06 x 500 to 2500 units).

An increased sales volume of 12.66% (633 units x $11.06) will recover the additional expenditure of $7,000 a month. Knowing this, the marketing director's decision becomes a calculated risk, rather than a gamble. If the chances to reach the sales goal are good, he goes ahead with his plan to increase his sales force and his advertising. If the chances are bad, he sits tight and waits for a more favorable time.

Results of mis-pricing

Mis-pricing, because true costs are not known or because pricing arithmetic is not properly used, frequently results in the loss of profits. A subsidiary of a multi-divisional company had never shown a profit in all the years of its existence. The subsidiary continued manufacturing only because its product was in an experimental field for which the parent company had high hopes for future profits.

The situation became a crisis, however, when the subsidiary's most important customer decided to manufacture the product rather than buy it from other sources.

Study by a pricing expert revealed that the subsidiary had included horizontal costs (overhead, salaries) in its price. This added 20% to the cost of every unit and priced it out of competition. At the consultant's recommendation, the subsidiary set up a sound pricing policy, basing price solely on replacement costs. The price was lowered from $10 to $8 a unit, and its once-lost customer decided to resume buying components rather than manufacture them.

Pricing flexibility

Knowledge of true costs and the use of the margin of profit concept gives management a pricing flexibility that results in maximum profits. For this reason, facts should always be made known to the sales manager, and frequently pertinent cost information should be made available to sales personnel in the field.

For instance, in the profit plan of a food product manufacturer, one large customer represented 18% of the margin of profit forecast for the quarter. The offering price of the product was $1.20 a pound for a 50,000 pound lot. Replacement cost was $1 a pound; delivery, one cent a pound; and brokerage fee, 3% of the selling price. If sold at this price the margin of profit would be $7,700.

The customer, however, balked at the $1.20 a pound price. He offered to pay $1.18, which would yield a margin of profit of $6,730. If no sale were made, no profit would result.

The sales manager, knowing true costs and the margin of profit concept, offered the customer 100,000 pounds at $1.16 a pound. Because of the size of the commission, he was able to persuade the broker to take 2% instead of his usual 3 %. The sale was concluded and the firm made a margin of profit of $12,678, after paying the broker's fee of $2,320.

Other factors

In obtaining facts about true costs and in setting the price that will bring the greatest margin of profit, the marketing executive should consult with other members of the management team before he makes his decision. For instance, what is the advertising situation? How much should be spent? How much

will be spent? Should advertising expenses be budgeted for the entire year, and thus be considered a horizontal cost or should they be variable and rise or fall with sales volume?

What is the labor situation? Is a union contract up for renewal? What will that do to production costs?

What is the sales picture? If we increase volume, can we sell the additional units? At present prices?

Ultimately one man has to determine the selling price—whether he is the company president, the marketing executive, the sales manager, treasurer, or another member of the management team. But the facts on which he must base his decision have to come from many segments of the operation.

Under any business conditions, sound pricing policies are the key to optimum profits. Yet many companies are content to play "follow the leader," letting their competitor's pricing action be the decisive factor in their own policies.

Although in boom times this method obviously can yield profits —the post-World War II business history is proof of that—it does not yield the greatest profits possible.

And, during periods of recession or depression, sound pricing policies are essential. For it is then that they can spell the difference between business success or business failure. The companies that not only weather adverse business conditions, but grow and prosper, are the companies whose pricing policies are based on facts used decisively and with understanding. ■

TECHNICAL ANALYSIS

From the viewpoint of the entrepreneur, the technical analysis serves to establish whether or not the project is technically feasible and provides a basis for cost estimating. Equally important, it provides an opportunity for consideration of the effect of various technical alternatives on employment, ecology, infrastructure demands, support of other industries, balance of payments, etc. Undoubtedly, this study is vital to the final decision to carry out the project or abandon it.

Purposes

The purposes of the technical analysis are: (1) to provide assurance that the project is technically feasible (i.e., that there are no technical considerations which would prevent success) and (2) to make tentative choices among technical alternatives so that the following cost estimates can be made:

- o Fixed investment costs
- o Manufacturing costs and expenses
- o Selling and distribution expenses
- o General and administrative expenses
- o Working capital
- o Start-up costs
- o Venture initiation costs

In order to accomplish these purposes, the technical analysis must attempt to answer these questions:

(1) What are the feasible technological alternatives available to produce the product?

(2) What are the social and economic side effects of these alternatives?

(3) For each technologically feasible alternative, or for a selected alternative, what are the requirements in men, machines, methods, tools, and materials?

(4) How should the facilities be arranged?

(5) Where should the plant be located?

(6) What are the building requirements?

(7) What are the costs involved?

(R)

Depth of the Technical Analysis

The amount of effort and detail required in the technical analysis depends on the project size, production processes, and desired accuracy of the cost estimates. It is often the case that standard production processes are well established and well known. Technical feasibility is, therefore, a certainty. It may also be that rough cost estimates are available from other firms and that such estimates are entirely adequate. In such cases, there is no need for spending money and effort on a technical analysis. On the other hand, it is possible that economic feasibility is dependent upon process innovation as yet untried and unproven. In these cases, technical feasibility must be established and, depending upon the size of the project, detailed and accurate cost estimates may be needed.

While it is true that the accuracy of technical studies must be related to the purpose for which they are intended, the risks of inadequate studies must be understood. Technical studies provide the basis for cost estimates. Thus, they influence initial estimates of the profitability of an investment during its preliminary stages and the final decision to carry out the project or abandon it.

Mistakes in technical analysis are most often due to inadequate preliminary analysis, the failure to consider alternatives, and the neglect of "secondary" factors.[1/] The inadequacy of technical analyses is also an important source of errors in estimating costs:

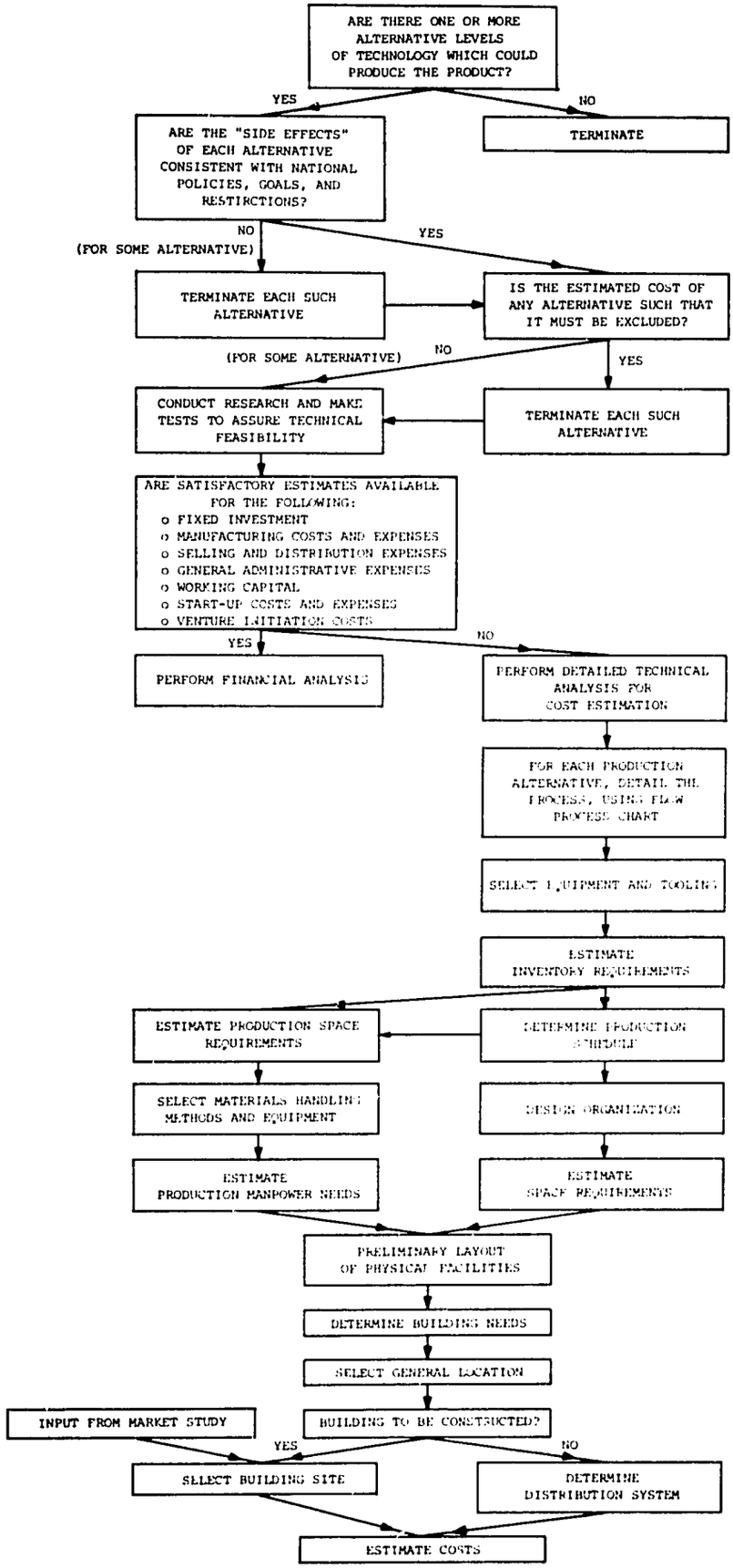
- o Lack of thoroughness may result in excessive start-up costs or an estimated level of output which is unattainable.
- o Underestimation or neglect of "secondary" factors may necessitate additional investment costs.

These notes describe a step-by-step procedure for a detailed technical analysis which will provide an accurate basis for cost estimation. In any particular study, it is likely to be unnecessary to perform all the steps in the detailed manner described. However, it is desirable to present the detailed procedure so that it will be available if needed.

1/ Secondary factors include materials handling, inventories, maintenance, and social facilities for employees. The latter vary from country to country.

Figure 1

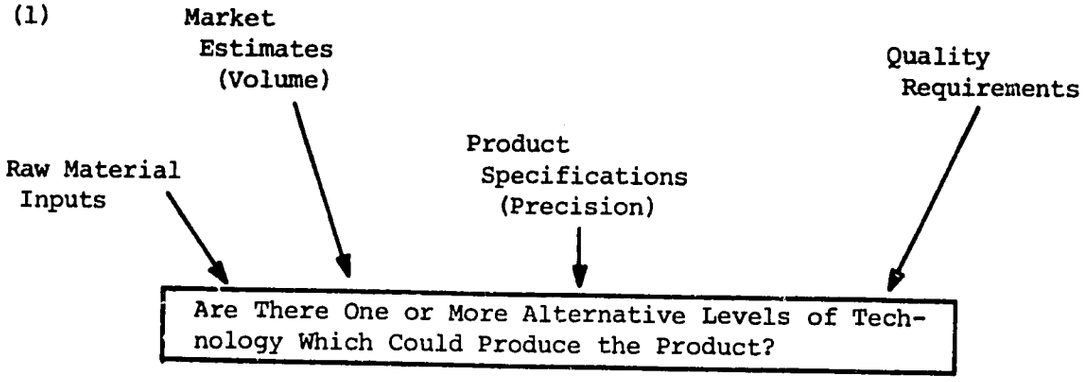
TECHNICAL ANALYSIS FLOW CHART



Steps of the Technical Analysis

The steps of a technical analysis are shown in Figure 1. The individual blocks in the diagram have been numbered and are discussed briefly in the following sections of this outline.

(1)



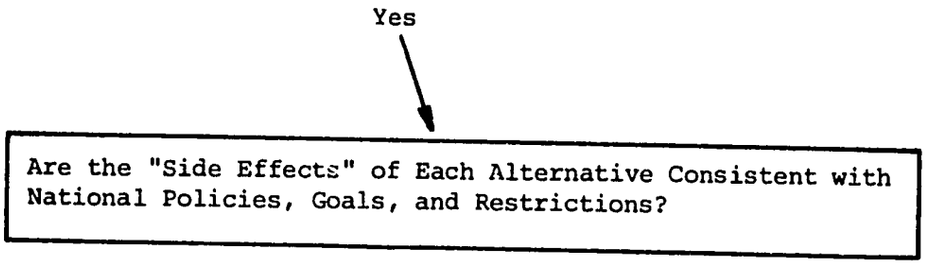
In any specific case, there quite likely will be more than one technological level at which the product can be produced. The alternatives may be basically different processes or may differ only in the degree of mechanization.

At this initial stage in the technical analysis, factors which affect consideration of alternative levels of technology are:

- o Production requirements (output quantity)
- o Product specifications (precision)
- o Process inputs
- o Quality requirements

We are concerned with identifying alternatives which are capable of doing the job!

(2)



This is the first of several steps in the process of eliminating alternatives which are inappropriate for producing the product. Note that the question refers to *alternative processes* and not to the venture itself. Similar questions concerning the venture should have been answered in the initial screening.

Factors to be considered as "side effects" are:

- o Contribution to employment
- o Requirements for scarce skills, expatriots
- o Energy requirements
- o Environmental effects
- o Capital requirements
- o Need for imported equipment
- o Support of indigenous industry effect of capital investment

(3)

Yes

Is the Estimated Cost of Any Alternative Such That It Must Be Excluded?

Even at this early stage, it is possible to examine rough estimates and reject alternatives which are clearly above the cost limits established for the project.

(4)

No

Conduct Research and Make Tests to Assure Technical Feasibility

Examples of research and tests which may be needed are:

- o Laboratory or pilot plant tests of various raw material inputs
- o Research to develop processes or to adapt existing technology

- Tests to verify adequacy of production process performance under local environmental conditions

(5)

Are Satisfactory Estimates Available for the Following?:
o Fixed Investment
o Manufacturing Costs and Expenses
o Selling and Distribution Expenses
o General and Administrative Expenses
o Working Capital
o Start-up Costs and Expenses
o Venture Initiation Costs

These estimates are necessary in the financial analysis when we must (a) determine the projected profitability of the company and (b) perform a cash flow analysis to determine capital requirements.

A detailed discussion of costs and cost estimating procedures will be given in Step 22. At this time, we shall broadly define the above terms:

- Fixed Investment
  The cost of land, buildings, and auxiliary installations, and of equipment and installation.

- Manufacturing Costs and Expenses
  The costs associated with production. These costs are direct material, direct labor, and factory overhead.

- Selling and Distribution Expenses
  The cost of making sales and distributing finished products to customers.

- General and Administrative Expenses
  General expenses of administration such as: management salaries, office salaries, and telephone.

- Working Capital
  Gross working capital includes all assets of the enterprise in current account. As such, gross working capital is part of the

investment in business and must be provided for in financial planning. Lack of adequate working capital is one of the most frequent causes of business failure.

- o Start-up Costs and Expenses

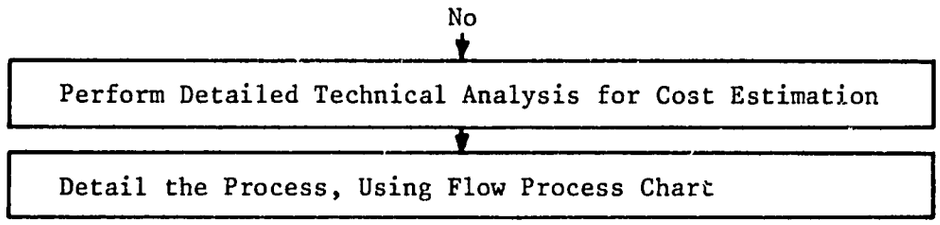
  Costs over and above normal manufacturing costs which may occur during plant start-up. Examples are increased overtime, rework, scrap, and learning costs.

- o Venture Initiation Costs

  Costs related to starting the enterprise. Examples are legal fees, project study, patents, and consultants' fees.

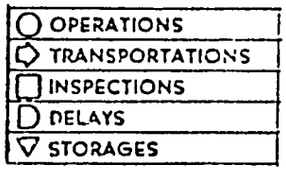
Estimates of these costs and capital needs are required for the financial analysis. If satisfactory estimates can be obtained from competitors, friends, trade sources, government data or elsewhere, they may be used without going through a costly detailed technical analysis. A word of caution is in order, however. Two of the most frequent causes of new venture failure are underestimation of fixed investment costs and failure to allow for working capital. If rough estimates are used for the financial analysis, they should be used with conservatism. In most cases, a detailed technical analysis should be made in order to estimate costs and capital needs more accurately.

(6 & 7)



The flow process chart is used in breaking down and analyzing individual operations in detail (see Attachment A).

7.1 Explanation of Symbols



7.2 Uses of the Flow Process Chart

- o Process operations planning
- o Materials handling
- o In-process inventories
- o Inspection

(8)

Select Equipment and Tooling for Each Operation

Some "do's" and "don'ts" for equipment selection:

- o Don't transfer methods and technology directly from another environment without modification.
- o Do consider the following factors which may affect the choice of equipment and tooling:
  - (a) Output capacity
  - (b) Output quality
  - (c) Labor requirements (quantity and skill)
  - (d) Power, air, water, gas, or other support requirement
  - (e) Reliability
  - (f) Maintainability
    - Availability of repair parts
    - Skill needed to repair
  - (g) Input material requirements
  - (h) Materials-handling requirements
  - (i) Set-up
  - (j) Installation and reinstallation expense
  - (k) Imported or indigenous equipment
  - (l) Life expectancy and salvage value
  - (m) Obsolescence risk
  - (n) Noxious by-products of operation
  - (o) Convenience and simplicity of use
- o Do consider the "side effects" mentioned in Step 2.
- o Do consider all alternatives and make the decision only after a sound engineering economic analysis.

(a) Cost factors for engineering economic analysis

- Investment
  - Purchase price
  - Installation costs (footings, etc.)
  - Transportation costs
  - Tests and "debugging" costs
- Expected life and salvage value
- Equipment operating costs
  - Labor
  - Power and utilities
  - Supplies
  - Scrap and rework
- Maintenance costs
  - Labor
  - Costs of parts
  - Value of downtime

(b) Comparison bases (See Attachment C)

- Present value of cash flow
- Payout period
- Return on investment

(9)

Estimate Inventory Requirements

9.1 Purpose of Inventory

Inventories absorb the shocks of fluctuating demand. They serve to decouple operations and demand-supply functions. The use of an inventory is necessary if delays in filling demands are to be avoided.

9.2 Types of Inventories

- o Raw material and components
- o Work in process
- o Finished goods
- o Supplies

(10)

Determine Production Schedule

Factors which affect the production schedule:

- o Demand variability (e.g., seasonality)
- o Inventory requirements

(11)

Estimate Production Space Requirements

11.1 Computed Estimates (see Attachment A)

Using process flow chart, compute the "total square meters per operation." Include the following areas:

- o Machine
- o Auxiliary equipment (benches, etc.)
- o Operator space
- o Material space

Multiply this subtotal by 150% to obtain an estimated area for each machine (this provides for spacing, aisles, etc.). Then multiply by the number of machines to get the number of square meters per operation.

11.2 "Guesstimates"

For a typical machine shop, a figure of 10-15 square meters per machine is an adequate estimate. Similar estimates can be made for other types of plants.

(12)

Select Materials-Handling Methods and Equipment

12.1 Factors to Consider in Selection of Materials-Handling Equipment

- o Use enough equipment to correlate materials handling with production requirements.

- o Use equipment which cannot damage parts being handled.
- o Design equipment to carry materials in a position to save space, and handling.
- o Use equipment which does not require fixed floor space.
- o Install only safe equipment.
- o Wherever possible, use gravity for material movement.
- o When loading or unloading time is a factor, use equipment in which power unit can be separated from load unit.
- o Plan to keep equipment operating as much of the time as practical.
- o Use adjustable conveyor drives to provide for flexibility changing production schedules.
- o Use standard equipment rather than special design equipment.
- o Provide alternative handling methods in case of breakdown.
- o Consider all characteristics of the move before selecting equipment.
- o Do not exceed equipment capacity.
- o Do not overmechanize.
- o Install materials-handling equipment which is flexible and can serve a variety of uses or applications.
- o Increase flexibility by means of accessories and attachments.
- o Remember unit handling cost is reduced as the number of pieces handled at one time is increased.
- o Select equipment on the basis of overall cost, not first cost.
- o Maintain the lowest possible ratio of equipment investment to units of materials handled.

12.2 Types of Equipment

Prof. James Apple categorizes and lists the following types of handling equipment (Ref. 5-1)

Apron	Belt
Arm	Bucket
Car-type	Roller
Chain	Screw
Chute	Slat
Flight	Suspended tray
Monorail	Tow
Pneumatic	Trolley

Power and free	Wheel
Pusher bar	

o Equipment for handling over a fixed area

Bridge crane	Jib crane
Gantry crane	Stacker crane
Hoist	

o Vehicles for handling over a variable path

Dolly	Narrow aisle truck
Crane truck	Platform truck
Forklift truck	Portable elevator
Handlift truck	Side-loading truck
Industrial tractor	Straddle carrier
Mechanical table	Platform hand truck

o Containers and supports

Pallets	Shop box
Pallet box	Skid
Racks and supports	Skid box
Shipping container	

(13)

Determine Production Manpower Needs

o Estimate production manpower needs, using flow process chart.
  (a) Number of employees
  (b) Skills

(14)

Design Organization

o Estimate staff and supervisory personnel needs.
o Principles of organization.

(15)

Estimate Space Requirements

- **Allow working space for all staff and supervisory personnel.**

(16)

Preliminary Layout of Physical Facilities

(See Guideline No. 8.)

- Use information from previous steps to determine space requirements for operational, service, and auxiliary activities.
- Establish activity interrelationships.
- Construct preliminary layout.
- Construct flow diagram to assure that work flow is smooth and efficient.

(17)

Determine Building Needs

- Determine the type and size of building structure needed to house all activities.

(18)

Select General Location

18.1 Factors to Be Considered in the Selection of a Broad Geographic Area

- Raw material factors
  - (a) Availability
  - (b) Price
  - (c) Terms of sale
  - (d) Transportation costs

o Market factors

(a) Competition

(b) Transportation costs and availability

8.2 Factors to Be Considered for Various Locations Within the Selected Area

o Labor

(a) Labor cost

-Variation in wage rates

-Living cost

Cost of food, clothing, housing, water, etc.
Relationship between above costs and wage

-Wage rates in similar business

(b) Labor stability

-Past history of labor turnover

-Strength of unions

(c) Availability

-Skilled workers

-Unskilled workers

(d) Productivity

(e) Labor laws (state)

-Regulations

Labor unions

Collective-bargaining agreements

Unfair employment practices

Anti-injunction laws

- Minimum wage orders (wage controls)

(f) Workmen's compensation insurance laws

(g) Unemployment tax

From past studies, it has been found that, "Where labor has been the primary factor in locating new plants, more emphasis has been placed on availability and on labor attitudes than on wage rates."

o Power

(a) Type of service

- Hydroelectric
- Steam
- Other

(b) Reliability of service, history of stoppages

(c) Adequacy of supply, seasonal restrictions

(d) Characteristics

- Phase
- Cycle
- Voltage

(e) Rates

(f) Availability of off-peak contracts

(g) Fuel adjustments

(h) Discounts and penalties

o Fuel cost and availability

o Water supply

(a) Available sources

(b) Capacity

(c) Size of piping

(d) Costs

(e) Drainage facilities

(f) Contaminants in water supply

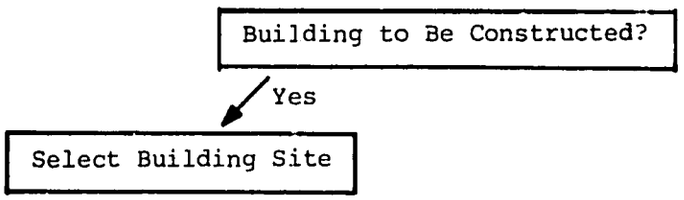
o Taxes

(a) State

(b) Local

o Local government regulations

(19 & 20)



o Availability of sites

(a) Check with real estate agencies

(b) Check with Chamber of Commerce

(c) Other

o Prepare a list of general specifications

o Check topographic maps

- o Soil analysis
- o Analysis of other factors
  - (a) Power
  - (b) Fuel
  - (c) Transportation
  - (d) Sewage
  - (e) Other

(See Attachment B.)

(21)

Determine Preliminary Distribution Requirements

21.1 Method of Distribution

- o Direct shipments to customers
- o Wholesale to distributors or other middlemen

21.2 Sales Method

- o Salesman in field
- o Sales representative
- o No sales force

21.3 Physical Distribution System

- o Transportation
  - (a) Public
  - (b) Owned
  - (c) Leased
- o Warehouse requirements
- o Packaging requirements

(22)

Estimate Costs

According to the OECD Manual of Industrial Project Analysis, mistakes in technical studies most often result from inadequate preliminary analysis, failure to consider all of the alternatives, and the neglect of "secondary" factors. These inadequacies are likely to lead to important errors in estimating costs:

- o The lack of thoroughness in initial analysis may result in costly "trials and errors" when the plant begins production and/or failure to reach planned output levels.
- o The underestimation of "secondary" factors involving a large increase in investment may lead to the necessity of abandoning the project.

Aside from problems caused by inadequate technical analysis, there are other important sources of error. These are:

- o Estimates of investment costs too low.
- o Failure to allow for adequate working capital.
- o Overoptimistic estimates of start-up costs and losses.
- o No allowance for future cost trends.

A checklist of costs and expenses which must be considered is given below:

22.1 Manufacturing Costs and Expenses

- o Direct material
- o Direct labor
- o Factory overhead (manufacturing expense)

(a) Expense labor

- Inspection and quality control
- Supervision
- Shipping and receiving
- Materials handling
- Maintenance
- Clerical
- Sorting and repair (product)
- Tool room or tool crib

- Packaging
- Janitorial
- Staff salaries

(b) Other manufacturing costs

- Maintenance and repair parts
- Fuels
- Power
- Water
- Packaging material
- Office supplies in shop
- Janitorial supplies
- Indirect product material (e.g., paint, glue)
- Rent
- Security
- Taxes
- Fringe benefits to employees
- Depreciation
- Training
- In-process inventory carrying charges
- Insurance
- Scrap
- Telephone
- Obsolete material
- Depreciation

22.2 <u>Selling and Distribution Expenses</u>

o Selling

(a) Salesmen's salaries

(b) Commissions

(c) Advertising

(d) Promotions

(e) Clerical salaries

(f) Credit checks

o Distribution

(a) Transportation

(b) Warehousing

(c) Finished goods inventory charges

(d) Shrinkage

22.3 General Administrative Expenses

(a) Management salaries

(b) General office

(c) Health

(d) Publications

(e) Postage

(f) Telephone

(g) Travel and Entertainment

(h) Maintenance of grounds

(i) Company automobile

(j) Office supplies

(k) Research and development

(l) Donations

(m) Product design

(n) Taxes and insurance

(o) Interest

The following costs are needed for estimating total capital requirements:

22.4 Fixed Investment Costs

(a) Land

(b) Buildings

(c) Other construction

(d) Production equipment (including installation)

(e) Materials-handling equipment

(f) Electrical supply

(g) Plumbing

(h) Air supply to pneumatic tools

(i) Safety and security systems

(j) Furniture and fixtures

(k) Office machines

(l) Vehicles

22.5 Working Capital

(a) Cash

(b) Raw material inventories

(c) In-process inventories

(d) Finished goods inventories

(e) Accounts receivable

(f) Expendable supplies

(g) Prepaid expenses

- Fuel and gas
- Power
- Water
- Sales expense
- Insurance
- Repairs and maintenance parts
- General office expenses and supplies
- Fees (legal, consulting, etc.)
- Rents

(Comment: Cash requirements at start-up will be greater than during normal operation because payrolls and other expenses must be met before income is received.)

22.6 Costs Related to Start-up

(a) Training costs

(b) Rework

(c) Overtime

(d) Scrap

(e) Equipment debugging

(f) Extra costs resulting from inefficiencies and delays

(g) Initial sales costs

(h) Printing and advertising

(i) Consultants' fees

(j) Travel

(Comment: Manufacturing costs at start-up are likely to be 33%-50% higher than normal.)

22.7 Venture Initiation Costs

(a) Costs of forming the company

(b) Initial investigations

(c) Marketing study

(d) Legal fees

(e) Research and technical studies

(f) Consultants' fees

(g) Expenses of obtaining financing

(h) Patenst

Attachment A

THE USE OF FLOW PROCESS CHARTS IN FEASIBILITY ANALYSIS

The Flow Process Chart provides a means to graphically portray the sequence of operations, transportations, inspections, delays, and storages which make up a production process. It is useful in

- o Planning and analyzing the flow of materials
- o Analyzing the sequence of production operations
- o Planning for equipment, manpower, and space requirements

The last of these uses is the one most relevant to the feasibility analysis of industrial projects.

The construction of the flow process chart requires a thorough step-by-step knowledge of the production process -- including all operations, the sequence in which they are to be performed, and the inspection required. This information is easily displayed on a special form which also facilitates analysis of equipment and manpower needs. The symbols used in the chart, and their meanings, are as follows:

Operation. An operation occurs when an object is intentionally changed in any of its physical or chemical characteristics, is assembled or disassembled from another object, or is arranged for another operation, transportation, inspection, or storage. An operation also occurs when information is given or received or when planning or calculating takes place.

Transportation. A transportation occurs when an object is moved from one place to another, except when such movements are a part of the operation or are caused by the operator at the work station during an operation or an inspection.

Inspection. An inspection occurs when an object is examined for identification or is verified for quality or quantity in any of its characteristics.

Delay. A delay occurs to an object when conditions, except those which intentionally change the physical or chemical characteristics of the object, do not permit or require immediate performance of the next planned action.

Storage. A storage occurs when an object is kept and protected against unauthorized removal.

Combined Activity. When it is desired to show activities performed either concurrently or by the same operator at the same work station, the symbols for those activities are combined, as shown by the circle placed within the square to represent a combined operation and inspection.

A sample form is shown in Figure 1.

Figure 1

FLOW PROCESS CHART

PART NAME _____

PROCESS DESCRIPTION _____

DEPARTMENT _____

PLANT _____

RECORDED BY _____ DATE _____

SUMMARY	
	NO.
○ OPERATIONS	
⇨ TRANSPORTATIONS	
□ INSPECTIONS	
D DELAYS	
▽ STORAGES	
TOTAL STEPS	
DISTANCE TRAVELED	

STEP	Operations Transport Inspect Delay Storage	DESCRIPTION OF _____ METHOD				
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
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	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					
	○⇨□D▽					

The procedure for making a Flow Process Chart is as follows:

(1) Fill in the heading to properly identify the process.

(2) In the first column, on the first line, enter the step number.

(3) Decide whether the first step is an operation, transportation, inspection, or storage and insert a small number 1 *inside* the symbol (each *type* of symbol is numbered consecutively.)

(4) Proceed through the process step by step until a logical desired end point is reached. In identifying steps and selecting symbols, follow the *product* as it flows through the process. Generally speaking, a transportation step is required between operations unless they are performed at the same work station. Also, a delay (temporary storage) usually precedes an operation. It is important that *all steps* be included.

Further steps depend upon the purpose for which the chart is used. These include:

- o Production equipment planning
- o Materials-handling equipment planning
- o Manpower planning
- o In-process inventory planning
- o Space requirements planning

Production Equipment Planning

For each operation, list the alternatives in methods and equipment to perform that operation. Also consider the possibility of grouping several operations which offer the possibility of being more economically performed if they are done at the same work station. Next, make an economic evaluation of these alternatives and select the best alternative for the operation or group of operations. In the "description" column, briefly specify the equipment and special tools selected for the operation. In Column 4, list the unit cost of the equipment, including special installation costs and any other "one-time" costs which should be included as capital equipment costs. Next, list the costs of tooling in Column 5. Column 6 is used to record the output capacity, i.e., units per hour or per shift. Output capacity can be obtained from the manufacturer. However, the manufacturer's rating usually represents *maximum* output under ideal conditions at 100% machine efficiency. Under normal operating conditions, output is likely to be about 90% of rated capacity. Next,

(1) STEP	(2)	(3) DESCRIPTION	(4) Equipment Cost	(5) Tooling Costs	(6) Output Capacity	(7) Number Required
	① ⇨ □ D ▽	Gisholt Lathe 12K10	12,000	2500	400	2
	○ ⇨ □ D ▽					

obtain the number of machines needed by dividing total production requirements for the operation by the estimated output capacity for one machine and use the next highest whole number. For example, if the production requirements are 200 units per day (one shift) and one machine can produce 125 per day, two machines would be required.

The total equipment costs for operation one can now be calculated by multiplying the number of machines times the unit equipment costs. Tooling costs can be obtained by multiplying the number of machines times the tooling costs for each machine or work station.

Materials-Handling Equipment Planning

Since all material and product moves are shown on the flow process chart, it is an easy matter to use the chart as an aid in estimating handling eequipment and labor costs. For each move, consider the weight and physical characteristics of the material to be moved and the estimated distance of the move. Based upon these considerations, make a preliminary choice of handling method, (e.g., hand, hand truck, roller conveyor, forklift truck) and enter the description of material moved and handling method in Column 3. In Column 4, estimate

(1) STEP	(2)	(3) DESCRIPTION	(4) Distance Moved	(5) No. of Men Involved	(6) Pieces Handled	(7) Time Required per Move
	○ ① ⇨ □ D ▽	Hand truck	25 m	1	1	3 min
	○ ⇨ □ D ▽					

the distance moved and in Column 5 the number of pieces handled. In Column 6, record an estimate of the time required, and in Column 7, the number of men required if the handling method requires a worker.

When these estimates have been made for each move, summarize the time required for the use of each type of movable handling equipment in order to determine the number needed. For example if a hand truck is to be used for a total of 14 hours per day, two would be needed, on a one-shift operation. The requirements for fixed path equipment, such as roller conveyor, also can be obtained from the chart. Simply note the moves for which such equipment is to be used and the estimated distances. Having obtained these equipment estimates, the next step is to obtain cost estimates from equipment vendors.

Manpower Planning

The questions which must be answered concerning production manpower needs are:

- o How many employees are needed?
- o What skills must these employees possess?

The flow process chart is useful in answering these questions with regard to direct production manpower and materials-handling manpower.

Materials-handling labor can be estimated using the flow process chart which was used to estimate handling equipment needs.

For example, suppose a hand truck will be used to move castings from storage to the first machining operation and that production is 20 units per day (three hours). It was previously estimated that one man would be involved and that the move would take three minutes. The total man-hours per day is obtained as follows:

$$\text{Total man-hours per day} = \frac{(\text{No. of men})}{(\text{ involved })} \times \frac{(\text{Production per day})}{(\text{ pieces handled })} \times \frac{(\text{Time required per move})}{(\quad 60 \quad)}$$

$$= (1) \times \frac{(20)}{(1)} \times \frac{(3)}{(60)}$$

$$= 1 \text{ hour}$$

The total work load is obtained by performing these calculations for each move and summing the results. Dividing by the number of work hours in the day will provide an estimate of manpower needs. It should be noted that this estimate will be only approximate. We have not considered the possibility that some

materials-handling tasks could be performed by production operators without reducing their output (e.g., during machining time), and we have assumed 100% efficient utilization of labor. In spite of these deficiencies, the estimate should be adequate for purposes of cost estimation.

Production labor requirements also can be estimated with the help of the flow process chart. Using a chart such as the one shown below, consider each operation and briefly describe the task which the workman must perform. In Column 4 enter an estimate of the skill required for this task, and in Column 5, the estimated production output per hour. Next, enter the required production. (This figure may be in any convenient units, e.g., daily, weekly or monthly.) In the last column, enter the number of man-hours needed. This figure is obtained by dividing the production requirement (Column 6) by the output per hour (Column 5).

(1) STEP	(2)	(3) DESCRIPTION of Task	(4) Skill Class	(5) Output per Hour	(6) Production	(7) Man-Hours Required
	1 ⇨ □ D ▽	Machine outside diameter	1	4	400/wk	100
	○ ⇨ □ D ▽					

In-Process Inventory Planning

For each delay and each storage shown on the flow process chart, estimate the amount of material or number of pieces involved. The total value of material or product in all delays and storages is an adequate estimate of the value of in-process inventory. Raw material and finished goods stocks must then be estimated in order to obtain the estimated value of all inventories.

Attachment B

SELECTION OF LOCATION FOR THE ENTERPRISE

A complex group of forces determines industrial location, the underlying force being, of course, cost considerations. Manufacturing industries fall into four major categories of location types:

Resource Orientation. Industries tend to locate near the raw materials source if the materials cost is 60% or more of the final value of the processed goods or if raw materials are difficult and costly to transport.

Market Orientation. Industries which tend to locate near their markets usually manufacture goods whose assembly and distribution costs exceed 30% of the total cost for the product.

Labor Orientation. Industries which tend to locate near a good labor force supply usually manufacture goods whose labor costs exceed 20% of the total product cost.

Foot-Loose Orientation. Industries of this type do not have any major cost element of materials, assembly and distribution, or labor, and hence, can locate anywhere according to considerations decided upon by management, for example, recreation and housing facilities for their employees, number of sunny days in the year, etc.

Following is a checklist which may be useful in plant location efforts:

A. Examine Raw Materials and Markets

1. Area which offers material availability and lowest transportation cost
   - (a) Location of source of each material
   - (b) Availability
   - (c) Price
   - (d) Terms of sale
   - (e) Freight rates to site
   - (f) Storage facilities
2. Area which offers the greatest marketing advantage
   - (a) Competition
   - (b) Available market

(c) Market growth potential

(d) Transportation costs

From this examination select a broad geographic area.

B. Analyse Labor Situation in Various Locations within the Geographic Area

1. Labor cost

(a) Variation in wage rates

(b) Living cost

(1) Cost of food, clothing, housing, water, etc.

(2) Relationship between above costs and wages

(c) Wage rates in similar businesses

2. Labor stability

(a) Past history of labor turnover

(b) Strength of unions

3. Availability

(a) Skilled workers

(b) Unskilled workers

4. Productivity

5. Labor laws (state)

(a) Regulations

(1) Labor unions

(2) Collective-bargaining agreements

(3) Unfair employment practices

(4) Anti-injunction laws

(b) Minimum wage orders (wage controls)

6. Workmen's compensation insurance laws

7. Unemployment tax

From past studies it has been found that, "Where labor has been the primary factor in locating new plants, more emphasis has been placed on availability and on labor attitudes than on wage rates."

C. Examine Power Availability

1. Type of service

(a) Hydroelectric

(b) Steam

(c) Other

2. Reliability of service, history of stoppages

3. Adequacy of supply, seasonal restrictions

4. Kind

(a) Phase

(b) Cycle

(c) Voltage

5. Rates

6. Availability of off-peak contracts

7. Fuel adjustments

8. Lighting allowances

9. Discounts and penalties

D. Examine Fuel Cost and Availability

E. Examine Water Supply

1. Available sources

2. Capacity

3. Size of piping

4. Costs

5. Drainage facilities

6. Contaminants in water supply

F. Climate and Topography

G. Taxation

1. State taxes

(a) Sales

(b) Property

(c) Corporate income

(d) Other

2. Local taxes

H. Gather Additional Data

1. Natural phenomena
   (a) Earthquakes
   (b) Floods
   (c) Other

I. Government

1. Direct government ownership
2. Direct government influences
3. Side effect of government programs
4. Legislative and legal effects

J. Identify the One Outstanding Community

1. Administration
   (a) Political party
   (b) Form of government
   (c) Taxes
2. Budget
3. Labor
4. Transportation facilities
5. Educational, recreational, and civic data
6. Population statistics, cost of living, and climate

K. Selecting the Site

1. Find out what sites are available
   (a) Check with real estate agencies
   (b) Check with Chamber of Commerce
   (c) Other
2. Prepare a list of general specifications
3. Check topographic maps
4. Soil analysis
5. Analysis of other factors
   (a) Power
   (b) Fuel
   (c) Transportation
   (d) Sewage
   (e) Other

Attachment C

ECONOMIC ANALYSIS OF INVESTMENT ALTERNATIVES

Choices among alternatives must be made at every stage in a project study. There are, for example, alternatives in project selection, market definition, pricing, technology, and distribution. To this point we have not dealt explicitly with how to evaluate alternatives. In the discussion which follows, it is presumed that several investment alternatives are available and that estimates of income and expenditure have been made for each of the alternatives. In each case, we have an estimated cash flow table for income and expenditure covering a number of years (or the entire estimated project life.) As stated in the OECD Manual of Industrial Project Analysis, we are faced with the following questions:

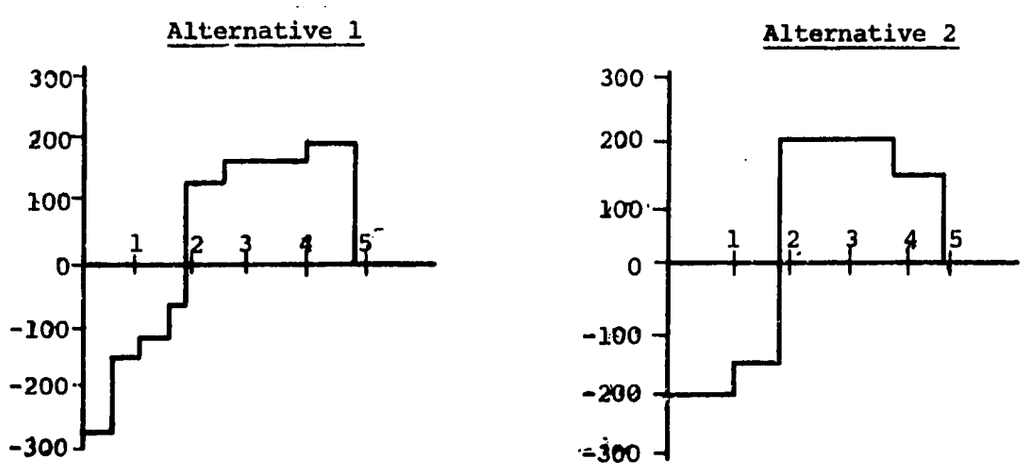
- o Of the various possible alternative schemes open to us, which is "best" in terms of some yet to be defined criteria?
- o When the "best" alternative has been ascertained, will it prove sufficiently worthwhile to justify the initial outlay?

The criteria which we choose must provide the answer to both questions, they must be applicable to any type of investment, and they must be easily calculated.

The criteria which we shall discuss are based on financial considerations only. They view the investment alternatives as sets of cash flows over time and provide a basis for comparison of dissimilar cash flows. (See Figure 1.)

Figure 1

ALTERNATIVES AS CASH FLOWS



(R)

This does not mean that financial considerations alone should dictate the choice among alternatives. Social, human, and political factors play an important and sometimes decisive role in investment decisions. Even in such cases, however, it is still important to evaluate the financial criteria.

1 Present Value of Future Costs and Benefits

In determining a criterion for comparison of investment alternatives, one likely candidate would be to express the total cash flows for each alternative as a single *equivalent* value which reflects the time value of money. Such a single value summarizes the value of all cash flows.

The present worth of discounted cash flows is an amount at present (t = 0) which is equivalent to a project's cash flow for a particular interest rate i. Thus the present worth of investment proposal j at interest rate i with a life of n years can be expressed as

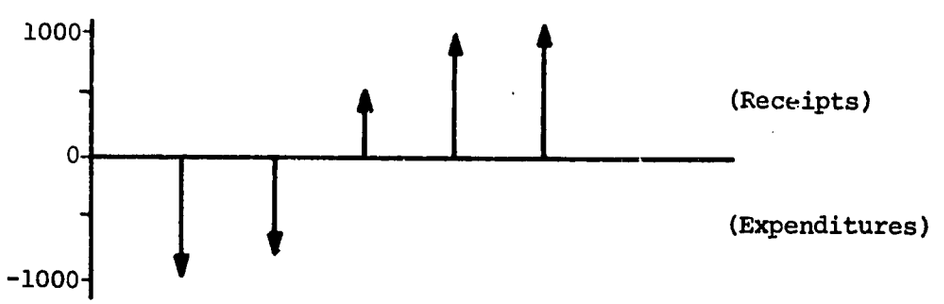
$$PW_j\ (i) = \sum_{n=o}^{N} F_{jn}\ (1 + i)^{-n}$$

when F_{jn} is the net cash flow from project j during period n. Calculations of present worth are facilitated by tabulated values of the factor

$$(P/F,\ i,\ n) = (1 + i)^{-n}$$

for various values of i and n. (See Table 1.)

1.1 *Example* (i = 8%)



$$PW\ (i = .08) = -1000\ (P/F,\ .08,\ 1) - 750\ (P/F,\ .08,\ 2)$$
$$+ 500\ (P/F,\ .08,\ 3) + 1000\ (P/F,\ .08,\ 4) + 1000\ (P/F,\ .08,\ 5)$$
$$= -1000\ (0.926) - 750\ (.857) + 500\ (.794) + 1000\ (.735) + 1000\ (.681)$$
$$= 244.25$$

1.2 *Advantages and Disadvantages*

The present-worth amount has a number of features that make it suitable as a basis for comparison. First it considers the time value of money according to the value of i selected for the calculation. Second, it concentrates the equivalent of any cash flow in a single index at a particular point in time (t = 0). In addition, the present-worth figure is an amount by which the equivalent receipts of a cash flow exceed or fail to equal the equivalent disbursements of that cash flow.

Disadvantages of this criterion are:

- It assumes inflows and outflows can be forecasted for the entire lifetime of the project and requires equal time periods for comparison of a number of investment alternatives.
- It requires that a discount rate be specified.
- It assumes that project alternatives are independent.

2 Benefit - Cost Ratio of Discounted Cash Flows

This criterion is similar to the present-value criterion. The difference is that expenditures (costs) and income (benefits) are treated separately and an index is obtained by forming a ratio of the present values.

2.1 *Example* (from section 1.1)

$$B/C\ (i = .08) = 1813.00/1568.75 = 1.156$$

2.2 *Advantages and Disadvantages*

The advantages and disadvantages are much the same as those for present value.

3 Internal Rate of Return

The internal rate of return is a widely accepted index of profitability. It is defined as the interest rate that reduces the present worth amount of a series of receipts and disbursements to zero. That is, the rate of return for investment proposal j is the interest rate i_j^* that satisfies the equation

$$0 = PW_j\ (i_j^*) = \sum_{n=o}^{N} F_{jn}\ (1 + i_j^*)^{-n}$$

Table 6

PRESENT VALUE OF F 1 AT RATE i PAYABLE IN t YEARS $(1 = i)^{-t}$

n \ i	2 %	3 %	4 %	5 %	5½ %	6 %	6½ %	7 %	7½ %	8 %	8½ %	9 %	9½ %	10 %	11 %	12 %	13 %	14 %	15 %	16 %	18 %	20 %	25 %	30 %
1	0.980	0.971	0.962	0.952	0.948	0.943	0.939	0.935	0.930	0.926	0.922	0.917	0.913	0.909	0.901	0.893	0.885	0.877	0.870	0.862	0.847	0.833	0.800	0.769
2	0.961	0.943	0.925	0.907	0.898	0.890	0.882	0.873	0.865	0.857	0.849	0.842	0.834	0.826	0.812	0.797	0.783	0.769	0.756	0.743	0.718	0.694	0.640	0.592
3	0.942	0.915	0.889	0.864	0.852	0.840	0.828	0.816	0.805	0.794	0.783	0.772	0.762	0.751	0.731	0.712	0.693	0.675	0.658	0.641	0.609	0.579	0.512	0.455
4	0.924	0.888	0.855	0.823	0.807	0.792	0.777	0.763	0.749	0.735	0.722	0.708	0.696	0.683	0.659	0.636	0.613	0.592	0.572	0.552	0.516	0.482	0.410	0.350
5	0.906	0.863	0.822	0.784	0.765	0.747	0.730	0.713	0.697	0.681	0.665	0.650	0.635	0.621	0.593	0.567	0.543	0.519	0.497	0.476	0.437	0.402	0.328	0.269
6	0.888	0.837	0.790	0.746	0.725	0.705	0.685	0.666	0.648	0.630	0.613	0.596	0.580	0.564	0.535	0.507	0.480	0.456	0.432	0.410	0.370	0.335	0.262	0.207
7	0.871	0.813	0.760	0.711	0.687	0.665	0.644	0.623	0.603	0.583	0.565	0.547	0.530	0.513	0.482	0.452	0.425	0.400	0.376	0.354	0.314	0.279	0.210	0.159
8	0.853	0.789	0.731	0.677	0.652	0.627	0.604	0.582	0.561	0.540	0.521	0.502	0.484	0.467	0.434	0.404	0.376	0.351	0.327	0.305	0.266	0.233	0.168	0.123
9	0.837	0.766	0.703	0.645	0.618	0.592	0.567	0.544	0.522	0.500	0.480	0.460	0.442	0.424	0.391	0.361	0.333	0.308	0.284	0.263	0.225	0.194	0.134	0.094
10	0.820	0.744	0.676	0.614	0.585	0.558	0.533	0.508	0.485	0.463	0.442	0.422	0.404	0.386	0.352	0.322	0.295	0.270	0.247	0.227	0.191	0.162	0.107	0.073
11	0.804	0.722	0.650	0.585	0.555	0.527	0.500	0.475	0.451	0.429	0.408	0.388	0.369	0.350	0.317	0.287	0.261	0.237	0.215	0.195	0.162	0.135	0.086	0.056
12	0.788	0.701	0.625	0.557	0.526	0.497	0.470	0.444	0.420	0.397	0.376	0.356	0.337	0.319	0.286	0.257	0.231	0.208	0.187	0.168	0.137	0.112	0.069	0.043
13	0.773	0.681	0.601	0.530	0.499	0.469	0.441	0.415	0.391	0.368	0.346	0.326	0.307	0.290	0.258	0.229	0.204	0.182	0.163	0.145	0.116	0.093	0.055	0.033
14	0.758	0.661	0.577	0.505	0.473	0.442	0.414	0.388	0.363	0.340	0.319	0.299	0.281	0.263	0.232	0.205	0.181	0160	0.141	0.125	0.099	0.078	0.044	0.025
15	0.743	0.642	0.555	0.481	0.448	0.417	0.389	0.362	0.338	0.315	0.294	0.275	0.256	0.239	0.209	0.183	0.160	0.140	0.123	0.108	0.084	0.065	0.035	0.020
16	0.728	0.623	0.534	0.458	0.425	0.394	0.365	0.339	0.314	0.292	0.271	0.252	0.234	0.218	0.188	0.163	0.141	0.123	0.107	0.093	0.071	0.054	0.028	0.015
17	0.714	0.605	0.513	0.436	0.402	0.371	0.343	0.317	0.292	0.270	0.250	0.231	0.214	0.198	0.170	0.146	0.125	0.108	0.093	0.080	0.060	0.045	0.023	0.012
18	0.700	0.587	0.494	0.416	0.381	0.350	0.322	0.296	0.272	0.250	0.230	0.212	0.195	0.180	0.153	0.130	0.111	0.095	0.081	0.069	0.051	0.038	0.018	0.009
19	0.686	0.570	0.475	0.396	0.362	0.331	0.302	0.277	0.253	0.232	0.212	0.194	0.178	0.164	0.138	0.116	0.098	0.083	0.070	0.060	0.043	0.031	0.014	0.007
20	0.673	0.554	0.456	0.377	0.343	0.312	0.284	0.258	0.235	0.215	0.196	0.178	0.163	0.149	0.124	0.104	0.087	0.073	0.061	0.051	0.037	0.026	0.012	0.005
21	0.660	0.538	0.439	0.359	0.325	0.294	0.266	0.242	0.219	0.199	0.180	0 164	0.149	0.135	0.112	0.093	0.077	0.064	0.053	0.044	0.031	0.022	0.009	0.004
22	0.647	0.522	0.422	0.342	0.308	0.278	0.250	0.226	0.204	0.184	0.166	0.150	0.136	0.123	0.101	0.083	0.068	0.056	0.046	0.038	0.026	0.018	0.007	0.003
23	0.634	0.507	0.406	0.326	0.292	0.262	0.235	0.211	0.189	0.170	0.153	0.138	0.124	0.112	0.091	0.074	0.060	0.049	0.040	0.033	0.022	0.015	0.006	0.002
24	0.622	0.492	0.390	0.310	0.277	0.247	0.221	0.197	0.176	0.158	0.141	0.126	0.113	0.102	0.082	0.066	0.053	0.043	0.035	0.028	0.019	0.013	0.005	0.002
25	0.610	0.478	0.375	0.295	0.262	0.233	0.207	0.184	0.164	0.146	0.130	0.116	0.103	0.092	0.074	0.059	0.047	0.038	0.030	0.024	0.016	0.010	0.004	0.001
26	0.598	0.464	0.361	0.281	0.249	0.220	0.194	0.172	0.153	0.135	0.120	0.106	0.094	0.084	0.066	0.053	0.042	0.033	0.026	0.021	0.014	0.009	0.003	0.001
27	0.586	0.450	0.347	0.268	0.236	0.207	0.183	0.161	0.142	0.125	0.111	0.098	0.086	0.076	0.060	0.047	0.037	0.029	0.023	0.018	0.011	0.007	0.002	0.001
28	0.574	0.437	0.333	0.255	0.223	0.196	0.171	0.150	0.132	0.116	0.102	0.090	0.079	0.069	0.054	0.042	0.033	0.026	0.020	0.016	0.010	0.006	0.002	0.001
29	0.563	0.424	0.321	0.243	0.212	0.185	0.161	0.141	0.132	0.107	0.094	0.082	0.072	0.063	0.048	0.037	0.029	0.022	0.017	0.014	0.008	0.005	0.002	0.001
30	0.552	0.412	0.308	0.231	0.201	0.174	0.151	0.131	0.114	0.099	0.087	0.075	0.066	0.057	0.044	0.033	0.026	0.020	0.015	0.012	0.007	0.004	0.001	
40	0.453	0.307	0.208	0.142	0.117	0.097	0.081	0.067	0.055	0.046	0.038	0.032	0.027	0.022	0.015	0.011	0.008	0.005	0.004	0.003	0.001	0.001		
50	0.372	0.228	0.141	0.087	0.069	0.054	0.043	0.034	0.027	0.021	0.017	0.013	0.011	0.009	0.005	0.003	0.002	0.001	0.001	0.001				

Source: Manual of Industrial Project Analysis in Developing Countries, Development Centre of the Organisation for Economic Co-operation and Development, Paris, 1973.

Solving for i_j^* directly is difficult and tedious unless done on a computer. The usual approach is to search for the appropriate value by trial and error.

3.1 *Example* (from section 1.1)

$$PW\ (i = .08) = 244.25 \quad \text{(previously calculated)}$$

$$\begin{aligned} PW\ (i = .10) &= -1000\ (.909) - 750\ (.826) + 500\ (.751) \\ &\quad + 1000\ (.683) + 1000\ (.621) \\ &= 151.00 \end{aligned}$$

$$\begin{aligned} PW\ (i = .12) &= -1000\ (.893) - 750\ (.797) + 500\ (.712) \\ &\quad + 1000\ (.636) + 1000\ (.567) \\ &= 68.25 \end{aligned}$$

$$\begin{aligned} PW\ (i = .14) &= -1000\ (.877) - 750\ (.769) + 500\ (.675) \\ &\quad + 1000\ (.592) + 1000\ (.519) \\ &= -5.25 \end{aligned}$$

Hence i^* is approximately 14%

3.2 *Advantages and Disadvantages*

The internal rate of return is familiar to may businessmen and administrators and is, therefore, readily accepted. It has advantages in not requiring the prior determination of a discount interest rate and it can be directly related to profit goals. The criterion of average rate of return is enough if an alternative must be accepted or refused; if its rate of return is higher than the average rate at which capital can be obtained, the alternative may be carried out. However, it is a valid measure for comparison of alternatives *only* if the financial conditions under which capital can be borrowed and invested are identical for the alternatives under consideration. Comparing the average return on two alternatives can only tell us that if the rate at which money can be borrowed is i_A, equal to the rate of return on Alternative A, the discounted income from Alternative A is nil; whereas, if the rate on borrowed capital is i_B, equal to the rate of return for Alternative B, the discounted return for Alternative B is nil.

A second disadvantage of the rate of return criterion is its dependency on the investment base. A return of 15% on an investment of $1,000 is not necessarily preferable to a return of 12% on a $10,000,000 investment.

4 The Payback Period

The payback (sometimes also called the recoupment) period is the number of years required for the earnings from the investment to equal the investment with no interest. It is a measure of the speed with which invested funds are returned to the business. The earnings figure used in the calculation should be cash earnings after taxes.

4.1 *Example* (from section 1.1)

Year	Expenditures	Receipts	Cumulative Cash Flow
1	1000.00	0	-1000.00
2	750.00	0	-1750.00
3	0	500	-1250.00
4	0	1000	- 250.00
5	0	1000	750.00

The table above shows that the payback period is just over four years.

4.2 *Advantages and Disadvantages*

Because it is relatively simple to calculate and is intuitively appealing, the payback period is frequently used to evaluate investment proposals. When used in conjunction with other criteria, it is useful in promoting wise investment decision making. When used as the only criterion for investment decisions, payback period is dangerous because it completely ignores all earnings beyond the payback years and may result in choosing a short-lived project rather than one which offers good returns over a long period of time.

5 Nonqunatifiable Considerations

Once a financial analysis has been made, other factors not amenable to being quantified also must be considered. These considerations may make it necessary to reject some presumably profitable investment, or accept a project that is not entirely profitable or a financially less satisfactory alternative. No complete list of these considerations can be given and only a few will be mentioned here.

The investment may be influenced by *strategic considerations*. For example, it may be advisable to provide for capacity by acquiring equipment sufficient to accommodate future growth, although the advantage of such an investment cannot be calculated at the time.

Another way to provide for possible future growth or change is to take into consideration the *adaptability* of the equipment. General purpose machines, for example, may be preferred to specialized equipment which does not provide flexibility to accommodate product changes.

FINANCIAL ANALYSIS

The financial portion of a feasibility study requires the assembly of the market and cost data into various pro forma statements and projections and the analysis of these in order to determine the commercial profitability of the proposed venture. In addition, we also include the analysis of social profitability and the overall evaluation of project feasibility. The process of financial analysis can be outlined by the major steps shown in Figure 1.

(1) Estimate Project Cost (Total Investment)

The first question to be answered by the financial analysis is, "How much will it cost to start this venture?" The total cost consists of the following:

- o Fixed Investment
- o Working Capital
- o Venture Initiation Costs

1.1 Fixed Investment

As defined previously, the fixed investment is the cost of land and improvements, buildings and site facilities, machinery and equipment which are required by the enterprise. These costs are frequently underestimated through omission of necessary nonproduction facilities (e.g., social facilities, canteen, and an infirmary) and failure to include installation and debugging costs in capital equipment costs.

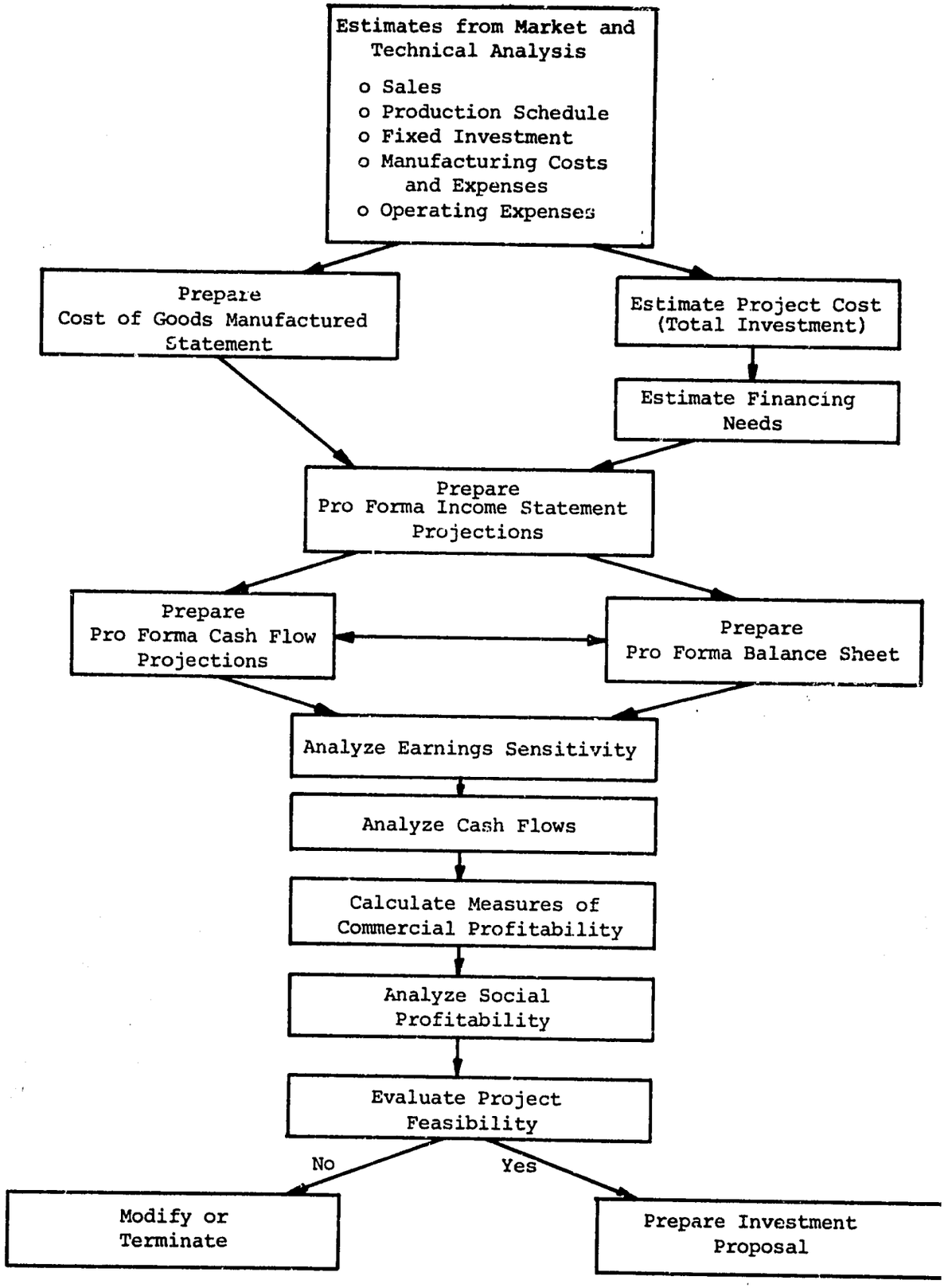
1.2 Working Capital

For the purpose of estimating total investment, it is recommended that gross working capital be used as opposed to net working capital. Gross working capital is defined as current assets required. Net working capital is current assets less current liabilities. Current assets required for a new enterprise include the following:

- o Cash balance minimum
- o Materials inventories
- o Expendable supplies and parts
- o Prepaid expenses (R)

Figure 1

FINANCIAL ANALYSIS



It is important to realize that extra cash is needed at the beginning of a new venture in order to meet expenses, such as payroll, utilities, telephone, interest, etc., which must be paid before cash inflow from sales is received. The most common source of error in project cost estimation and a common cause of business failure is inadequate working capital.

1.3 Venture Initiation Costs

Venture initiation costs are incurred in making initial investigations and forming the company. (See pages 5-21.) It is likely that these will be considered capital costs and amortized over some time period. They must not be omitted from the project cost estimate.

1.4 Total Project Costs

A total project cost summary is shown in Table 1. Since this summary is the basis for the financial plan and loan request, it is extremely important. Perhaps most important is that the entrepreneur not *underestimate* the project cost. Lenders tend to be very unhappy with entrepreneurs who are forced to return and say, "I underestimated my capital needs, and if I cannot obtain an additional loan my business will fail!"

Table 1

TOTAL PROJECT COST SUMMARY

	Foreign Exchange	Local Currency	Total
Advance Expenditures			
Land and Improvements			
Buildings and Site Facilities			
Machinery and Equipment			
Consulting Services			
Intangibles			
Preliminary Expenses			
Allowance for Unforeseen Costs			
Total Fixed-Asset Costs			
Working Capital Needed			
Current Assets Required			
Raw Materials			
Expendable Supplies and Spare Parts			
Goods in Process			
Finished Goods Stock			
Accounts Receivable			
Prepaid Expenses			
Cash Balance Minimum			
Total Current Assets			
Total Working Capital			
Total Project Cost			

(2)

Estimate Magnitude of Financing

Once the total investment has been determined, attention is given to an initial estimate of the magnitude of financing needs. Later, when cash flow projections have been made, it may be necessary to revise the original estimate. For the purposes of these notes, we shall assume that the entrepreneur cannot supply all the funds and that at least some external financing is necessary.

The matter of *how much* external money will be needed is not the only question facing the entrepreneur. Other questions are as follows:

- What form of financing should be used?
- What are the sources for funds?

The answers to these questions are dependent on the regulations and capital availability in each country. They are beyond the scope of these notes.

(3)

Prepare Cost of Goods Manufactured Statement

As a first step toward preparation of the pro forma income statement, it is necessary to estimate the cost of goods manufactured. A suggested format for the statement of cost of goods manufactured is shown in Table 2. The statement is explained by the following equation:

Cost of Goods Manufactured = Work in Process (Beginning Inventory)
+ Raw Materials Used
+ Direct Labor Expended
+ Factory Overhead
- Work in Process (Ending Inventory)

Necessary data for calculating each of the above should be available from the cost estimates of the technical analysis.

(4)

Prepare Pro Forma Income Statement Projections

The market analysis, subject to the technical constraints of the plant's operating capacity, provides the data needed for estimating sales revenue. The technical analysis provides estimates of cost elements. These data are prerequisites for arriving at the most important financial forecast related to

Table 2

STATEMENT OF COST OF GOODS MANUFACTURED

For the Year Ended _____

Raw Materials				
Inventory, Beginning			xx,xxx	
Purchases		xx,xxx		
Less: Purchases Return and Allowances	x,xxx			
Purchases Discounts	x,xxx	x,xxx		
		xx,xxx		
Add: Transportation on Purchases		x,xxx	xx,xxx	
			xxx,xxx	
Less: Inventory, Ending			xx,xxx	
Raw Materials Used				xx,xxx
Direct Labor				xx,xxx
Factory Overhead				
Depreciation			x,xxx	
Factory Supplies Expense			x,xxx	
Heat, Light, and Power Expense			x,xxx	
Indirect Labor Expense			x,xxx	
Insurance Expense			xx,xxx	
Repairs to Machinery, Equipment, and Buildings			x,xxx	
Taxes Expense			x,xxx	
Miscellaneous Factory Expense			x,xxx	
Total Factory Overhead Costs				xx,xxx
Total Material, Labor, and Factory Overhead				xxx,xxx
Add: Work-in-Process Inventory, Beginning Inventory				xx,xxx
				xxx,xxx
Less: Work-in-Process Inventory, Ending Inventory				x,xxx
Cost of Goods Manufactured for the Year				xxx,xxx

the project -- the income projections. This is the estimate which shows whether the project should be profitable at the volume of production which is likely to be saleable. It shows how much margin can be counted on for repayment of debt, for plowing back into the business for expansion, and for payment of dividends to the owners. This is the all-important test which shows how safe the project is for the prospective lender, and how attractive for the investor.

The pro forma income statement attempts to forecast business operations over a specific time interval by means of the profit equation:

After Tax Net Profit =
Gross Sales - Returns and Allowances - Discounts
- Cost of Goods Sold
- Operating Expenses
+ Other Revenue
- Interest Expenses
- Income Taxes

A suggested format for the income statement for one year is shown in Table 3. In making the income statement projections for a new venture, it is highly desirable to provide monthly or quarterly forecasts for the first year of operations and annual projections for at least four additional years. Attachment A contains an example of an income statement and illustrates the detail involved in its preparation.

Table 3

INCOME STATEMENT

For the Year Ended _____

Gross Sales		xxx,xxx
Less: Sales Returns and Allowances	x,xxx	
Sales Discount	x,xxx	x,xxx
Net Sales		xxx,xxx
Cost of Goods Sold		
Finished Goods, Beginning Inventory	xx,xxx	
Cost of Goods Manufactured	xxx,xxx	
Goods Available	xxx,xxx	
Finished Goods, Ending Inventory	xx,xxx	
Total Cost of Goods Sold		xxx,xxx
Gross Margin		xx,xxx
Operating Expenses		
Selling Expenses	xx,xxx	
General and Administrative Expenses	xx,xxx	
Total Operating Expense		xx,xxx
Operating Profit		xx,xxx
Other Revenue and Expense		
Other Revenue Earned	x,xxx	
Less: Interest Expense	x,xxx	x,xxx
Profit Before Income Taxes		xx,xxx
Income Taxes		x,xxx
Net Profit After Taxes		xx,xxx

4.1 Sales

The market analysis provides necessary data for this section of the statement. (See pages 4-21.) Estimates of returns, allowances, and discounts may be obtained from those who are experienced in the industry.

4.2 Cost of Goods Sold

The purpose of this section is to obtain an estimate of the cost of goods which produced the sales revenues. These costs are obtained by adjusting the cost of goods manufactured to reflect finished goods inventory changes. Net sales less cost of goods sold provides an estimate of gross margin (gross profit) for the period.

4.3 Operating Expenses

Estimates of selling expenses and general and administrative expenses were provided by the technical analysis. Subtracting operating expenses from gross margin produces an estimate of operating profit for the period.

4.4 Other Revenue and Expense

It is likely that the proposed new venture will have no revenue other than product sales. If so, "Other Revenue Earned" will be omitted and the interest expense on borrowed funds will be subtracted from operating profit to obtain an estimate of before-tax profit.

4.5 Net Profit after Taxes

This figure is the all important "bottom line." As stated earlier, it provides an estimate of funds which will be available to repay lenders, expand the business, and reward the entrepreneur. Projections over a five-year horizon are useful to indicate growth and healthy development of the new firm.

(5)

Prepare Pro Forma Balance Sheet

In an ongoing business, the balance sheet tells "where we are" at a particular point in time. The pro forma balance sheet for a proposed venture represents an effort to project "where we will be" after a specific period of operation. It is dependent upon the income statement and cash flow statement

as indicated in Figure 1. In essence, the balance sheet is a listing of all the resources of the business together with interests of creditors and owners in those resources. It represents the financial position of the firm at a given date.

In order to properly assess the profitability of the proposed firm, it will be necessary to make balance sheet projections for at least the first five years of operation. It may be desirable to make monthly projections for the first year. A suggested format for the balance sheet is shown in Table 4.

5.1 Assets

The assets (resources) of the business are grouped into several categories according to liquidity. Current assets consist of cash and other resources which under normal operations are converted to cash within the operating cycle. In most cases the operating cycle will be a year or less. As shown in Table 4, current assets frequently consist of the following items:

- o Cash
- o Accounts receivable
- o Notes receivable
- o Inventories
- o Prepaid expenses

The cash portion of current assets represents only that which is on hand and on deposit that is available for general business purposes. Cash held for a special purpose (e.g., bond retirement) is not included in current assets. The amount estimated for the cash account in the pro forma balance sheet should be based on the pro forma cash flow projections (Section 5).

Receivables are an important element of current assets since they represent money which otherwise might be available as cash. It is not unusual for a firm to extend credit to virtually all its customers and to have one to two months' sales tied up in receivables. A method of estimating accounts receivable is discussed in Section 6.

Inventories consist of finished goods available for immediate sales, goods in various stages of manufacture, and materials which will be used in the creation of products. In addition, expendable supplies used in production are also a resource and are included here. Estimates of inventories should be available from the technical analysis.

Table 4

BALANCE SHEET

As of _____

ASSETS

Current Assets		
Cash		x,xxx
Accounts Receivable	xx,xxx	
Less: Allowances for Discounts, Returns, Adjustments, and Uncollectibles	xxx	x,xxx
Notes Receivable		x,xxx
Inventories		
Finished Goods	xx,xxx	
Work in Process	x,xxx	
Raw Materials	x,xxx	
Expendable Supplies	x,xxx	xx,xxx
Prepayments of Expense		xx,xxx
Total Current Assets		xxx,xxx
Long-Term Investments		xx,xxx
Plant Assets		
Land		xx,xxx
Buildings	xx,xxx	
Less: Accumulated Depreciation	x,xxx	xx,xxx
Equipment	xx,xxx	
Less: Accumulated Depreciation	x,xxx	xx,xxx
Intangible Assets		
Organization Expense		x,xxx
Other Assets		
Cash Surrender Value of Life Insurance on Company Officers		x,xxx
Total Assets		xxx,xxx

LIABILITIES AND OWNERS' EQUITY

Current Liabilities	
Accounts Payable	xx,xxx
Notes Payable	x,xxx
Accrued Wages and Other Expense	x,xxx
Estimated Income Taxes Payable	x,xxx
Total Current Liabilities	xx,xxx
Long-Term Liabilities	
Notes Payable	xx,xxx
Other	x,xxx
Total Liabilities	xxx,xxx
Owners' Equity	xx,xxx
Total Liabilities and Owners' Equity	xxx,xxx

Prepaid expenses are payments for services which will be received in the near future. These include such items as insurance premiums, rent, and interest. Although these items are not converted into cash in the normal course of business operation, they are expenses which if not prepaid would have resulted in additional cash. (However, they would have to be paid eventually.)

The total value of current assets is a measure of funds available to the business in normal operation. The use of this measure in evaluating project feasibility will be discussed in Sections 9 and 12.

The remaining items in the assets section of the balance sheet are largely self-explanatory and will not be discussed in these notes. Detailed discussions of these items can be found in any accounting or financial statements text.

5.2 Liabilities and Owners' Equity

The liabilities and owners' equity section of the balance sheet lists all the claims against the assets of the firm. Current liabilities represent claims which arise from normal current operations of the business and which will require, within approximately one year, cash or replacement by another current liability. Current liabilities frequently consist of the following items:

- o Accounts payable
- o Notes payable
- o Accrued wages and other expenses
- o Estimated income taxes payable

Accounts payable include only amounts owed for materials and supplies purchased on credit. An estimate of accounts payable is obtained by estimating the value of materials purchases required to support the projected production schedule and assuming reasonable "terms" for payment of these billings (e.g., payment in 30 days).

Notes payable can be projected by means of the cash flow statement under the assumption that temporary cash shortages will be met with short-term loans. Estimates for accrued wages and other expenses should be based on the projected production schedule and payroll practices. An estimate of income taxes payable should be based on the pro forma income statement.

A long-term liability is an obligation that normally will not be paid within one year from the date of the balance sheet. These may include mortgage notes payable and term loans.

The preceding liabilities to "outside parties" must be sharply distinguished from the owners' equity, which is represented by the difference between total assets and liabilities to others. Liabilities represent priority claims to the assets of the business and the residue belongs to the owners.

The foregoing is a brief and incomplete discussion of the balance sheet. No effort has been made to deal with special questions such as, "How do we handle estimated major repairs and renewals which we know must be made in five years?" Such matters are beyond the scope of this course, and the reader is referred to the texts listed in the reference section of these notes.

(6) **Prepare Pro Forma Cash Flow Projections**

The purpose of the cash flow statement is to show the movement of cash into and out of the business. In the financial analysis of a project feasibility study, cash flow projections are particularly important. The would-be entrepreneur wants to know, "Will my cash account always have enough money in it so that I can meet my bills and debt service?" and potential lenders want to know, "Will cash be available to meet interest and principal payments on my loan?" Since this is the case, the suggested format shown in Table 5 differs somewhat from conventional cash flow statements in that it does not include noncash items such as depreciation and provisions for bad debts. It is, in fact, a cash flow budget which is useful to (a) determine the amount of cash needed to start the enterprise, (b) plan for timing of loan funds, and (c) assure that, if projected cash flows are met, cash will be available to meet payments as they come due. Thus, the cash flow projections are used for financial planning, project evaluation, and control (if the project is implemented).

Cash flow projections should be made for monthly periods during the preoperating period (i.e., from time of first expenditures to plant operation) and the first year of operations. Projections for subsequent years may be on a quarterly or annual basis.

6.1 Cash Receipts

The cash receipts section of the cash flow projections lists all *sources* of cash. Collections of receivables may be estimated as follows:

Collections of Receivables =

Estimated Balance (Beginning)

+ Net Sales

- Estimated Balance (Ending)

The estimated receivables balance at the end of a period is based on billing practices and terms given to purchasers. For example, if customers are billed at time of shipment and given 30-day terms, receivables will consist of 30 days' sales. Other cash receipt items (see Table 5) appear to be self-explanatory.

Table 5

CASH FLOW PROJECTIONS

For the Period Ending_____

Opening Balance	xx,xxx
Cash Receipts	
Collections of Receivables	x,xxx
Cash Sales	x,xxx
Sale of Temporary Investments	x,xxx
Sale of Equity	x,xxx
Short-Term Borrowings	x,xxx
Long-Term Borrowings	x,xxx
Investments	x,xxx
Total Receipts	xx,xxx
Cash Disbursements	
Payments for Raw Materials Purchases	xx,xxx
Payments for Labor	xx,xxx
Manufacturing Overhead and Expense 1/	x,xxx
Selling Expense 1/	x,xxx
General and Administrative Expense 1/	x,xxx
Payments for Fixed Assets	x,xxx
Interest Payments	x,xxx
Loan Repayments	x,xxx
Payments on Real Estate Mortgage	x,xxx
Payments on Income Taxes	x,xxx
Other Taxes and Assessments	x,xxx
Total Disbursements	xx,xxx
End Balance	xx,xxx

1/ Cash outlays only.

6.2 Cash Disbursements

The disbursements section lists all *uses* of cash. Since raw materials are usually purchased in anticipation of production requirements, payments during a given month will depend on production schedules, lead time, and purchase terms.

In practice, there is always a certain amount of unpaid labor since workers are paid at the end of a work period. However, for the purposes of cash flow projections, it is convenient to assume that labor is paid in the same month that the cost is incurred.

(7) **Analyze Earnings Sensitivity (Risk Analysis)**

Pro forma financial statements are based upon estimates and forecasts. They represent a composite of "guesses" and "plans." It is appropriate, therefore, to ask, "What will be the result if the guesses turn out to be wrong and the plans are not met?"

One advantage of a careful feasibility analysis of a project is that it may be used to examine the effect on projected earnings if "something goes wrong." How sensitive are earnings to increased start-up costs? To a fall in prices or decreased sales? To increased raw material costs? Inquiry into such questions is called *sensitivity analysis*. All projects should be subjected to sensitivity analysis.

7.1 The Effect of Volume on Earnings

The customary measure of below-normal output is the *break-even* point. This is the percentage of full-capacity output at which the firm can stay in business and cover its overhead, including full debt service (interest and principal repayments). At the break-even point, the firm can cover all fixed costs, although there is no profit.

Acceptable break-even points vary widely, but according to Murray Bryce in his book, Industrial Development, a good project should not have a break-even point higher than 70%, for there are few industries which can safely count on always operating at a higher level than this.

The break-even volume is calculated by determining the total annual fixed or overhead costs, including full debt service, and by calculating separately the variable cost involved in producing each unit of product. The variable production cost per unit is then subtracted from the expected selling price per unit to find the margin available for overhead costs. The annual total of overhead costs is divided by the margin per unit to give the number of units which must be produced to take care of overhead.

7.2 The Effect of Errors in Estimating Future Expenditures

The best practical approach to assessing the risks due to possible errors in estimating future expenditures is to select those factors whose estimated values may contain significant errors and then to calculate the effect of errors of different magnitudes on the profitability measurements.

Estimates which are most commonly examined by a sensitivity analysis are the following:

- o Initial investment
- o Selling price
- o Raw material input prices
- o Operating expenditures
- o Life of the investment

(See Attachment B.)

7. Probability Techniques for Risk Analysis

The calculations described above are a straightforward (but often quite sufficient) means of dealing with the question of risk and uncertainty in project analysis. A more elaborate risk analysis technique, using probability theory and computer simulation, is outlined by Hertz. (See Attachment C.) This method requires that the analyst estimate probability distributions for the following factors:

- o Market size
- o Selling price
- o Market growth rate
- o Share of market
- o Investment required
- o Residual value of investment
- o Operating costs
- o Fixed costs
- o Useful life of facilities

These estimated probabilities are used in the simulation, which develops a probability distribution for the rate of return. This information can be an extremely important aid to risk assessment.

(8) **Analyze Cash Flows**

As stated previously, the cash flow projection is a schedule, over time, of cash inflows and outflows and is an attempt to pinpoint cash surpluses and shortages so that arrangements can be made to cover the maturing obligations of the firm. Analysis of the cash flow projections consists of ascertaining that a minimum cash balance is not penetrated at any time. (For example, the entrepreneur may decide that a minimum cash balance of $1,000 should be maintained.) It is, therefore, not sufficient to examine the ending balances only. If disbursements for the period exceed the beginning cash balance, it is necessary to consider the timing of receipts and disbursements within the period.

If the projection indicates a cash problem, consideration can be given to one or more of the following:

- o Receivables financing
- o Inventory financing
- o Faster receivables collection
- o Inventory turnover improvement
- o Gross profit improvement
- o Extended terms from suppliers
- o Additional borrowings

(9) **Calculate Measures of Commercial Profitability**

As previously stated (Section 7), the pro forma financial statements represent, in reality, a plan. The questions to be answered are: "How good is the plan?" and "How profitable is this venture likely to be if the plan is followed?" Certainly the pro forma income statements and balance sheets provide information which goes a long way toward answering these questions. The former projects business activity and profits and the latter projects changes in owners' equity. There are several commonly used measures of commercial profitability which should be examined.

It is common practice to show, at regular intervals, the relationship between various items or groups of items in the balance sheet and between these items and those on the income statement. There are many possible such relationships (usually called ratios) which could be examined. However, at this point we shall examine only those which are concerned with profitability.

9.1 Profitability as Related to Investment

The entrepreneur understandably is concerned with the return (profits) on his investment. There are, no doubt, other uses to which he could put his capital, and he must compare the proposed venture with those alternatives. Two ratios are commonly used.

(a) Net Profits to Tangible Net Worth

$$\frac{\text{Net Profit}}{\text{Tangible Net Worth}}$$

The ratio of net profit to tangible net worth is a measure of return on the owners' capital employed in the business. Net profit projections are obtained directly from the pro forma earnings statement. Tangible net worth is defined as the owners' equity less intangible assets (e.g., goodwill, patents, trademarks, etc.) as shown on the balance sheet. Frequently, the tangible net worth figure is adjusted to reflect the average found during the year.

This is a fair measure for appraising the earning power of the ownership investment. From the viewpoint of the entrepreneur, a high figure would seem desirable, since it leads to higher profits. However, if the high ratio is a result of too extensive use of borrowed funds there may be danger ahead. When unfavorable business conditions develop, a relatively small amount of owners' equity cannot absorb resultant losses. In fact, the firm may have difficulty meeting its maturing liabilities. A small ratio of net profit to tangible owners' equity indicates an inadequate return to the owners and that their capital might be better used elsewhere.

(b) Operating Profit to Total Assets

$$\frac{\text{Operating Profit}}{\text{Total Assets}}$$

This ratio measures the earnings of the business on *all* its assets before taxes and compensation to the contributors of these assets. It is

suggested to add the beginning total asset figure to the ending total asset figure and divide by two in order to obtain an average value for total assets.

9.2 Profitability as Related to Sales

As pointed out, the most crucial measure of profitability is return on investment. However, examination of net profit related to sales also is useful.

$$\frac{\text{Net Profit}}{\text{Net Sales}}$$

This ratio is an aid in measuring the efficiency of operations and provides a basis for comparing the proposed venture with industry performance (if data are available). A variation of this ratio which may also be of interest is:

$$\frac{\text{Operating Profit}}{\text{Net Sales}}$$

Both ratios are used in analyzing the efficiency of the firm.

9.3 Measures of Liquidity and Indebtedness

The preceding measures have provided insight into the potential profitability of the proposed venture according to data from pro forma statements. The entrepreneur also is concerned with evaluating the financial strength of the company. There are several ratios which should be examined.

(a) Current Assets to Current Liabilities

$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$

The current ratio is one of the most commonly used indicators of financial strength. Its purpose is to measure the firm's capacity to meet its current liabilities. From the creditors' point of view, a high ratio is desirable. However, from the firm's point of view, too high a ratio may indicate badly managed cash and/or excessive inventories. A generally accepted value for the current ratio is considered to be a 2:1 relationship.

A figure related to the current ratio is "net current assets," which is the difference between current assets and current liabilities. This figure is looked upon as a "reserve strength."

(b) The Liquidity Ratio or "Acid Test"

$$\frac{\text{Cash, Marketable Securities, Net Receivables}}{\text{Current Liabilities}}$$

This ratio, like the current ratio, is used to measure the firm's ability to meet its current obligations. It is, however, a much more severe measure since it emphasizes only "liquid" assets. A rule of thumb of 1:1 is commonly applied.

(c) Debt Ratios

There are several ratios which express relationships between borrowed funds and ownership funds. The purpose of looking at such measurements is to appraise the company's ability to meet both long-term and short-term liabilities as they mature -- particularly if the firm should encounter unexpected problems. The ratios most commonly used are the following:

- o $\frac{\text{Total Debt}}{\text{Total Assets}}$
- o $\frac{\text{Total Debt}}{\text{Tangible Net Worth}}$

Although these ratios are relevant to long-range profitability of the firm, they are of greater interest to the lending agency in attempting to appraise the investment proposal. These and other measures of the business plan will be discussed more fully in Chapter 7 of these notes.

(10) **Analyze Social Profitability**

Equally important to commercial profitability from the viewpoint of a country is a social profitability, that is, the contribution the project can make to the national economy. The measurement of social profitability is usually reserved for major industrial projects. In cases where it is necessary to evaluate this factor, special assistance should be given by the government. There is considerable literature on the subject of measuring social profitability, and the review of techniques for cost-benefit analysis such as the Little-Mirrless method would take considerable time. The procedure for measuring social profitability outlined by Murray Bryce illustrates the rationale behind social profitability analysis without the complexity of some of the other

methods. The starting point for measuring social profitability by this system is the calculation of estimated commercial profitability by ordinary accounting methods.

10.1 Adjustments to Estimated Operating-Cost Items in Which the Real Cost to the Economy is Either Greater or Less Than the Cost to the Enterprise

Minus adjustments to commercial operating-cost estimates are needed when real costs to the economy are less than commercial costs to the firm.

- o To a firm which must import raw materials, the duties charged on those materials are costs; but to arrive at real costs to the economy, the duties should be deducted.
- o Other taxes, which are properly shown in commercial estimates as operating costs, are not real costs to the economy and therefore should be deducted.
- o Unused or underused resources, when brought into use by a new project, usually will have to be paid for at going commercial rates. The adjustment required is to price such a resource in operating costs at the alternate-use value which exists if the proposed project is not constructed, not at the regular commercial price.

Plus adjustments to commercial operating-cost estimates are required when real costs to the economy are higher than commercial costs to the enterprise. These adjustments usually arise from either or both of two causes -- subsidies or foreign exchange undervaluation.

- o A Subsidy to a project may take many forms; all represent a situation in which the project receives something it needs free or below real costs. The cost of such subsidies needs to be added to the commercial operating-cost estimates.
- o Foreign exchange costs may form a significant part of a project's estimated operating expenses. If the rates are too low, if the foreign currency is undervalued in relation to local currency, the foreign exchange portion of the operating costs for the project will be worth more to the economy than the firm has to pay for it. It is necessary to adjust the cost estimates to what they would be if the foreign exchange were priced at its real value to the economy. For example, if it is thought that foreign exchange is worth twice as much to the country as the official rate indicates, all

foreign exchange expenses in a project's operating-cost estimates should be raised by that much to show the real cost to the economy.

10.2 Adjustments to Estimated Operating-Income Items in Which the Real Benefit to the Economy is Either Greater or Less Than to the Enterprise

Income to a firm is mainly revenue from sales, but the benefit to the economy may be more than the sales revenue of the firm. This is likely to be the case mainly when projects earn foreign exchange by exporting products, or save foreign exchange by producing goods which substitute for imports. If the foreign exchange earned or saved by a project is undervalued at the official rate, an adjustment to a realistic rate is needed to take into account the real value of the foreign exchange earnings or savings to the economy. The opposite adjustment is needed in cases where the operating income is worth less to the economy than to the proposed commercial firm. This situation arises generally when a new domestic factory, protected by tariff, produces goods formerly imported. When the goods were imported, their real cost to the economy -- assuming realistic exchange rates -- was the delivered cost in the country, not including duty. If the new domestic project is to sell at a higher price -- taking advantage of the tariff protection -- its revenue estimates should be scaled down to what they would be without tariff protection to show the revenue at the alternative cost to the economy of obtaining the same goods from abroad.

10.3 Adjustment to Estimated Net Operating Income of the Project to Reflect Measurable Economic Costs or Benefits to the Economy Aside from Those Which Would Affect the Project as a Commercial Enterprise

The need for such adjustments arises when a project has major measurable economic benefits or negative effects on the economy which do not enter into commercial estimates at all. For example, a project in Italy involved the construction of a large floating dry dock to service passing foreign ships. The project's main value to the economy was that it would bring large foreign exchange income to the country for repair work and provisioning of the ships serviced. To measure the value of the project to the economy, it was necessary to add an estimate of the value of the possible related activities -- plus a premium, because most of the earnings would be in foreign exchange.

The reverse of this situation -- cases in which minus adjustments need to be made to reflect social costs or benefits outside of ordinary operating costs and benefits -- also arises. One such case would occur if a proposed project would render existing facilities in the country obsolete so that they would have to be scrapped as noncompetitive. When the estimated social profitability for the new project has been calculated, the return on the old plant should be deducted to show the net value to the economy of having the new plant.

An illustration of the ordinary commercial profitability estimates and the social profitability estimates for a hypothetical industrial project is shown in Table 6.

Table 6

SUMMARY OF COMMERCIAL AND SOCIAL PROFITABILITY ESTIMATES

	Commercial Profitability	Social Profitability
Operating Revenues	$5,000,000	$7,000,000 a/
Operating Costs		
Raw Materials	$1,500,000	$1,900,000 b/
Labor	1,000,000	750,000 c/
Management and Sales	200,000	200,000
Depreciation	500,000	500,000
Interest	300,000	300,000
Taxes	500,000	d/
Total Operating Costs	$4,000,000	$3,650,000
Net Profit	$1,000,000	$2,350,000

Adjustments Made to Commercial Estimates to Get Social Estimates:

a/ 40% added to revenues to show value to the economy of gross foreign exchange revenues.

b/ 40% added to $1 million of imported raw material costs to reflect real cost of the foreign exchange to economy.

c/ 25% deducted from labor costs to reflect estimated alternative-use value of labor in agriculture.

d/ Taxes deducted, as they are not a cost to the economy.

(11)

Evaluate Project Feasibility

To say that a project is feasible implies that it meets the following criteria:

- The necessary technology either exists or can be developed
- The project is not inconsistent with social dictates
- The financial returns are satisfactory to all those who will invest funds in the project

The first two requirements have been assured by analyses described in previous sections of these notes. The question raised by the last criterion must be answered by the entrepreneur and those who provide funds for the venture. The answer will depend upon the comparative attractiveness of this and other investment alternatives.

(12)

Prepare Investment Proposal

Assuming that, from the viewpoint of the entrepreneur and his advisors, the project meets the above criteria, the next step is the preparation of the loan request. It is quite likely that lending agencies will have individual format requirements and perhaps special forms. The entrepreneur must check with potential lenders and meet their particular requirements regarding data and how they should be presented.

Generally, a short introduction must allow the evaluating official to quickly appraise the main features of the project and the results of the feasibility study. According to the OECD Manual of Industrial Project Analysis, the introduction should cover the following points in a few lines;

- Promoter or promoters of the project
- Product or products manufactured
- Level of normal output
- Raw materials used and the sources of supply
- Technical production method selected and the location of the plant
- Total cost of the project (in local currency and foreign currencies)
- Proposed method of financing (the proportions to be provided from the various sources of capital) and the legal structure of the future enterprise

- Unit cost of manufacture compared with present costs (e.g., at FOB or CIF prices)
- Size of the market and the expected trading profits
- Effects of the project on the economy, public finances, and the labor market.

The main body of the proposal should provide details of the market, technical, and financial analyses, but should not burden the reader with unnecessary computations and supporting data. In addition, and perhaps most important, the lender will want to know a great deal about the management of the proposed venture -- education and training, experience, financial resources, other business interests, etc.

Attachment A

COMPARISON OF INVESTMENT REQUIREMENTS FOR A PEANUT BUTTER PROCESSING PLANT LOCATED IN ALBANY, CHICAGO, OR CINCINNATI

Two types of investment – fixed investment and working capital – are examined. Fixed investment requirements include land and building, processing equipment, and auxiliary equipment for operating, testing, and office uses. Itemized cost estimates on each requirement, given separately, based on three plant sizes and three locations are as follows:

Land and Building – Land requirements are estimated on the basis of two acres for a 2,000-pounds-per-hour plant, four acres for a 4,500-pounds-per-hour plant and five acres for a 9,000-pounds-per-hour plant. Building space requirements are estimated at 20,000 square feet, 32,000 square feet, and 50,000 square feet, respectively, for the given plant sizes (See Table 17).

Land costs are estimated at $4,000 per acre in Albany, $32,000 per acre in Chicago, and $27,500 per acre in Cincinnnati. These costs were average 1971 actual land-transaction prices supplied by Lawyers Title Insurance Company and were based on developed industrial lands.

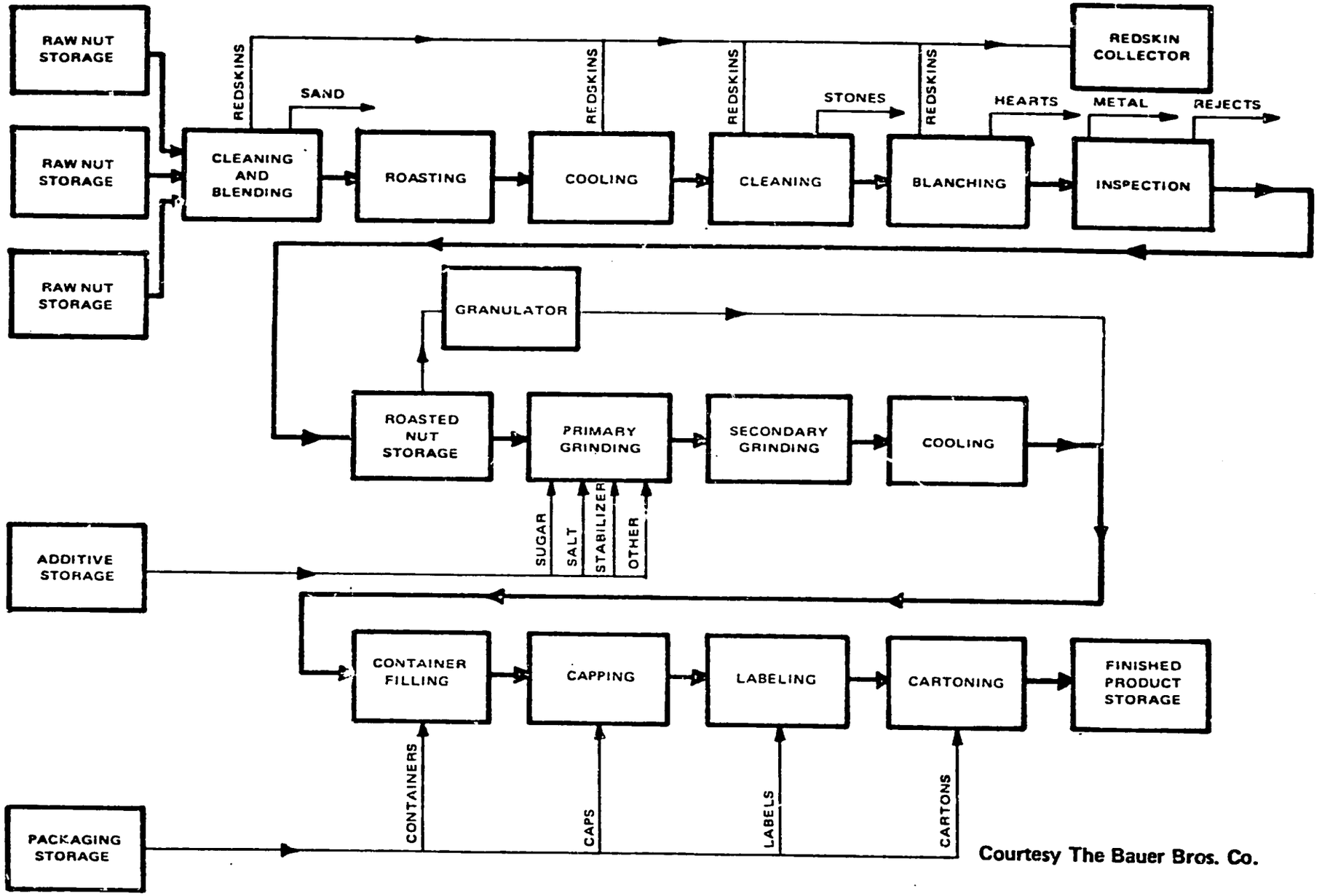
Building costs are $11.54 per square foot for Albany, $14.09 per square foot for Chicago, and $15.22 per square foot for Cincinnati (See Appendix C, Table 11). These costs are based on "Dodge Building Cost Calculation and Valuation Guide", in which average costs in the United States are $13.52 per square foot for a brick-concrete plant building with a wall height of 20 feet and useful space of 10,000 square feet (1). The costs include structure and finish, heating, ventilation, plumbing, electrical, and site work.

The cost estimates on land and plant building (See Table 17) are based on the above data. Obviously, Albany has the lowest costs, with a saving of 46 percent over Chicago and 56 percent over Cincinnati.

Processing Equipment – Two peanut butter processing models are used in this study. One is built around a batch-type roaster and the other is based on a continuous- type roaster. The first model is adopted for a plant with an output of 2,000 pounds per hour, and the second is adopted for both a 4,500-pounds-per-hour and a 9,000-pounds-per-hour plant. Itemized machinery costs for the 2,000-pounds-per-hour model are given in Appendix C, Table 12, while cost data for the 4,500 and 9,000-pounds-per-hour models are given in Appendix C, Table 13. Both systems use up-to-date machinery. No attempt is made here to describe the function of each piece of machinery listed. However, the combinations of machinery have been put together by two leading peanut butter manufacturing equipment suppliers.

Processing equipment may cost $114,000 for a 2,000-pounds-per-hour plant, $279,000 for a 4,500-pounds-per-hour plant, and $511,000 for a 9,000-pounds-per-hour plant. Location has very little bearing on the cost picture because transportation costs are an insignificant part of the total machinery costs.

Source: Southwest Georgia Area Planning and Development Commission, Peanut Processing Opportunities, June 1972.



Courtesy The Bauer Bros. Co.

Figure 13. Typical peanut butter processing plant.

Table 17. Investment requirements on land and building for three given plant sizes and three locations for peanut butter processing, 1971

	Plant size in pounds per hour		
	2,000	4,500	9,000
Space estimates			
Land in acres	2	4	5
Building space in square feet			
Production	3,000	5,000	8,000
Storage	12,400	19,000	30,000
Office	600	1,000	2,000
Cold storage	4,000	7,000	10,000
Total	20,000	32,000	50,000
Cost estimates			
Albany, Georgia			
Land ($4,000 per acre)	$ 8,000	$ 16,000	$ 20,000
Site preparation	3,000	5,000	8,000
Building ($11.54 per square foot)	230,800	369,280	577,000
Total	$241,800	$390,280	$605,000
Chicago, Illinois			
Land ($32,000 per acre)	$ 64,000	$128,000	$160,000
Site preparation	8,000	13,000	21,000
Building ($14.09 per square foot)	281,800	450,880	704,500
Total	$353,800	$591,880	$885,500
Cincinnati, Ohio			
Land ($27,500 per acre)	$ 55,000	$110,000	$137,500
Site preparation	7,000	12,000	19,000
Building ($15.22 per square foot)	304,400	487,040	761,000
Total	$366,400	$609,040	$917,500

Packaging Equipment – Itemized machinery costs for the three given plant sizes are presented in Appendix C, Table 14. Generally the larger the plant, the more automatic machinery is needed. The automatic case former, caser, case sealer, and palletizer are not included in the 2,000-pounds-per-hour plant, but they are specified for the 9,000-pounds-per-hour plant. The 4,500-pounds-per-hour plant has all machines listed except the palletizer. These machines, with attachments, can handle jar sizes of 6 ounces, 8 ounces, 12 ounces, 28 ounces, and 48 ounces. The investment costs are $32,000, $58,500, and $87,410, respectively, for the three plant sizes.

Auxiliary Equipment for Operating, Testing, and Office Uses – Equipment under this category includes a forklift, truck, battery, air compressor, boiler, pallets, belt conveyer, testing machinery, fire extinguishers, office machines, office furniture, and miscellaneous items. The total costs are estimated at $35,700, $63,450, and $98,000 for the three plant sizes. Details are given in Appendix C, Table 15.

Working capital is another investment requirement associated with a plant. Requirements for working capital vary according to plant size and location, ranging from $681,000 to $3,119,000. As a rule of thumb, working capital should be equivalent to two months' raw materials and one month's finished goods. Detailed estimates are given in Appendix C, Table 16.

PRODUCTION COSTS

VARIABLE COSTS

Two types of production costs – variable and fixed costs – are examined. Variable costs include raw materials, labor, containers, utilities, and miscellaneous items. Raw materials used in the making of peanut butter are shelled peanuts and such additives as sugar, salt, and stabilizers. These costs, discussed separately below, include:

Shelled Peanuts – It is assumed that the plants would have to buy shelled peanuts from the open market. Plant operators would buy in bulk in the summer and store the peanuts in the producing area. Commonly used peanut grades include Spanish No. 1, Spanish U. S. Splits, Runner No. 1 with Splits, Runner No. 1, and Runner Splits. The average price was 20 cents per pound in August 1971, and one-third cent would be added to the price each month until the next peanut season. Large users generally buy their yearly supply by October. An average annual price of 22 cents per pound is adopted for the Albany location.

Peanut kernel shrinkage in processing may range from 6 percent to 12 percent and is due to the removal of moisture skins, hearts, rejects, and foreign matter. A 10 percent shrinkage is used in this study. A typical shrinkage is given below:

Moisture	*4 percent*
Redskins	*2 percent*
Hearts	*2 percent*
Rejects	*2 percent*
Total	*10 percent*

Each pound of peanut butter would consist 90 percent of peanuts and 10 percent of additives by weight. Since the processing loss of peanut kernels is "made up" by additives, one pound of peanut kernels is required to make one pound of peanut butter. Annual shelled peanut requirements for the three plant sizes are 8 million, 18 million and 36 million pounds (Appendix C, Table 17).

In early 1972, brokers reported delivered Runner No. 1 peanuts cost 22 cents per pound in Albany, 22.9 cents per pound in Chicago and 22.6 cents per pound in Cincinnati. Annual costs of shelled peanuts for the plant locations in Albany, Chicago, and Cincinnati are given in Appendix C, Table 18. Albany has the lowest cost of the three locations. The cost of shelled peanuts represents the single largest financial outlay in peanut butter processing or over 50 percent of the total cost.

Additives – Additives used in the processing of peanut butter include sugar, salt, and stabilizers. The amount of additives used differs from one producer to another. In this study, a formula of 6.5 percent sugar, 1.5 percent salt, and 2.0 percent stabilizers is adopted. The sugar used is a mixture of corn syrup solids and is mostly dextrose. Salt is added to improve the flavor, and stabilizers such as hydrogenated vegetable oil, glycerin, lecithin, or antioxidants are used to prevent oil separation and to control rancidity. The cost of sugar or corn dextrose is higher in the North (11.5 cents per pound) than in the Southeast (11 cents per pound). Salt and stabilizer costs are about the same over the eastern part of the United States at $2 per hundred pounds and at 30 cents per pound, respectively. The amounts of additives required are given in Appendix C, Table 19, and their costs are estimated in Appendix C, Table 20.

Labor – The difference in direct labor requirements among the three given plant sizes is slight because of the highly automatic modern equipment developed in recent years. The number of workers is given by job classification in Appendix C, Table 21. In the 2,000-pounds-per-hour plant, the plant manager or a mechanic is expected to act as foreman. In the packaging section, the 2,000-pounds-per-hour plant requires five workers per shift, while the 9,000-pounds-per-hour plant needs only three. The reason is that automatic caser and a palletizer are added to the larger plants.

Wage rates used in calculating labor costs were based on actual interviews. Fringe benefits of 15 percent above given wage rates are added. Annual labor cost savings at the Albany location are significant – 77 percent compared with Chicago and 68 percent over Cincinnati. Labor costs are detailed in Appendix C, Table 22. Total labor costs for the 9,000-pounds-per-hour plant were only $124,200 at the Albany location compared to $219,800 in Chicago and $208,472 in Cincinnati.

Containers – It is assumed that the peanut butter produced in this study is intended primarily for the retail trade in the domestic market. Widemouthed glass jars are commonly used in this outlet. Jar sizes vary to a great extent, and the demand for the various jar sizes in the market would determine the volume of packs produced. The jar sizes adopted in this study are based on information developed from trade sources. Appendix C, Table 23 shows the number of cases required under each output volume.

Packaging costs per case, which include jars, cartons, caps, and labels, are given for each size jar and case in Appendix C, Table 24. The costs of the packaging materials, as given by major companies, are about the same over the eastern part of the United States. A few suppliers sell on base prices plus freight costs. Since the major suppliers have plants strategically located in different places, the difference in freight costs is negligible. Annual costs of these materials are presented in the table.

Utilities – Power, gas, and water are included. Electricity requirements are broken down by operating and lighting purposes. Volume requirements for the three plant sizes are given in Appendix C, Table 25. Horsepower (HP) is converted to 30-minute integrated kilowatt (KW) demand. The operation is based on 16 hours per day, 21 days per month, and 12 months a year. Electricity needed for lighting is based on two watts per square foot of the estimated plant spaces mentioned in previous sections and is based on 24 hours a day. The requirements for power are split almost evenly between operating and lighting purposes.

Since the post "price freeze" period, costs of electricity have increased about 10 percent. For the consumption volume given in Appendix C, Table 25, power rates are 1.37335 cents per kilowatt-hour (KWH) in Albany, 1.70973 cents per KWH in Chicago, and 1.1524 cents per KWH in Cincinnati. Annual power costs for the three plants are estimated in Appendix C, Table 26.

Gas is required for both processing and heating purposes, and the rates for the two purposes are different. It is estimated that 34,800 British thermal units (BTU) would be required to produce 100 pounds of peanut butter per hour. On this basis, the volume of gas required for processing each month is estimated in Appendix C, Table 27. Gas rates were obtained from gas companies in the different locations. Annual costs of gas for processing purposes are given in Appendix C, Table 28.

Gas requirements for heating purposes normally would be 7 BTU's per cubic foot in a brick building. However, the heat generated for processing purposes would remain partially in the building and thus would reduce the volume needed for heating. As a rule of thumb, 4 BTU's per cubic foot would be required for heating the plant building.

Differences in climate from place to place must be taken into account. The degree-day, a unit that represents one degree below 65 degrees in the mean daily outdoor temperature, is used to indicate the relative coldness of a given location. Albany has about 1,900 degree days a year, Chicago registers 6,000 degree days, and Cincinnati has 4,400 degree days. Thus, Chicago is about 3.16 times as cold as Albany, and Cincinnati is about 2.32 times as cold as Albany. Based on these assumptions, the estimated gas requirements for the different plant sizes are given in Appendix C, Table 29. Annual costs of gas for heating purposes are given in Appendix C, Table 30.

The water needs in a peanut butter plant are small, and the cost of water is insignificant relative to the total costs. It is estimated that water expenditures would be approximately $600 a year for a 2,000-pounds-per-hour plant, $1,000 a year for a 4,500-pounds-per-hour plant, and $1,500 a year for a 9,000-pounds-per-hour plant.

Miscellaneous – Miscellaneous expenses associated with variable costs may include such items as glue, ink, paper, and tape. They are estimated roughly at 1 percent of the total variable costs.

FIXED COSTS

General expenses or overhead costs may include administrative personnel, depreciation on building and equipment, interest, ad valorem taxes, insurance, and miscellaneous.

Administrative Personnel – A 9,000-pounds-per-hour plant would be large enough to afford a general manager, a sales manager, and a plant manager. In a 4,500-pounds-per-hour

plant, the general manager would handle sales jobs as well. The plant manager would have to handle all three jobs in a 2,000-pounds-per-hour plant. Detailed personnel requirements are listed in Appendix C, Table 31, and annual salary costs are shown in Appendix C, Table 32. There are some differentials in pay scale between Albany and the two northern cities. A 20 percent cost above salary is added to cover fringe benefits such as retirement plan, personnel insurance, paid holidays, and vacations.

Depreciation – Depreciation schedules vary with individual companies. In this study, the standards used are 30 years on the building, 12 years on processing and packaging equipment, and 10 years on equipment for auxiliary operation and office uses. Because of the variation in real estate value by location, the depreciation expenses in Albany, Chicago, and Cincinnati are presented separately in Appendix C, Tables 33, 34, and 35. For the largest plant size the annual depreciation is $78,900, $83,150, and $85,034 for the three respective locations.

Interest – Interest is based on the total fixed capital investment plus working capital. Borrowed capital for fixed investment may be paid out in a number of years and depends upon profit situations and the company's policy. Interest is assumed at 7.25 percent of the fixed investment. The interest rate for working capital is assumed at 6 percent; it is paid for only six months, because after this period of operation, the cash generated from sales should be able to take care of working capital. Annual interest expenses are presented in Appendix C, Table 36, by plant size and by location.

Ad Valorem Taxes –The ad valorem tax rates for Albany, Chicago, and Cincinnati are given below:

Albany, Georgia	*Assessment: 40 percent of real market value* *Rate: $48.95 per $1,000 assessed value*
Chicago, Illinois	*Assessment: 33 percent of real market value* *Rate: $65.82 per $1,000 assessed value*
Cincinnati, Ohio	*Assessment: 40 percent of real value on property* *Rate: $49.44 per $1,000 assessed value*

Based on these rates, Appendix C, Table 37 shows the annual ad valorem taxes for the three plant sizes in each of the three cities. These calculations indicate that Albany has the lowest property taxes.

Insurance – Insurance costs vary according to the type of plant construction and fire protection in the plant, location, and other factors. Only a rough estimate can be made without knowing the specific conditions for a given plant. The rates in Albany are about 20 percent lower than in both Chicago and Cincinnati. The rates for fire and other extended risks coverage in Albany are 44 cents per hundred dollars on building, machinery, and equipment and about 48 cents per hundred dollars on such contents as raw materials and finished goods. The rates in Chicago and Cincinnati are about the same at 56 cents per hundred dollars on building, machinery and equipment, and at 62 cents per hundred dollars on raw materials and finished goods. It is assumed that not over two weeks' raw materials and finished goods would be stored in the plants at any time. The detailed calculations are given in Appendix C, Table 38.

Miscellaneous – Miscellaneous expenses such as office supplies, telephone, telegraph, parts and maintenance, association dues, and others are estimated roughly at 10 percent of the total general expenses.

POTENTIAL RETURNS

Three national brands of peanut butter – Skippy, Peter Pan, and Jif – account for over 50 percent of sales in the United States. Their prices are the same with one pricing system throughout the nation. However, many smaller manufacturers sell at prices which are generally lower than those of the national brand names. With limited distribution and smaller sales expenses, these small producers can afford to sell at lower prices. A comparison of prices between the three national brands and a local brand is presented in Appendix C, Table 39. It appears that the local brand has an average price about 15 percent lower than that of the three national brands. The prices given in the table are delivered prices on a per-case basis with a minimum order of 50 cases. A cash discount of 2 percent is given if the order is paid within 10 days of delivery.

For calculation purposes the wholesale prices of the three national brands are used because of their uniformity in pricing and their sales volume in the market. An average price of $0.5542 per pound has been derived by weighting the sales volume as follows:

6-ounce size	*10 percent*
12-ounce size	*25 percent*
18-ounce size	*35 percent*
28-ounce size	*25 percent*
48-ounce size	*5 percent*

The average price per pound also is based on the prices for shipment volumes of 20,000 pounds to 39,999 pounds. The per-pound price calculation is given in Appendix C, Table 40. Based on the average price of $0.5542 per pound, gross sales revenues would be $4,433,600 for a 2,000-pounds-per-hour plant, $9,975,600 for a 4,500-pounds-per-hour plant, and $19,951,200 for a 9,000-pounds-per-hour plant.

Sales expenses include cash discounts, brokerage fees, advertising and promotion, and cost of freight-out (shipments of finished goods). Cash discounts are generally given at 2 percent of the sales price if an order is paid within a 10-day period subsequent to delivery. It is assumed that half of the annual sales volume will carry this cash discount. Brokerage fees would amount to about 5 percent of the gross revenues since the national brands make extensive use of brokers throughout the nation in selling their products. Advertising and promotional expenses are assumed at 5 percent of gross sales.

Freight-out costs are estimated for packaged peanut butter on a per-hundredweight basis and are calculated separately for three sizes of markets – national, eastern and regional. These costs have been presented in the transportation analysis in a previous section (Table 11). In Albany, the costs are $1.44 for national distribution, $1.18 for distribution in the eastern market, and 65 cents for distribution in the southeastern market. The per-hundredweight freight-out costs in Chicago are $1.24 for both the national market and the eastern market, while the respective costs in Cincinnati are $1.17 and 76 cents. The costs of serving their regional markets have not been worked out for Chicago and Cincinnati; the Albany rate of 65 cents is used for these two locations.

Based on these per-hundredweight freight-out rates, detailed costs on a per-case basis are derived and total freight-out costs are estimated by plant size and by location in Appendix C, Table 41. In the table, the costs for a 2,000-pounds-per-hour plant are calculated on the basis of regional distribution in the three different regions in which the

plants are located, those for a 4,500-pounds-per-hour plant in terms of sales to the eastern market, and those for a 9,000-pounds-per-hour plant on the rates for national distribution. Based on the demand analysis given in a previous section, the consumption of peanut butter in 1970 was estimated at 451 million pounds in the nation, 286 million pounds in the eastern market area, and 83 million pounds in the southeastern region. Consequently, a 36-million-pounds-per-year plant would have to sell its product nationally, an 18-million-pounds-per-year facility would require the market in the eastern part of the United States to absorb its production, and an 8-million-pound-per-year plant would need to sell only in a regional market.

Taxes include federal and state taxes on corporate income, which may be derived by subtracting all expenses and depreciation from gross sales. Federal taxes on corporate income are 45 percent. State taxes on corporate income vary; the Georgia tax is 6 percent, that for Illinois is 4 percent, and Ohio taxes are 4 percent on the first $25,000 and 8 percent on the income beyond that amount.

Production costs and sales expenses for the three plant models in the three cities are summarized in Table 18. Except for freight-out costs, the sales expenses are the same for all three plant sizes and among the three given locations. Variable costs differ considerably among the three cities. Albany has the lowest variable costs and general expenses (fixed costs). For a 9,000-pounds-per-hour plant, the combined savings in variable costs and general expenses in Albany would amount to over $500,000 annually. The details are given in Table 18.

Cost per pound also is given in the table. In Albany, the cost per pound is about 41 cents, while about 2 cents should be added to the cost in Chicago and Cincinnati. The per-pound variable costs and general expenses decline as the plant size increased. However, this advantage is nearly offset by the increased freight-out costs.

A summary statement of estimated costs and profits for the three plant models in the three given locations is presented in Table 19. The table includes income, investment, percentage return, and payout period. Because it has the lowest costs, Albany has the highest cash income in all the three models. Despite the higher state taxes in Georgia than in Illinois (state taxes are lower in Georgia than in Ohio), Albany still leads the other two locations in net corporate income and shows, therefore, a higher return on both fixed and total investment. Net income as a percentage of gross sales varies by plant size. For a 4,500-pounds-per-hour plant, it is about 12.2 percent in Albany, 11.0 percent in Chicago, and 11.1 percent in Cincinnati. Net income as a percentage of the total investment for a 4,500-pounds-per-hour plant is about 52 percent in Albany, 43 percent in Chicago, and 43 percent in Cincinnati. The payout period ranges from seven to 10 months in Albany to nine to 15 months in Cincinnati.

It should be noted that all costs and returns given in this section are based on 100 percent efficiency in plant operation without any mishaps or nonproductive motion on the part of labor or machinery. In reality, 10 to 20 percent of the production may be wasted in the process of production, thus increasing the per-unit production cost and reducing the profit margin. Wastage in the different stages of peanut butter production varies by individual plant, however, and there is no commonly accepted rule. Finally, the costs and returns presented in this section represent only a normal year's operation and do not include start-up costs in the initial year.

Table 18. Estimated annual costs and earnings of typical peanut butter plants, by plant size and location, 1972[a]

	2,000 pounds per hour plant serving its regional market			4,500 pounds per hour plant serving the eastern market			9,000 pounds per hour plant serving the national market		
	Albany	Chicago	Cincinnati	Albany	Chicago	Cincinnati	Albany	Chicago	Cincinnati
Sales									
Volume (pounds)	8,000,000	8,000,000	8,000,000	18,000,000	18,000,000	18,000,000	36,000,000	36,000,000	36,000,000
Dollars	$4,433,600	$4,433,600	$4,433,600	$ 9,975,600	$ 9,975,600	$ 9,975,600	$19,951,200	$19,951,200	$19,951,200
Sales expenses									
Cash discount, 2% of ½ sales	$ 44,336	$ 44,336	$ 44,336	$ 99,756	$ 99,7[illegible]	$ 99,756	$ 199,512	$ 199,512	$ 199,512
Brokerage fees, 5%	221,680	221,680	221,680	498,780	498,780	498,780	997,560	997,560	997,560
Advertising and promotion, 5%	221,680	221,680	221,680	498,780	498,780	498,780	997,560	997,560	997,560
Freight out	85,525	85,525[b]	85,525[b]	349,336	367,099	224,996	852,617	734,198	692,751
Subtotal	$ 573,221	$ 573,221	$ 573,221	$ 1,446,652	$ 1,464,415	$ 1,322,312	$ 3,047,249	$ 2,926,830	$ 2,887,383
Variable costs									
Peanuts	$1,760,000	$1,832,000	$1,808,000	$ 3,960,000	$ 4,122,000	$ 4,068,000	$ 7,920,000	$ 8,244,000	$ 8,136,000
Sugar	57,200	59,800	59,800	128,700	134,550	134,550	257,400	269,100	269,100
Salt and stabilizers	50,400	50,400	50,400	113,400	113,400	113,400	226,800	226,800	226,800
Labor	101,430	181,010	171,396	115,690	204,148	193,384	124,200	219,800	208,472
Containers	602,877	602,877	602,877	1,356,476	1,356,476	1,356,476	2,712,951	2,712,951	2,712,951
Power	8,158	10,156	6,845	10,943	13,623	9,182	18,738	23,328	15,723
Gas	2,863	3,606	3,242	5,693	6,685	6,129	10,682	11,916	10,965
Water	600	600	600	1,000	1,000	1,000	1,500	1,500	1,500
Miscellaneous	26,000	27,000	27,000	57,000	59,600	58,900	113,000	117,000	116,000
Subtotal	$2,609,528	$2,767,449	$2,730,150	$ 5,748,902	$ 6,011,482	$ 5,941,021	$11,385,271	$11,826,395	$11,697,511
Fixed costs									
Administrative	$ 50,400	$ 63,000	$ 63,000	$ 90,000	$ 112,200	$ 112,200	$ 140,400	$ 174,600	$ 174,600
Depreciation	23,429	25,119	25,893	46,779	49,499	50,705	78,900	83,150	85,034
Interest	51,134	59,614	60,407	103,324	118,780	119,754	186,242	206,858	210,038
Ad valorem taxes	8,292	11,631	10,839	15,492	21,565	19,974	25,482	33,949	31,917
Insurance	3,077	4,245	4,365	6,226	8,478	8,668	11,272	15,148	15,545
Miscellaneous	14,400	17,200	17,200	27,400	32,000	32,300	46,000	53,200	53,500
Subtotal	$ 150,732	$ 180,809	$ 181,674	$ 289,221	$ 342,522	$ 343,601	$ 488,296	$ 566,905	$ 570,634
Total costs	$3,333,481	$3,521,479	$3,485,075	$ 7,484,775	$ 7,818,419	$ 7,606,934	$14,920,816	$15,322,130	$15,155,528
Cost per pound									
Sales expenses	7.16c	7.16c	7.17c	8.04c	8.14c	7.35c	8.46c	8.14c	8.02c
Variable costs	32.62	34.59	34.13	31.94	33.40	33.01	31.63	32.85	32.49
General expenses	1.88	2.26	2.27	1.61	1.90	1.91	1.36	1.57	1.58
Total	41.66c	44.01c	43.57c	41.59c	43.44c	42.27c	41.45c	42.56c	42.09c

[a] See Appendix C for development of cost and income items.

[b] Freight out costs were not calculated for the regional markets served by a Chicago or Cincinnati plant, it was assumed these costs would be the same as the Albany plant.

Table 19. Summary statement of estimated costs and profits of typical peanut butter plants, based on three different sizes and on three locations, 1972

	Albany, Georgia			Chicago, Illinois			Cincinnati, Ohio		
	Plant size in pounds per hour			Plant size in pounds per hour			Plant size in pounds per hour		
	2,000	4,500	9,000	2,000	4,500	9,000	2,000	4,500	9,000
Income									
Gross sales	$4,433,600	$9,975,600	$19,951,200	$4,433,600	$9,975,600	$19,951,200	$4,433,600	$9,975,600	$19,951,200
Variable costs	2,609,528	5,748,902	11,385,271	2,767,449	6,011,482	11,826,395	2,730,160	5,941,021	11,697,511
Variable profit	$1,824,072	$4,226,698	$ 8,565,929	$1,666,151	$3,964,118	$ 8,124,805	$1,703,440	$4,034,579	$ 8,253,689
Sales expenses	573,221	1,446,652	3,047,249	573,221	1,464,415	2,928,830	573,221	1,322,312	2,887,383
Out-of-pocket fixed costs	127,303	242,442	409,396	155,690	293,023	483,755	155,811	292,896	485,600
Cash income	$1,123,548	$2,537,604	$ 5,109,284	$ 937,240	$2,206,680	$ 4,712,220	$ 974,408	$2,419,371	$ 4,880,706
Depreciation	23,429	46,779	78,900	25,119	49,499	83,150	25,883	50,705	85,034
Net income before taxes	$1,100,119	$2,490,825	$ 5,030,384	$ 912,121	$2,157,181	$ 4,629,070	$ 948,525	$2,368,666	$ 4,795,672
Federal taxes, 45%	495,054	1,120,871	2,263,673	410,454	970,731	2,083,081	426,836	1,065,900	2,158,052
State taxes	66,007	149,449	301,823	36,485	86,287	185,163	74,882	192,550	389,456
Net income	$ 539,058	$1,220,505	$ 2,464,888	$ 465,182	$1,100,163	$ 2,360,826	$ 446,807	$1,110,216	$ 2,248,164
Investment									
Fixed investment	$ 423,500	$ 791,230	$ 1,301,410	$ 535,500	$ 992,830	$ 1,563,010	$ 548,100	$1,009,990	$ 1,613,910
Working capital	681,000	1,532,000	3,063,000	693,000	1,560,000	3,119,000	689,000	1,551,000	3,101,000
Total	$1,104,500	$2,323,230	$ 4,364,410	$1,228,500	$2,552,830	$ 4,682,010	$1,237,100	$2,560,990	$ 4,714,910
Percent return on									
Fixed investment	127	154	189	87	111	151	81	110	139
Total investment	49	52	56	38	43	50	36	43	48
Payout period									
(with depreciation included)	10 months	8 months	7 months	14 months	11 months	8 months	15 months	11 months	9 months

Table 11. Brick-concrete plant building average costs, wall height 20 feet, useful space 10,000 square feet, average quality, April 1970 to April 1971

	Index	Dollars per square foot
United States	100.0	13.52
Los Angeles, Calif.	99.7	13.48
Albany, Ga.[a]	85.4	11.54
Atlanta, Ga.	93.0	12.57
Macon, Ga.	87.8	11.87
Savannah, Ga.	83.0	11.22
Chicago, Ill.	104.2	14.09
Indianapolis, Ind.	105.3	14.24
Grand Rapids, Mich.	108.6	14.68
Kansas City, Mo.	104.1	14.07
New York, N. Y.	119.9	16.21
Cincinnati, O.	112.6	15.22
Dallas, Tex.	94.4	12.76
Ft. Worth, Tex.	91.4	12.36
Norfolk, Va.	83.1	11.23
Portsmouth, Va.[b]	83.1	11.23
Suffolk, Va.[b]	83.1	11.23

[a] The composite index of Macon and Savannah, Georgia, was used.

[b] The index of Norfolk, Virginia, was used.

Source: Dodge, F. W., Company, A Division of McGraw-Hill, Inc., Dodge Building Cost Calculation and Valuation Guide, New York, 1971.

Table 12. Peanut butter processing equipment and quoted F.O.B. costs, batch type, based on 2,000-pounds-per-hour output, 1971

Machinery and model	Cost
Bucket elevator (Bauer No. 381 - 17 feet 9 inches)	$ 1,695
Ray-O-Matic roaster (Bauer No. 333)	10,470
Color control (Bauer No. 332-J)	3,520
Automatic cooler (Bauer No. 334-C)	5,995
Separator system (Bauer No. 208 - 42 inches)	4,000
Bucket elevator (Bauer No. 381 - 11 feet 11 inches)	1,325
Blancher (Bauer No. 341-B)	4,100
Picking table (Bauer No. 361 - 30 inches)	2,135
Magnet (Bauer No. 238 - 30 inches)	355
Bucket elevator (Bauer No. 381 - 11 feet 11 inches)	1,325
Peanut butter mill (Bauer No. 248-C)	7,200
Texturizer (Bauer No. 148)	3,300
Pumps - 2	2,100
Metering screws - 3	1,800
Hoppers	2,900
Color sorters (Icore Model 5141) - 4	15,800
Dust collector (Icore Model 75-80)	1,100
Scraped surface heat exchangers (Votator No. 1039SP)	9,780
Votator auxiliary equipment	14,580
Conveyor elevators	4,200
Installation and wiring	14,720
Freight in	1,600
Total	$114,000

Table 13. Peanut butter processing equipment and quoted F.O.B. costs, continuous type, based on hourly output of 4,500 pounds and 9,000 pounds, 1971

Machinery	Cost: Plant size in pounds per hour 4,500	9,000
Raw peanut dump	$ 360	$ 720
Bucket elevator	3,400	3,500
Cleaner feed bin	400	400
Recirculating peanut cleaner	6,000	9,200
Bucket elevator	3,700	4,000
Roaster feed hopper	1,600	3,200
Continuous roaster and cooler	77,400	154,800
Cooler collector	3,900	7,800
Cylinder cleaning rig	3,200	6,400
Bucket elevator	3,400	6,800
Blancher feed bin	1,700	3,400
Split nut blancher	11,600	23,200
Blancher nut cleaner	4,800	9,600
Collector for blancher	2,700	5,400
Color sorters and dust collector (Icore)	31,600	63,200
Picking table	3,150	6,300
Mill feed hopper	2,500	2,500
Peanut butter mill	16,000	24,000
Additive feeder	13,200	19,800
Mixing pump	4,500	9,000
Nut granulator	3,300	3,300
Heat exchanger system (Votator)	19,250	38,500
Conveyor elevators	4,200	6,400
Installation and wiring	51,975	93,020
Freight in	5,165	7,560
Total	$279,000	$511,000

Table 14. Peanut butter packaging equipment and quoted F.O.B. costs, by given plant size, 1971[a]

Machinery	Cost: Plant size in pounds per hour 2,000	4,500	9,000
U. S. container feeder	$ 4,350	$ 4,350	$ 4,350
Sanitair air cleaner (DS-8)	10,850	10,850	10,850
Piston filler	4,500	6,000	10,500
Resina capping machine (S-20)	4,700	5,800	5,800
Attachments for cap sizes	660	660	660
Attachments for container sizes	720	720	720
New Way labeler	3,590	3,590	3,590
Attachments for glass	705	705	705
Attachments for shape	700	700	700
New Way case former (VCF)	-	9,000	9,000
New Way vertical caser	-	8,650	8,650
Attachments	-	690	690
New Way container accumulator	705	-	-
New Way case sealer	-	6,125	6,125
Columbia palletizer	-	-	23,000
Freight in	520	660	2,070
Total	$32,000	$58,500	$87,410

[a] Machinery can handle jar sizes of 6, 8, 12, 18, 28, and 48 ounces.

Table 15. Auxiliary equipment for operating, testing, and office uses in peanut butter plants and estimated costs, 1971

Item	Plant size in pounds per hour					
	2,000		4,500		9,000	
	Number	Cost	Number	Cost	Number	Cost
Electric forklift	1	$ 7,500	2	$15,000	3	$22,500
Battery and charger	1	3,000	2	6,000	3	9,000
Air compressor	1	700	1	1,200	1	1,800
Boiler	1	5,000	1	8,000	1	10,000
Pallets	300	1,200	500	2,000	1,000	4,000
Belt conveyor	1	300	1	450	1	600
Laboratory equipment	1	4,000	1	6,000	1	8,000
Fire protection	1	6,000	1	10,000	1	15,000
Office furniture		5,000		10,000		20,000
Office machines		1,500		3,000		5,000
Miscellaneous		1,500		1,800		2,100
Total		$35,700		$63,450		$98,000

Table 16. Working capital requirements for peanut butter processing, by location and by plant size, 1972

Location	Plant size in pounds per hour	One month finished goods	Two months raw materials	Total
Albany, Ga.	2,000	$ 370,000	$ 311,000	$ 681,000
	4,500	831,000	701,000	1,532,000
	9,000	1,662,000	1,401,000	3,063,000
Chicago, Ill.	2,000	$ 370,000	$ 323,000	$ 693,000
	4,500	831,000	729,000	1,560,000
	9,000	1,662,000	1,457,000	3,119,000
Cincinnati, O.	2,000	$ 370,000	$ 319,000	$ 689,000
	4,500	831,000	720,000	1,551,000
	9,000	1,662,000	1,439,000	3,101,000

Table 17. Annual shelled peanut requirements for peanut butter processing, by plant size, 1972

Plant size	Shelled peanut requirements	
	Daily	Yearly
pounds per hour	pounds	
2,000	32,000	8,000,000
4,500	72,000	18,000,000
9,000	144,000	36,000,000

Table 18. Annual costs of shelled peanuts for peanut butter processing, by location and by plant size, 1971

Location	Cost		
	Plant size in pounds per hour		
	2,000	4,500	9,000
Albany	$1,760,000	$3,960,000	$7,920,000
Chicago	1,832,000	4,122,000	8,244,000
Cincinnati	1,808,000	4,068,000	8,136,000

Table 19. Daily and annual requirements for additives in the manufacture of peanut butter, by plant size

Plant size	Daily requirements			Annual requirements		
	Sugar	Salt	Stabilizers	Sugar	Salt	Stabilizers
pounds per hour	pounds					
2,000	2,080	480	640	520,000	120,000	160,000
4,500	4,680	1,080	1,440	1,170,000	270,000	360,000
9,000	9,360	2,160	2,880	2,340,000	540,000	720,000

Table 20. Annual costs of additives for peanut butter processing, by plant size and by location, 1972

Plant size in pounds per hour	Cost			
	Sugar		Salt	Stabilizers
	Albany	Chicago or Cincinnati	Three cities	Three cities
2,000	$ 57,200	$ 59,800	$ 2,400	$ 48,000
4,500	128,700	134,550	5,400	108,000
9,000	257,400	269,100	10,800	216,000

Table 21. Labor requirements per eight-hour shift and total, by job classification, for the given peanut butter plant sizes

Job classification	Number of workers								
	2,000 pounds per hour			4,500 pounds per hour			9,000 pounds per hour		
	First	Second	Total	First	Second	Total	First	Second	Total
Foreman	-	-	-	1	1	2	1	1	2
Production worker	2	2	4	2	2	4	2	2	4
Maintenance	1	1	2	1	1	2	1	1	2
Packaging	5	5	10	4	4	8	3	3	6
Receiving and shipping	1	1	2	2	2	4	3	3	6
Clean up and odd jobs	1	1	2	1	1	2	2	2	4
Total	10	10	20	11	11	22	12	12	24

Table 22. Annual labor cost requirements for peanut butter processing, by location and by plant size, 1972[a]

Job classification	Albany: Hourly rate	Albany: Annual costs, Plant size in pounds per hour: 2,000	4,500	9,000	Chicago: Hourly rate	Chicago: Annual costs, Plant size in pounds per hour: 2,000	4,500	9,000	Cincinnati: Hourly rate	Cincinnati: Annual costs, Plant size in pounds per hour: 2,000	4,500	9,000
Foreman	$3.25	-	$ 13,000	$ 13,000	$5.28	-	$ 21,120	$ 21,120	$5.00	-	$ 20,000	$ 20,000
Production worker	2.15	$ 17,200	17,200	17,200	3.50	$ 31,200	31,200	31,200	3.72	$ 29,760	29,760	29,760
Maintenance	3.00	12,000	12,000	12,000	4.75	19,000	19,000	19,000	4.22	16,880	16,880	16,880
Packaging	2.15	43,000	34,400	25,800	3.90	78,000	62,400	46,800	3.72	74,400	59,520	44,640
Receiving and shipping	2.00	8,000	16,000	24,000	3.65	14,600	29,200	43,800	3.50	14,000	28,000	42,000
Clean up and odd jobs	2.00	8,000	8,000	16,000	3.65	14,600	14,600	29,200	3.50	14,000	14,000	28,000
Subtotal		$ 88,200	$100,600	$106,000		$157,400	$177,520	$191,120		$149,040	$168,160	$181,280
Workmen's compensation and fringe benefits at 15% of hourly rate		13,230	15,090	16,200		23,610	26,628	28,680		22,356	25,224	27,192
Total		$101,430	$115,690	$124,200		$181,010	$204,148	$219,800		$171,396	$193,384	$208,472

[a] (1) Based on two shifts (8 hours per shift) a day, 250 days a year, or 2,000 working hours per worker a year.
(2) Total labor costs under each job title were derived as follows: Number of workers x 2,000 hours x hourly rate.

Table 23. Annual peanut butter volume produced, by jar size and the number of cases required

Jar size (ounces)	Number of packs per case	Net peanut butter weight per case (pounds)	Percent of production	2,000 pounds per hour: Pounds	Number of cases	4,500 pounds per hour: Pounds	Number of cases	9,000 pounds per hour: Pounds	Number of cases
48	6	18	10	800,000	44,444	1,800,000	100,000	3,600,000	200,000
28	12	21	25	2,000,000	95,238	4,500,000	214,286	9,000,000	428,571
18	12	13.5	35	2,800,000	207,407	6,300,000	466,666	12,600,000	933,333
12	24	18	25	2,000,000	111,111	4,500,000	250,000	9,000,000	500,000
6	24	9	5	400,000	44,444	900,000	100,000	1,800,000	200,000
Total			100	8,000,000	502,644	18,000,000	1,130,952	36,000,000	2,261,904

Table 24. Estimated annual costs for peanut butter packaging materials, by plant size, 1972

Jar size in ounces	Number of jars per case	Cost of jars, caps, cartons, and labels per case	Annual cost: Plant size in pounds per hour 2,000	4,500	9,000
48	6	$1.00	$ 44,444	$ 100,000	$ 200,000
28	12	1.41	134,286	302,143	604,285
18	12	.92	190,814	429,333	858,666
12	24	1.62	180,000	405,000	810,000
6	24	1.20	53,333	120,000	240,000
Total			$602,877	$1,356,476	$2,712,951

Table 25. Annual power requirements for operating and for lighting purposes, by peanut butter plant size

Plant size in pounds per hour	HP	Operating purposes: KW demand per 30 minutes	KWH per month	Lighting purposes: KW demand per hour	KWH per month	Total annual KWH
2,000	150	75	27,500	40	22,000	594,000
4,500	170	85	31,200	64	35,200	7,961,800
9,000	320	160	58,700	100	55,000	1,364,400

Table 26. Estimated annual power costs for peanut butter plants, by plant size and by location, 1972

Plant size in pounds per hour	Annual cost: Albany	Chicago	Cincinnati
2,000	$ 8,158	$10,156	$ 6,845
4,500	10,943	13,623	9,182
9,000	18,738	23,328	15,723

Table 27. Gas volume required for peanut butter processing purposes, by plant size

Plant size in pounds per hour	BTU per hour	Therms per hour (100 cubic feet)	Therms per day	Therms per month
2,000	700,000	7.00	112.00	2,352.00
4,500	1,566,000	15.66	250.56	5,261.76
9,000	3,132,000	31.32	501.12	10,523.52

Table 28. Estimated annual cost of gas for peanut butter processing, by plant size and by location

Plant size in pounds per hour	Albany		Chicago		Cincinnati	
	Per month	Per year	Per month	Per year	Per month	Per year
2,000	$188.59	$2,263.08	$187.38	$2,248.56	$181.11	$2,173.32
4,500	392.29	4,707.48	376.46	4,517.52	369.68	4,436.04
9,000	760.56	9,126.72	715.88	8,590.56	700.38	8,404.56

Table 29. Annual gas volume required for heating purposes in peanut butter plants, by plant size and by location

Plant size in pounds per hour	Plant space (20 feet in height)	Therms		
		Albany	Chicago	Cincinnati
2,000	20,000	6,000	18,960	13,920
4,500	32,000	10,000	31,600	23,200
9,000	50,000	16,000	50,560	37,120

Table 30. Estimated annual cost of gas for heating purposes in peanut butter plants, by plant size and by location

Plant size in pounds per hour	Annual cost		
	Albany	Chicago	Cincinnati
2,000	$ 600	$1,357	$1,069
4,500	986	2,168	1,693
9,000	1,555	3,325	2,560

Table 31. Administrative personnel requirements for given peanut butter plant sizes

Plant size in pounds per hour	General manager	Sales manager	Plant manager	Accountant	Stenographer	Clerk
2,000	-	-	1	1	1	2
4,500	1	-	1	1	2	3
9,000	1	1	1	1	3	4

Table 32. Annual costs of administrative salaries for peanut butter plants, by location and by plant size

	Albany			Chicago or Cincinnati		
	Size in pounds per hour			Size in pounds per hour		
	2,000	4,500	9,000	2,000	4,500	9,000
General manager	-	$20,000	$ 25,000	-	$ 25,000	$ 30,000
Sales manager	-	-	20,000	-	-	25,000
Plant manager	$16,000	16,000	20,000	$20,000	20,000	25,000
Accountant	8,000	9,000	10,000	10,000	11,000	13,000
Stenographer	6,000	12,000	18,000	7,500	15,000	22,500
Clerk	12,000	18,000	24,000	15,000	22,500	30,000
Subtotal	$42,000	$75,000	$117,000	$52,500	$ 93,500	$145,500
Fringe benefits (20%)	8,400	15,000	23,400	10,500	18,700	29,100
Total	$50,400	$90,000	$140,400	$63,000	$112,200	$174,600

Table 33. Annual depreciation expenses on building and equipment for peanut butter processing, by plant size, in Albany, Georgia

Item	Life (years)	Value: Plant size in pounds per hour 2,000	4,500	9,000	Annual depreciation: Plant size in pounds per hour 2,000	4,500	9,000
Building	30	$230,800	$369,280	$577,000	$ 7,693	$12,309	$19,233
Processing equipment	12	114,000	279,000	511,000	9,500	23,250	42,583
Packaging equipment	12	32,000	58,500	87,410	2,666	4,875	7,284
Operating and administrative equipment	10	35,700	63,450	98,000	3,570	6,345	9,800
Total annual depreciation expenses					$23,429	$46,779	$78,900

Table 34. Annual depreciation expenses on building and equipment for peanut butter processing, by plant size, in Chicago, Illinois

Item	Life (years)	Value: Plant size in pounds per hour 2,000	4,500	9,000	Annual depreciation: Plant size in pounds per hour 2,000	4,500	9,000
Building	30	$281,800	$450,880	$704,500	$ 9,393	$15,029	$23,483
Processing equipment	12	114,000	279,000	511,000	9,500	23,250	42,583
Packaging equipment	12	32,000	58,500	87,410	2,666	4,875	7,284
Operating and administrative equipment	10	35,700	63,450	98,000	3,570	6,345	9,800
Total annual depreciation expenses					$25,119	$49,499	$83,150

Table 35. Annual depreciation expenses on building and equipment for peanut butter processing, by plant size, in Cincinnati, Ohio

Item	Life (years)	Value: Plant size in pounds per hour 2,000	Value: Plant size in pounds per hour 4,500	Value: Plant size in pounds per hour 9,000	Annual depreciation: Plant size in pounds per hour 2,000	Annual depreciation: Plant size in pounds per hour 4,500	Annual depreciation: Plant size in pounds per hour 9,000
Building	30	$304,400	$487,040	$761,000	$10,147	$16,235	$25,367
Processing equipment	12	114,000	279,000	511,000	9,500	23,250	42,583
Packaging equipment	12	32,000	58,500	87,410	2,666	4,875	7,284
Operating and administrative equipment	10	35,700	63,450	98,000	3,570	6,345	9,800
Total annual depreciation expenses					$25,883	$50,705	$85,034

Table 36. Annual interest expenses for peanut butter processing, by plant size and location, 1972

	Principal			Interest Rate	Annual interest		
	Plant size in pounds per hour				Plant size in pounds per hour		
	2,000	4,500	9,000		2,000	4,500	9,000
Albany, Georgia							
Fixed capital	$423,500	$ 791,230	$1,301,410	7.25%	$30,704	$ 57,364	$ 94,352
Working capital	681,000	1,532,000	3,063,000	6%, 6 months	20,430	45,960	91,890
Total					$51,134	$103,324	$186,242
Chicago, Illinois							
Fixed capital	$535,500	$ 992,830	$1,563,010	7.25%	$38,824	$ 71,980	$113,318
Working capital	693,000	1,560,000	3,119,000	6%, 6 months	20,790	46,800	93,540
Total					$59,614	$118,780	$206,858
Cincinnati, Ohio							
Fixed capital	$548,100	$1,009,990	$1,613,910	7.25%	$39,737	$ 73,224	$117,008
Working capital	689,000	1,551,000	3,101,000	6%, 6 months	20,670	46,530	93,030
Total					$60,407	$119,754	$210,038

Table 37. Property values and annual ad valorem taxes by plant size and location (peanut butter), 1972[a]

	2,000 pounds per hour			4,500 pounds per hour			9,000 pounds per hour		
Location	Actual value	Assessed value	Annual tax	Actual value	Assessed value	Annual tax	Actual value	Assessed value	Annual tax
Albany	$423,500	$169,400	$ 8,292	$ 791,230	$316,492	$15,492	$1,301,410	$520,564	$25,482
Chicago	535,500	176,715	11,631	992,830	327,634	21,565	1,563,010	515,793	33,949
Cincinnati	548,100	219,240	10,839	1,009,990	403,996	19,974	1,613,910	645,564	31,917

[a] See text for assessment percentages and tax rates.

Table 38. Annual insurance costs for a peanut butter processing plant, by plant size and location, 1972

Plant size in pounds per hour	Plant building, machinery, and equipment		Raw materials and finished goods		Total annual insurance costs
	Value	Insurance costs	Value	Insurance costs	
			Albany, Georgia		
2,000	$ 412,500	$1,815	$ 263,000	$1,262	$ 3,077
4,500	770,230	3,389	591,000	2,837	6,226
9,000	1,273,410	5,603	1,181,000	5,669	11,272
			Chicago, Illinois		
2,000	$ 463,500	$2,596	$ 266,000	$1,649	$ 4,245
4,500	851,830	4,770	598,000	3,708	8,478
9,000	1,382,010	7,739	1,195,000	7,409	15,148
			Cincinnati, Ohio		
2,000	$ 486,100	$2,722	$ 265,000	$1,643	$ 4,365
4,500	887,990	4,973	596,000	3,695	8,668
9,000	1,457,410	8,161	1,191,000	7,384	15,545

Table 39. Peanut butter price list for three national brand names and one local brand name, January 1972

Case size[a]	Skippy, Peter Pan, and Jif: 40,000 pounds and over	20,000 to 39,999 pounds	50 cases minimum to 19,999 pounds
6/48	$ 8.90	$ 8.95	$ 9.00
12/28	10.90	10.95	11.00
12/18	7.35	7.38	7.42
24/12	10.25	10.30	10.35
24/6	5.80	5.82	5.85
Case size[a]	**A local brand name: 24,000 pounds and over**	**5,000 to 23,999 pounds**	**50 cases minimum to 4,999 pounds**
6/40	$6.20	$6.45	$6.65
12/28	8.90	9.35	9.55
12/18	6.10	6.35	6.55
24/12	8.70	9.10	9.30
24/8	6.35	6.60	6.75

[a] Number of jars per case and number of ounces of peanut butter per jar.

Table 40. Average price per pound of peanut butter, the three national brands, shipments of 20,000 to 39,999 pounds, 1972

Case size[a]	Price per case	Peanut butter net weight in pounds per case	Price per pound	Percent of total sales	Weighted total
6/48	$ 8.95	18	$0.4972	5	$ 2.486
12/28	10.95	21	0.5214	25	13.035
12/18	7.38	13.5	0.5466	35	19.131
24/12	10.32	18	0.5722	25	14.305
24/6	5.82	9	0.6466	10	6.466
					$55.423

$55.423 ÷ 100 = $0.5542 per pound

[a] Number of jars per case and number of ounces of peanut butter per jar.

Table 41. Estimated annual freight-out costs for shipping peanut butter, by plant size and location, 1972

Case size[a]	Gross weight in pounds per case	2,000 pounds per hour: Freight cost per case	2,000 pounds per hour: Number of cases	2,000 pounds per hour: Total freight cost	4,500 pounds per hour: Freight cost per case	4,500 pounds per hour: Number of cases	4,500 pounds per hour: Total freight cost	9,000 pounds per hour: Freight cost per case	9,000 pounds per hour: Number of cases	9,000 pounds per hour: Total freight cost
Albany, Georgia										
6/48	30	$0.1950	44,444	$ 8,667	$0.3540	100,000	$ 35,400	$0.4320	200,000	$ 86,400
12/28	33	0.2145	95,238	20,429	0.3894	214,286	83,443	0.4752	428,571	203,657
12/18	21.5	0.13975	207,407	28,985	0.2537	466,666	118,393	0.3096	933,333	288,960
24/12	31	0.2015	111,111	22,389	0.3658	250,000	91,450	0.4464	500,000	223,200
24/6	17 5	0.11375	44,444	5,055	0.2065	100,000	20,650	0.2520	200,000	50,400
Total			502,644	$85,525		1,130,952	$349,336		2,261,904	$852,617
Chicago, Illinois										
6/48	30	$0.1950	44,444	$ 8,667	$0.3720	100,000	$ 37,200	$0.3720	200,000	$ 74,400
12/28	33	0.2145	95,238	20,429	0.4092	214,286	87,686	0.4092	428,571	175,371
12/18	21.5	0.13975	207,407	28,985	0.2666	466,666	124,413	0.2666	933,333	248,827
24/12	31	0.2015	111,111	22,389	0.3844	250,000	96,100	0.3844	500,000	192,200
24/6	17.5	0.11375	44,444	5,055	0.2170	100,000	21,700	0.2170	200,000	43,400
Total			502,644	$85,525		1,130,952	$367,099		2,261,904	$734,198
Cincinnati, Ohio										
6/48	30	$0.1950	44,444	$ 8,667	$0.2280	100,000	$ 22,800	$0.3510	200,000	$ 70,200
12/28	33	0.2145	95,238	20,385	0.2508	214,286	53,743	0.3861	428,571	165,471
12/18	21.5	0.13975	207,407	28,985	0.1634	466,666	76,253	0.25155	933,333	234,780
24/12	31	0.2015	111,111	22,389	0.2356	250,000	58,900	0.3627	500,000	181,350
24/6	17.5	0.11375	44,444	5,055	0.1330	100,000	13,300	0.20475	200,000	40,950
Total			502,644	$85,525		1,130,952	$224,996		2,261,904	$692,751

[a] Number of jars per case and number of ounces of peanut butter per jar.

Attachment B

ANALYSIS OF INVESTMENT RISKS AND CHOICE OF THE BEST ALTERNATIVE

Underlying all our arguments so far has been the assumption that we had perfect knowledge of the future, whenever information about the future was required for making a decision. In other words, each decision (as to price level, volume of production, size of initial investment, discount rate, etc.) was the logical outcome of a perfectly known sequence of future situations. As a result it was possible to classify each possible solution according to the present (discounted) value of the earnings it would procure and select the one which offered the maximum return.

Let us now consider the position realistically. Our knowledge of the future, and sometimes even of the present, is imperfect. Each decision taken now is the outcome of a set of assumptions concerning the future events (the increase or decrease in the price of raw materials, the abolition of aid to exports, the emergence of new competitors, climatic uncertainties, political or social developments, human caprice and instability, and so on). This uncertainty moreover is worsened by the fact that our forecasts are based on an imperfect knowledge of economic conditions.

> « The outstanding fact » wrote Keynes[1] « is the extreme precariousness of the basis of knowledge on which our estimates of prospective yield have to be made. Our knowledge of the factors which will govern the yield of an investment some years hence is usually very slight and often negligible. If we speak frankly, we have to admit that our basis of knowledge for estimating the yield ten years hence of a railway, a copper mine, a textile factory, the goodwill of a patent medicine, an Atlantic liner, a building in the City of London, amounts to little and sometimes nothing. »

Although techniques of economic forecasting are somewhat more advanced than they were when Keynes wrote these lines, they cannot eliminate the uncertainty of many factors affecting the profitability of investments. Even abstention is a kind of choice. In an economic world characterised by the prevalence of uncertainty, criteria for decision-taking are essential both for the practical man and the theorist.

Errors ad risks arising from uncertainty about the future can be put into three broad categories. In practice, of course, each project is subject to several kinds of risks, and their classification into one or another of these categories may be open to discussion.

The three categories are :

— Risks which can be measured in terms of a probability coefficient related to each possible situation. For example, economic activities subject to climatic variations are uncertain, but known in terms of probability.

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1. J.M. Keynes, *General Theory of Employment, Interest and Money.*

Source: Manual of Industrial Project Analysis in Developing Countries, Development Center of the Organization for Economic Co-operation and Development, Paris, 1968.

— Risks relating to a future situation which cannot be measured in terms of probability, but depend on a single event, or a limited number of events, such as the success or failure of political negotiations, the results of elections, scientific discovery, etc.
— Risks due to ordinary mistakes in estimates or forecasts at the planning stage. The most common mistakes in this field were described in Chapters I and II. They can occur both in forecasts of demand and prices, and in estimates of costs.

This chapter will deal with ways of measuring the degree to which the project may be affected by the risks and errors inherent in any investment decision.

Having made allowance for these risks, and for all the other factors outside the scope of economic analysis, the people responsible for the project will have done al they possibly can to ensure that they select the best possible solution.

It should finally be noted that risks from the point of view of the community may differ from those which affect the firm, and also that different methods of allowing for risk may be appropriate. In this chapter we concern ourselves only with risk from the point of view of the firm.

1. TAKING RISKS INTO ACCOUNT WHEN ESTIMATING THE PROSPECTIVE YIELD OF PROJECT

The future is always uncertain. It is clear that a wise choice cannot be made between projects on the basis of a calculated present value, without also taking into account how uncertain these calculations are. The uncertainty may be much greater for one project (or variant) than another.

1.1. Probability distributions

Ideally the project analyst might present the man who chooses with a ' probability distribution ', i.e. a range of present values of each project with a probability estimate attached to each such value. Thus instead of saying that the calculated present value is 5, he might produce a range of the following sort :

Present value	— 5	0	+ 5	10
Probabilities	0.2	0.2	0.4	0.2

By multiplying the outcomes by the probabilities and summing, one can then produce « the actuarial present value » — which is 3 in the above case.

Even if the above is possible, it does not follow that the logical thing to do is to substitute actuarial values and choose accordingly. For instance, let there be two projects A and B as follows :

Outcome	— 1	0	1	2	3	
Probability A	0	.1	.8	.1	0	Actuarial value = 1.0
Probability B	.3	.1	.1	.1	.4	Actuarial value = 1.2

There is no logical reason why B should be chosen. The substantial fear of loss in Case B may well make one prefer Case A. This will depend

partly on the purely subjective preferences of the chooser, and partly on the objective circumstances of the firm. For instance, if the firm had many projects similar to B the consolidated risk of loss would become very small, and it would be sensible to go for these more risky projects. But if B is a large project, and the firm's financial position is tight, then it would be foolish.

In practice however, although actuarial values play an important role in the insurance business, it is likely to be impractical to produce a « probability distribution » of outcomes for any industrial project.

The final outcomes depend on a large number of separate estimates, for many of which there would be no sound basis for assigning numerical probabilities. These can generally be attached only when there is a long valid experience, e.g. in the case of an irrigation project, one can readily produce a probability distribution for rainfall if records have been kept, but not for the effect of the water on crops, since this will depend on many complementary factors whose values are unknown in the particular case.

1.2. Sensitivity analysis

Despite the inability of the project analyst to produce a probability distribution of present values, it is nevertheless important to give the man who makes the final choice as much assistance as possible in seeing where the risks lie, and in assessing their importance.

The best practical way to do this is to select those variables whose estimated values may contain significant errors, and then to calculate the effect of errors of different sizes on the present value of the project. This is known as sensitivity analysis : i.e. one investigates the sensitivity of the outcome to various kinds of errors.

When the analyst has discovered the variables to which the outcome is most sensitive, he should :

— scrutinise his estimates of these with the greatest care ;
— discuss the estimated values in his report, and suggest the possible range of error ;
— present the sensitivity analysis for the use of the final chooser.

It should be noted that the point of the sensitivity calculation is not only to give an idea of the change in present value which results from wrong estimates, with a view to helping the chooser to decide whether a project is viable or not. It may have already been decided to proceed with one or other variant of a project, in which case the sensitivity analysis is primarely concerned to show whether one of the variants is significantly riskier than the other. Also, at the early stages of the project investigation, sensitivity analysis may be used to pick out those variables to the estimation of which the most resources and thought should be devoted.

1.3. Errors of estimation and of forecasting

We have briefly described how to deal with problems raised by uncertainty about the future when assessing an investment. We must now go further, and indicate how an attempt should be made in practice to take

account of errors made in estimating numerical values in cases where the possible error is still of a reasonable magnitude. This, in fact, implies an analysis of the degree to which the conclusions of the study may be affected by moderate changes in certain variables.

Further, the purpose of calculating the error is frequently not to show how the discounted value of future returns would be affected by defective estimation ; rather, is it intended to see how *the ordering* of the solutions may be changed — always provided that the present value of future returns remains positive. Sometimes the aim of the calculation will be to pinpoint factors with a critical influence on the present value of returns so that intensive effort can go into estimating these factors accurately.

Different methods may be considered for carrying out this analysis. They must be adapted to the time horizon envisaged in the study (short, medium or long-term) and also to the nature of factors capable of affecting the prospective yield of the project.

We shall first describe a very simple method — frequently included in the management manuals of firms — called the « break-even point » method, i.e. the production or price level at which the enterprise balances its expenditure and receipts.

We shall then describe a more general method that attempts to take into consideration all factors affecting the project's prospective yield.

1.3.1. *The « break-even point » method*

In simple cases, the main object of this method is to determine the lowest production and price levels at which the enterprise can operate without endangering its financial viability. The period adopted for the break-even point study should also be specified i.e., short or long-term, since certain expenditure headings which may be considered as given in one case may become variable in the other.

Let us take an enterprise manufacturing a single product and consider its turnover and costs :

- Turnover is derived from product sales.
- As a first approximation, cost outlays may be considered to consist of :
  - fixed costs, independent of actual production ;
  - variable costs, directly related to the level of output.

Fixed costs may themselves be broken down into two types of expenditure :

- Depreciation charges : the amounts charged annually as representing the cost of investments made in earlier periods, which do not, however, correspond to actual cash payments by the enterprise.
- Structural outlays : these are related to the productive capacity of the enterprise rather than to the actual level of output. They include the salaries and associated outlays in respect of management and supervisory staff and overhead expenses proper (rents, taxes not dependent on profit or turnover, marketing expenses in some cases, financial charges, etc.). This expenditure corresponds to the actual cash payments entailed by the very existence of the enterprise.

Variable costs are expenses directly related to production (cost of labour inputs, raw materials, power, some maintenance, etc.). For given productive capacity, they depend only on the actual level of output.

This classification of costs as fixed and variable is, of course, often arbitrary and depends mainly on the period considered. The number of machines may decrease or increase in the long-term, and the cost of depreciation, which is fixed in the short term, becomes variable in the long term. Thus, the numerical value of the break-even point will differ according to the time horizon chosen.

Let us consider these different aspects in a mathematical example.

Construction of a plant with a production capacity of 150,000 units for a good χ has cost $4 million.

A market study has shown that the total output can normally be sold at $25 per unit.

On this structural basis the working expenses are :

— $325,000 fixed costs,
— $160,000 depreciation (linear depreciation schedule),
— $18 per unit of production for variable working expenses.

Let us determine the level of output χ for which receipts are equal to total working expenses (unit selling price is $25).

Thus :

$$25\,\chi = 325{,}000 + 160{,}000 + 18\,\chi$$
$$\chi = 69{,}286 \text{ units.}$$

If the selling price falls, for an output of 150,000 units the enterprise will continue to make a profit until the price falls to the value determined by the following equation :

$$150{,}000\,p = 325{,}000 + 160{,}000 + 18 \times 150{,}000$$
$$\text{thus } p = \$21.2.$$

Graph V.1 illustrates the break-even point concept ; the physical volume of output is shown on the abscissa and costs on the ordinate.

Total expenditure is represented by the line DD', with its slope indicating the variable unit cost, and the total fixed costs by the height at the origin (OD) i.e. :

$$OD = \$485{,}000$$

Sales are represented by the line OV whose slope indicates the unit selling price.

At a selling price of $25 the break-even point is at the intersection of the lines DD' and OV.

Thus, the following results are obtained :

— the break-even point corresponds to an output of 69,286 units :
— the minimum selling price at which the enterprise makes neither profit nor loss is indicated by the slope of the line OA (A is the point representing normal activity), i.e. $21.2.

Annual profit is represented by the segment AB.

Should there be a change in demand for the product in the face of

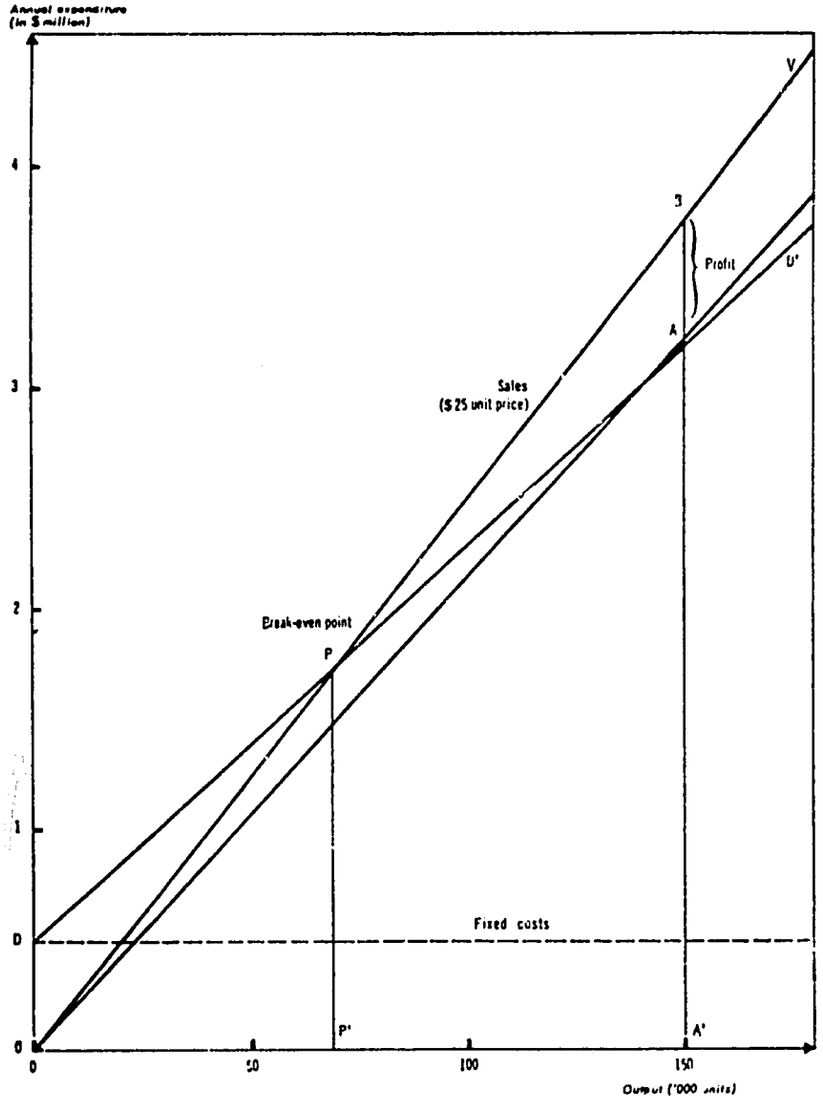
variations in output, the safety margin for the enterprise — *all other factors, including the price, being equal* — is determined by the equation

$$\frac{A'P'}{OA'} = \frac{150{,}000 - 69{,}286}{150{,}000} = 54 \text{ per cent.}$$

The safety margin for price changes is :

$$\frac{25 - 21.2}{25} = 15 \text{ per cent.}$$

Graph V.1. GRAPH DETERMINING THE BREAK-EVEN POINT



This graph is based on the assumption that depreciation must be fully covered by receipts. It therefore corresponds to the case in which the maximum permissible error is calculated before undertaking an investment, and before the corresponding outlays have actually been made.

A second « break-even point » can be identified that neglects amortization. The point of this is that only operating costs are a drain on the project's cash flow. Failure to meet them means that production must stop. In our example we now exclude the $160,000 of amortization charges but retain the $325,000 necessary to meet the remuneration of permanent staff and so on (see page 157) together with all the charges that are proportional to the level of output.

Thus, it will be seen from graph V.2 on which the physical annual output (or the corresponding receipts for a unit price of $25) is plotted on the horizontal axis, with expenditure excluding depreciation, and receipts are plotted on the vertical axis, that :

— with annual turnover below $1,160 million for a unit selling price of $25, the enterprise will be obliged to close down because it will not cover its actual working expenses. Minimum output is therefore 46,430 units ;

— if annual repayment of borrowing amounts to $180.000, output must be at least 72,140 units in order to cover each annual instalment ;

— with an output of 150,000 units, the enterprise will have to close down if receipts fall below $3,025,000, i.e. if the selling price is less than $20.2 per unit.

The calculation of the break-even point provides a relatively flexibe instrument that may be tailored to the needs of the particular problem under study. Our two examples have concerned an enterprise producing one product. In principle it may be extended to enterprises producing more than one product. However the analysis becomes complicated if the group of products do not vary together in a given proportion.

Nevertheless, from the standpoint of short-term financial administration, calculating the break-even point makes it possible to determine the minimum conditions required to keep the enterprise in operation, and it is a preliminary step towards an analysis of the degree to which the prospective yield on a project is affected by the parameters conditioning it. However, further studies are required if a more complete assessment of the longer term is to be made.

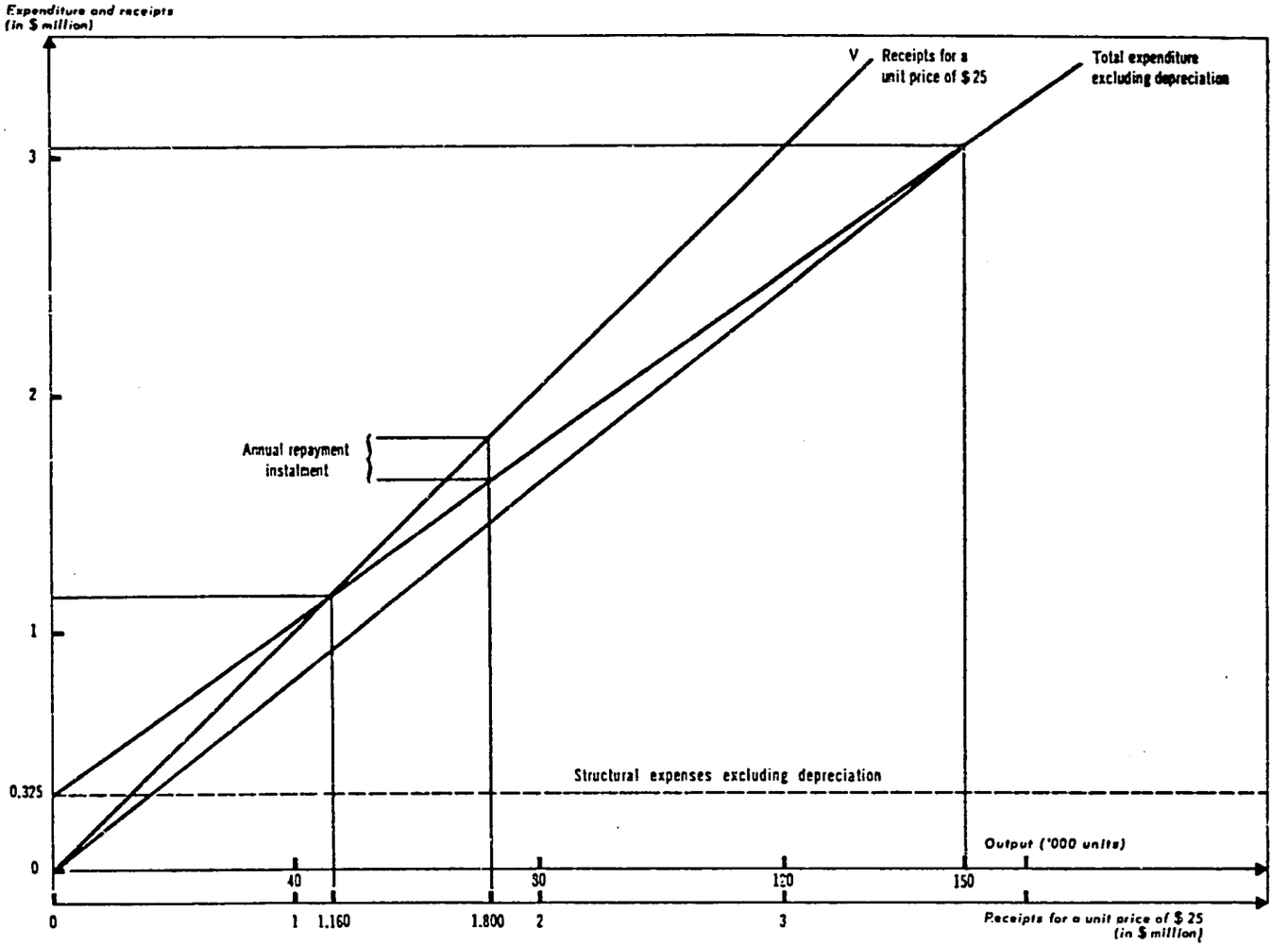
1.3.2. *The effects of errors in estimating and forecasting the prospective yield of the project*

If we consider the mathematical expression for the discounted value of future returns B(I) of an industrial project representing an initial investment I_o with or without a gestation period, writing the rate of discount as i, receipts and operating expenses as R_p and D_p for the year p, we have :

$$B(I) = - \sum_{p=o}^{n} I_p/(1+i)^p + \sum_{p=o}^{n} (R_p - D_p)/(1+i)^p$$

clearly the error of estimation may relate to one or another of the terms in the equation, i.e. :

Graph V.2. USE OF THE BREAK-EVEN POINT FOR FORECASTS REGARDING FINANCES



— each of the I_p or fixed investment expenditures made in any period ;
— each of the D_p or variable costs incurred in any period ;
— each of the R_p or amounts of gross revenue accruing in any period ;
— n, the life-time of the project ;
— i, the rate of discount.

The most common errors in this field have already been pointed out in previous chapters. We shall summarise them briefly, adding certain items, and we shall then give some practical rules for calculating the degree to which a project may be affected by errors of estimation.

1.3.2.1. *Inaccuracy in estimating the scale of the initial investment*

The discounted value of a project's future earnings is obviously particularly influenced by errors in estimating the scale of the initial investment because this factor, being the first to be taken into account, carries more weight.

In practice, moreover, unexpectedly increasing investment expenditure can halt the project's implementation through lack of finance, even though it may still be potentially profitable.

The most common errors, already pointed out in Chapter II, relate to :

— engineering and construction work, in cases where the characteristics of the ground at the site have been inadequately investigated ;
— overlooking ancillary installations or related facilities of low individual unit cost, which, however, add up to a considerable amount : handling equipment, storage space, maintenance materials, stocks of spare parts, assembly costs, light office equipment, water and power supplies, etc. ;
— underestimating the period for completion and the increased cost entailed by interim interest payments and, in many countries, by a fall in the value of money.

The degree of accuracy in determining different items of expenditure depends, moreover, on the nature of the individual items. It is therefore advisable to specify the most probable minimum and maximum estimate for each item.

In order to determine the degree to which the discounted value of future returns is affected by variations in the scale of the investment, *all factors otherwise being equal,* we may use a concept of elasticity similar to the concept of demand elasticity described in Chapter I.

The elasticity of the discounted value of future returns B(I) in relation to the investment I may be defined as :

$$^{e}B/I = - \frac{\Delta B}{\Delta I} \times \frac{I}{B}$$

Under the assumptions made, ΔI has no systematic, functional influence on receipts and working expenses (R_p and D_p), and it can therefore be assumed that :

$$\Delta B = -\Delta I$$

whence :

$$\cdot B/I = \frac{I}{B}$$

The variability of the discounted value of future returns with respect to errors in the scale of investments is therefore the reciprocal of the ratio of net returns to investment cost.

1.3.2.2. *Inaccuracy of estimates of future expenditure*

This frequently depends on the extent to which it is possible to forecast the technical parameters. In consequence, it varies greatly from one industry to another. While the margin of error may be small in certain industries, engineering for instance, enormous sums may be involved in the case of opening a new mine where a deposit has been found but not worked. In this case, too, it may be desirable to allow for a range of values in the estimates, as already mentioned in Chapter II.

As in the case of receipts, a very common error is the assumption that the level of expenditure in real prices is constant. The wage level rises, the cost of power tends to fall, the cost of some equipment decreases (or its efficiency is improved for the same price). All these factors affect the production account and have to be estimated.

Another matter to be investigated is the payment of interest and the repayment of loans in foreign currencies when domestic inflation may have led to the devaluation of local currency.

The effects of such a situation will vary considerably according to the closeness of the relationships between the enterprise and foreign markets. Consider the case where the exchange rate is flexible and the price of foreign currency in terms of domestic currency rises with the domestic price level. An exporting industry exploiting local resources will increase its receipts in terms of domestic currency, whilst an enterprise producing mainly for the domestic market, using imported raw materials and with loans contracted in foreign currencies, will be powerfully affected by devaluation.

This problem should therefore be considered carefully in each case.

1.3.2.3. *Inaccuracy of estimates concerning future demand and prices*

However precise the technique used to estimate future demand, complete certainty never attaches to the result of such a calculation. So it is advisable to make most favourable and least favourable assumptions, together with an intermediate assumption. Frequently, these alternative assumptions relate to specific occurrencies, e.g. the abolition of export bounties, changes in customs duties, variations in exchange rates, etc.

Next, an estimate will be made for each assumption of the returns at various probable price levels. Theoretically, it is easy to demonstrate the effect of a future change in price. Variation in the rate of return will be greater :

— the higher the discounted value of future production ;
— the more distant the expenditure in time and the nearer the returns.

An error commonly made is to assume that the selling price will remain stable providing the price level in general remains stable. The

history of numerous manufactured goods shows that their real price does in fact fall in course of time. This factor is of direct bearing on the yield on a project and must be taken into account.

This study is particularly important in the case of goods sold for export for which the world price level is extremely unstable. Particular examples are raw materials and foods for which variations in market price from 20 to 30 per cent are quite usual (e.g. copper or sugar).

In practice, it is possible to calculate the variation in the discounted value of future returns as a function of the selling price and thus determine the selling price or level of output at which the present value of future returns is nil.

Let us reconsider the example in paragraph 1.3.1.

The sale of the output of 150,000 units at the price of $25 gives an annual income of $3,750,000.

Fixed costs (not counting depreciation) total $325,000, and proportional costs $2,700,000 ($18 per unit).

The annual trading profit before depreciation is thus:
$3,750,000 — (325,000 + 18 × 150,000) = 725,000. This amount, discounted over 25 years at 10 per cent for example, and after the initial investment expenditure has been deducted, gives a present value of $2,580,000.

The following table shows the calculation in detail for different rates of discount.

CALCULATION OF THE PRESENT VALUE OF FUTURE YIELD

Thousands of dollars.

	RATE OF DISCOUNT				
	0 %	8 %	10 %	15 %	20 %
Discounted trading profit before depreciation . . .	18,125	7,750	6,580	4,680	3,670
Less: initial investment expenditure	4,000	4,000	4,000	4,000	4,000
Discounted profit	14,125	3,750	2,580	680	—330

Graph V.3 shows changes in the discounted values of future yields for different selling prices.

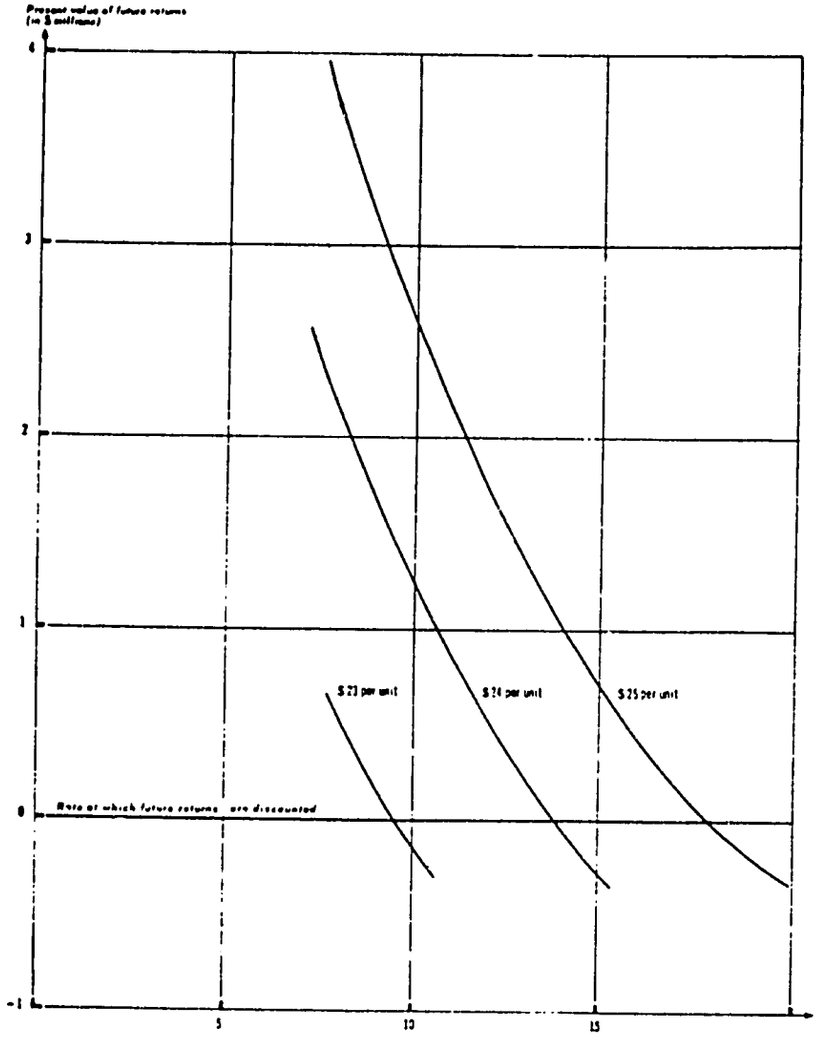
A one dollar decrease in the selling price entails an annual reduction of profits of $150,000, i.e. approximately $1,600,000 in present value discounted at 8 per cent over 25 years. If the selling price is decreased by about $2.3, the present value of the future yield discounted at 8 per cent is nil. At this rate, the safety margin around the probable price of $25 appears to be narrow, being only $2.3 or approximately 9 per cent.

1.3.2.4. *Inaccuracy of estimates concerning the life of the investment*

The rate of return and the present value of the prospective yield are the less vulnerable to an error in estimating the life of the investment the longer this life is.

This may be illustrated by means of the previous mathematical example.

Graph V.3. **CHANGES IN THE PRESENT VALUE OF FUTURE RETURNS FOR DIFFERENT SELLING PRICES**



The investment of $4,000,000 gives an annual trading profit of $725,000 (for a selling price of $25). The profit, discounted over 25 years at rates of 8 per cent and 10 per cent, amounts to $3,750,000 and $2,580,000 respectively (cf. paragraph 1.3.2.3), the present values of future revenues being $7,750,000 and $6,580,000 respectively.

If the life of the investment is reduced by 20 per cent (20 years instead of 25 years), the present value of future revenues, discounted at the same rates, will be $7,130,000 and $6,160,000 respectively.

It is reasonable to assume that the enterprise has a residual value equal to the capital expenditure not yet written off (in point of fact, this residual value will usually be nil, but certain replacement expenditures will not be undertaken).

In our example the residual value is $830,000, i.e. a present value of $178,000 when discounted at 8 per cent, and $124,000 at 10 per cent.

On these assumptions, the discounted value of future returns decreases by $442,000 at a rate of 8 per cent and $296,000 at 10 per cent, i.e. reductions of 11.8 and 10.6 per cent respectively, which should be assessed against a 20 per cent error on the life of the investment.

1.3.2.5. Errors in the choice of discount rate

Some idea of the effect of such errors in the calculations can be gained from the table below.

CALCULATION OF PRESENT VALUE OF FUTURE RETURNS

Thousands of dollars.

	RATE OF DISCOUNT			
	8 %	10 %	15 %	20 %
Investment expenditure	4,000	4,000	4,000	4,000
Discounted value of future receipts	7,750	6,580	4,680	3,670
Discounted value of future profits	3,750	2,580	680	— 330

Such errors may result from an underestimation of the rate of interest at which loans are available in the future. This risk can be avoided by obtaining all the necessary finance before undertaking the project. However it must be remembered that this will involve a cost due to the holding of idle funds, unless they can be loaned again at short term.

1.3.2.6. *The method of calculating errors*

In the light of experience gained with other projects, the people in charge will estimate the maximum possible errors for each numerical value. These depend on the nature of the activity under consideration (in the case of a mining project the risks are very much higher than for a shoe factory) and the progress made with the project.

Errors should be calculated with careful attention to the kind of outcome considered. Do we seek some assurance that the best alternative will still be reasonably profitable even when some data are inaccurate (a criterion of absolute profitability), or is it simply to ensure that the classification of the alternatives remains unchanged (a criterion of relative profitability) ?

With the second aim in view, it may be allowed that a possible error in respect of certain items of expenditure is the same for all alternatives, and therefore cannot call their ranking into question (the CIF price of equipment does not usually depend on its specific future location in a country, but the wage level may differ). With the first aim in view, however, the cumulative effect of costing errors for each component may significantly affect absolute profitability. At all events, an attempt should be made to determine the exact degree to which the results may be affected by error, even if this means collecting supplementary information on all factors.

2. METHODS OF MINIMISING RISKS

A distinction may be made between two different cases :

— risks relating to errors in forecasting ;

— risks relating to factors external to the enterprise.

2.1. Risks related to errors in forecasting

Thorough preliminary technical and economic studies are the best way of minimising these risks. Thus, every effort should be made to ensure that no factor in the project has been neglected or obviously miscalculated. Check lists in greater detail than those included in the annex to Chapter II of the Manual may be used for this purpose.

Nevertheless, the unexpected will still occur. It will therefore be advisable — after a realistic and preferably pessimistic estimate of all costs — to make allowance for contingencies in investment and operating expenditure. This allowance is often estimated at about 10 per cent of the expenditure taken into consideration. Such a procedure appears justified in the majority of cases, but different rates may also be adopted according to the nature of the expenditure.

2.2. Risks related to factors external to the enterprise

To assess these risks, every aspect of the methods used by the enterprise should be examined. We shall simply enumerate here some of the ways in which risks, especially marketing risks, may be minimised :

— Signing long-term contracts with certain suppliers or customers.

— Collaboration with other producers with regard to specialising in given products or geographic areas. These practices are not always approved by the authorities but, in some cases, may be tolerated or even initiated by them.

— Measures by the public authorities to eliminate over-fierce competition during a limited time (putting quotas on imports, prevention of further competition). It is a matter for the public authorities whether such arrangements are justifiable in the public interest.

— Diversifying the firm's activities. An enterprise producing a single good may be placed in serious difficulties if a persistently unfavourable market situation should develop for this good.

These few examples show how an enterprise should equip itself for success in a constantly changing economic world where risks cause difficulties, but also stimulate constructive ideas that may benefit the enterprise and the community.

CONCLUSION : CHOOSING THE BEST ALTERNATIVE

According to the nature of the project, the choice of the best alternative will depend on the public authorities or private investors. It should be noted, even in the latter case, however, that the public authorities can affect the project by sanctioning it, or by granting it special privileges, only if certain conditions are satisfied.

Naturally, these conditions should remain flexible enough not to dissuade the private investor from his project if it is advantageous to the community.

We shall therefore describe the problem of choosing the best alternative essentially from the standpoint of those responsible for the project. The final decision will depend on numerous factors which we shall deal with in turn. The first factor to be taken into consideration is the *commercial return on the project*, i.e. :

— *The present value of future returns* that it promises at the rate of discount which the promotors judge reasonable ;
— *the ability of the enterprise* to meet its commitments to suppliers of capital (lenders or shareholders).

If (*a*) there is a perfect capital market, so that the firm can borrow as much as it wants at the market rate of interest, (*b*) there is no risk, the future being known, and (*c*) there are no unquantifiable factors neglected in the calculation, then the firm selects the project, or the variant, with the highest present value (there can under these conditions be no problem of not satisfying its creditors)[1].

If the firm cannot borrow as much as it wants, or if it is imprudent to do so for reasons of risks, then the position is more complicated. In general, the firm will select the project or variant with the highest ratio of discounted net current receipts to (discounted) investment lost. Some exceptions to this rule were discussed in Chapter IV. But there may also be exceptions because the project with the best calculated ratio is particularly risky, or because unquantifiable factors have been neglected.

For example, a large project may overstrain the firm's financial resources, so that the risk is increased by having a high ratio of borrowed capital to own resources. For this reason, a smaller project with rather lower returns might be preferred.

Again, a large project will, in general, require more expert management, and given the shortage of skilled management and supervisory staff, the firm may reduce its risk by spreading its resources among smaller, more easily manageable lines of activity. Similarly risk is reduced by a diversification of output, whether from one factory or several. For this reason also, one might choose a technical variant not perfectly adapted to the production originally envisaged, which would, however, permit the management to adapt the output more easily to a market whose changes cannot be perfectly foreseen.

A firm may also be able to limit its risk by adopting a suitable strategy vis-à-vis the market. For example, it might pay it in the long-run to build too large a plant to discourage competitors from entering, although this would reduce its readily calculable profits. Alternatively, it may be unwise to aim for a monopoly position in case this should provoke unfavourable government action. Finally, the firm may reduce its risks by choosing lines of activity which it believes the Government will favour, and might support in some way if things go wrong.

For such reasons as these, concerning uncertainty or the impossibility of calculating certain factors, it may be wise to forego some anticipated

1. There may be an exception when the present value of a project under consideration increases by delaying its initiation.

returns to order to reduce the risks involved. This consideration will often affect the choice of project or variant.

After studying all these factors the choice has to be made. Despite all the information collected and processed, the final decision will always be a gamble at shorter or longer odds. In his instructive book *Les Propos d'un Confiseur* (What the Confectioner Said), Auguste Detoeuf shows Mr. Barenton arguing with his opponents about the introduction of the ice-cream industry into France : « It may all be very likely, but it is by no means certain », object the more timid. « Nothing is certain but the past », replies Mr. Barenton, « but we are concerned only with the future »[1].

The past may certainly throw light on the future, but this light will never be bright enough. It may be improved by the economists' techniques, but those taking the decision cannot delegate their responsability when the time comes for the choice to be made. The economist's role is simply to make them aware of the consequences of different possible decisions, and enable them to take only those risks judged acceptable to the enterprise.

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APPRAISAL OF INVESTMENT PROPOSALS[1/]

1 Purpose of the Investment Proposal

The investment proposal is prepared for the purpose of "selling" the project. Generally, this means convincing a lending institution that the project is a good financial investment for which they should lend money to the entrepreneur. The proposal also may be submitted to government development agencies for approval. Attachment A is the format used by IDD in loan evaluation.

2 The Investment Proposal from the Viewpoints of the Venture Capitalist and the Development Professional

According to the U. S. Small Business Administration, only 5% of new business ventures in the U. S. succeed. The vast majority fail within a few years or even months. The basic question to be answered by the lender of capital is, "Will this new venture be a financial success?" The development professional also is concerned with the potential for financial success, but his interest extends to other questions related to social and economic consequences of the project.

What appraisals does each of these individuals make?

- o Venture Capitalist -- Commercial Profitability
  - (a) What is the "up-side" potential?
  - (b) What is the "down-side" risk?
  - (c) What is the probability for financial success?
- o Development Professional -- Potential for Success and Economic, Social and Environmental Impact
  - (a) Will the business be a financial success?
  - (b) What will be its impact on the economics of the area (country)?
  - (c) What are the social consequences?
  - (d) What are the adverse effects on "quality of life"?

3 The Contents of the Proposal

The following outline illustrates how a proposal should be organized:

I. Introduction and Summary
   - A. Introduction of entrepreneur and company
   - B. Description of the industry and the specific product or service to be produced

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1/ Much of the material which provides the basis for this presentation is from Murray Bryce's book, *Industrial Development*.

C. Discussion of unique features

D. Financial plan, i.e., sources of capital

II. Market Analysis

A. Industry growth and trends

B. Total potential market (market research)

C. Competition

D. Marketing plan and pricing considerations

E. Projected share of market and estimated sales

F. Diversification opportunities

G. Potential problems and risk actions

III. Technical Analysis (Operations)

A. Process descriptions

B. Sources of raw materials

C. Manpower and skills requirements

D. Labor relations

E. Space and equipment requirements

F. Plant location and justification

G. Estimates of equipment costs and operating costs

H. Planned plant capacity and growth

IV. Financial Analysis

A. Pro Forma Statements

1. Monthly income and expenses for at least 13 months and by year for 5 years

2. Balance sheets by quarter

3. Cash flow monthly for at least 12 months and by quarter (or year) for 5 years

4. Itemized list of cash expenditures, i.e., exactly what money will be used for

5. If entrepreneur has been in business, show accounts receivable, sales, backlogs, liens, etc.

B. Sensitivity (Risk Analysis)

1. Break-even level

2. Effects of errors in estimation of important parameters

C. Measurements of financial success

1. Return on investment

2. Other ratios

V. Economic and Environmental Impact

A. Jobs created and payroll added to the community

B. Local goods and services consumed

C. Local taxes paid

D. Plan for handling undesirable effects (e.g., pollutants)

VI. Management and Organization

A. Organization structure

B. Salary structure

C. Qualifications of management

D. Stock ownership by officers

E. Personal financial statements of management

4 Appraisal of Commercial Profitability

What is the likelihood for realization of financial success? It is safe to assume that the financial results claimed in the proposal show a very attractive financail picture. The appraiser must determine the likelihood of achieving these profits. Factors which threaten profitability can be inferred from the profit equation.

Profit = Net Sales Billed - Costs

Thus, for a starter, we are interested in unifying the following:

- o Market aspects and sales volume (units and dollars)
- o Technical aspects and costs
  - Investment
  - Operating
  - Start-up
  - Other
- o Liquidity
  - Cash flow
  - Provisions for operating expenses and debt retirement
- o Overall financial analysis
- o Management competency

The importance of these appraisals necessitates further discussion of such.

4.1 Market Aspects and Sales Volume

The appraiser must both verify the estimates and examine threats to achievement of sales. A useful way to view the market is to think in terms of what is the "up-side" potential and the "down-side" risk.

4.1.1 *Indicators of High "Up-side" Potential*

- o Increasing demand sources in the selected market area
- o Selected market area only a small part of larger unserved market
- o Natural opportunities for diversification which will increase market

4.1.2 *Indicators of Potentially Excessive "Down-side" Risk*

- o Decreasing sales base
- o Economically sensitive sales base (e.g., creosote rails)
- o Competitive control of market
- o Vulnerability of raw material inputs

4.1.3 *Is the Product's Price Competitive?*

Attention should be given to checking the estimates of product price with competitive products or services.

- o A project's competitive strength -- the market it can capture -- will depend mainly on how its prices compare with those of competitors, domestic or foreign. In relation to the present or potential competition, it is necessary to know whether the project has any significant cost advantages or disadvantages.
- o In the domestic market, the project's advantage resulting from tariff protection or other restriction of imports which can be expected to be long term should be taken into account.
- o In the export market, the project's disadvantage due to import levies and barriers in the proposed export markets should be taken into consideration.
- o It is essential to keep in mind the advantages which might accrue to any competitor through construction of a much larger plant, or through the use of more efficient or cheaper equipment, fuel, raw materials, or processes.

4.1.4 *Is the Estimate of Total Market Reasonable?*

- o Decide what effective market area the project would have. This depends mainly on estimated price, compared with those of competitors, and transportation costs.
- o Make the projections of future market size on the basis of several alternative rates of growth: a low rate which represents the minimum growth which the most pessimistic analyst would expect; a medium rate; and a high rate which would be maximum under the most favorable conditions.

4.1.5 *How Much of the Total Market Is Really Available?*

The most difficult part of the analysis is to estimate how much of the total market the project can be expected to capture. This is strictly a matter of opinion, but the opinion should be based on a careful consideration of the comparative prices, existing competition, and the probability of competition from other new projects being planned or constructed.

- o Who are the customers? Is the market dominated by a very few customers?
- o What competitive advantage does the entrepreneur claim? What makes this product or service more attractive than that offered by competition?
- o Who is the competition?
- o Is competition powerful enough to cut prices below the break-even price of this enterprise?
- o Are there threats to the sales volume from unforeseen circumstances (e.g., competition, legislation, national availability, obsolescence, technology, style changes, or other consumer whims)?
- o Is the marketing plan capable of achieving the projected sales volume?
- o Is the distribution plan adequate?
- o Is the available market growing or declining? Are growth estimates reasonable?
- o If the market is primarily export, is it likely to disappear because of import levies and barriers?
- o If the market is domestic, does it depend on protective import restrictions? Are these likely to continue over the long run?

4.2 Technical Aspects and Costs

The appraisal of technical aspects of industrial projects represents an attempt to determine whether they are sound in regard to every engineering consideration, including process, equipment, size, internal balance, availability of all necessary physical operating requirements, location, and design.

Such an appraisal requires an evaluation of the adequacy of the scope of the technical preparatory work which has been done, and of the qualifications of the engineers. A suggested approach for conducting a technical appraisal is as follows:

4.2.1 *Competency of Engineers*

The engineering development of almost every industrial project, whatever the size, usually has to be done by people other than the project's financial originators, that is, by consulting engineers. The question simply is whether the consultants are really competent in their specialized field. To measure their qualifications and evaluate their judgment, the following questions are relevant:

- Has the firm designed or built plants in the same industry in recent years?
- If so, were their clients satisfied with their work?
- Are the plants in commercial operation and how successful are they?
- Has the firm had operating experience in the industry or only construction experience?
- Does the firm have access to the latest technology in the field?
- Are the engineers who actually did the work on the project men of long experience in the industry?

4.2.2 *Scope of Technical Work*

No matter how competent the consulting engineers may be, it is important to investigate the scope of their work on the project; consultants are often given terms of reference which are so limited that they do not have the opportunity to investigate or analyze some of the important matters which should be studied. Here it is necessary to inquire:

- Did the industry-specialized experts state unequivocally that they consider the project to be sound?
- Did they advise as to the process to use?

- Did they set forth in detail the requirements of the industry as to raw materials, fuel, power, transportation, supplies, etc.?
- Did they investigate, or at least check, the availability, quality, and cost of the various requirements in the locations proposed for the plant?
- Did they design the process and other equipment and the buildings for the project?
- Did they investigate all possible locations and conclude that the proposed location is the best?
- Did they prepare specifications, equipment lists, and schedules?

4.2.3 *Reexamination of Major Points*

It is always an essential part of project appraisal to reinvestigate some of the major technical questions to verify the conclusions given. The following questions illustrate the nature of points which should be reexamined:

- Have all possible alternative processes been studied adequately, and is there convincing justification for the one chosen?
- Have all alternatives as to fuel been examined sufficiently, with acceptable justification for the one selected?
- Has it been proved beyond reasonable doubt that all necessary requirements of the industry, such as raw materials, power, fuel, and transportation, can be secured in the proposed location in adequate quantity and quality and at the price stated?
- Have the proposed capacities of the various parts of the plant been balanced so that full-capacity output can be obtained with all units working the same number of hours?
- Have alternate sizes for the plant been studied adequately, and is the size chosen the best? Are the effects on capital and operating cost of larger or smaller plants made clear so that alternatives can be studied?
- Is the plant designed for economical expansion if this is required at a later date?
- Has the need for spare parts been given enough consideration, and is the initial stock proposed adequate and included in the cost estimates?

- Are the major items of plant equipment described fully enough to provide a basis for inviting bids?
- Have technological changes taking place in the industry been considered adequately?
- Are any major technical problems anticipated in connection with the project, and have they been disclosed so they can be evaluated?

4.2.4 *Plant Location*

The location for a project is of such great importance that it deserves special attention in the appraisal. A good approach to appraisal of the site is to compare the availability, suitability, and the cost of all significant operating items which may vary from one location to another. Usually the main items of this kind will be the following:

- Raw materials and supplies
- Transportation of raw materials and supplies to plant
- Fuel
- Transportation of fuel to plant
- Electric power
- Labor (including housing and transportation)
- Transportation of finished goods to market

4.2.5 *Cost Estimates*

Costs are derived from the technical analysis. According to the OECD Manual of Industrial Project Analysis, the principal sources of error in estimating costs are as follows:

- Inadequate technical analysis
- Estimates of investment expenditure too low
- Failure to allow for working capital
- Overoptimistic estimates of costs and outputs in the early years of operation
- No explicit assumptions made as to the future trends of costs

The following questions may serve to examine cost estimates:

- Are investment estimates too low? Do they include equipment transport, installation, and "debugging"? Are time estimates realistic?
- Does the firm have a significant competitive advantage in operating costs?

- Can competition gain a cost advantage through construction of a large plant or improved processes, equipment, and raw materials?
- Have adequate provisions been made for start-up costs?
- Will inflation affect costs more than prices?

4.3 Liquidity

In his enthusiasm, the entrepreneur may overlook the need for balanced cash flow in business start-up. (Banks and other lending institutions understandably attach great importance to accurate estimation of working capital requirements.) The cash flow estimate is particularly important as an aid in judging whether the proposed financial plan will provide enough cash when needed during construction and initial operations. The appraisal analyst must examine whether the cash flow analysis provides for the following:

- Inventory buildup
- Extra production costs at start-up
- Time allowed for collection of receivables
- Time within which suppliers must be paid
- Sales fluctuations
- Possible delays in starting production and making shipment
- "Learning costs" at start-up
- Interest payments

4.4. Overall Financial Analysis

4.4.1 *Financial Ratios*

Ratios are useful tools in the financial appraisal of projects and show the relationship of one financial fact to another. (See Attachment B.) A ratio based on estimates for a new project, when compared with the same ratio for a comparable operating firm, may provide a basis for judging whether the proposed project is likely to be in line financially with its competitors.

- The ratio of turnover of total capital is a rough measure of general efficiency, as it shows the total volume of business being done on a given amount of total investments. It is calculated by dividing total net sales (or other revenues) by total assets, and is usually expressed as a percentage. By comparing this estimated ratio for a new project with the same ratio for existing enterprises in the same business, it is possible to see whether the

cost of the proposed plant is roughly what it should be for the volume of business to be done.

- o Profitability should be calculated as profit margin by dividing net profit by total sales.
- o Profitability can be calculated also as return on total investment by dividing net profits by total assets.

4.2.2 *Measurements of Financial Safety Margins*

On the basis of the revisions of the financial forecasts which have been prepared during the appraisal, it is necessary to measure the probable ability of the project to survive.

- o The debt service coverage, which is the ratio of cash available (profits plus depreciation accruals) to cash required for interest and principal repayments on loans, measures the margin of safety in a project's ability to service its debt.
- o The break-even point should be calculated, using the revised estimates of production costs. This will show the percentage of capacity at which the project would have to operate in order to cover its fixed cash overhead expenses, including debt interest and repayment obligations.
- o Revised calculations also should be made to show how much reduction in sales prices the project could suffer while still covering the overhead costs.
- o The revised cash flow estimate is particularly important as an aid in judging whether the proposed financing arrangements will ensure enough cash when needed during construction, and enough money for initial working capital when operations commence. The appraising authority may want to require a modification of the financing plans so that the project will not be short of funds necessary to complete it and get it into production.

4.4.3 *Financial Structure*

A thorough review of the proposed financial structure for a project is an essential part of appraisal, often revealing unsatisfactory features which need to be changed to make a project acceptable for financing. To be sound from a lender's viewpoint, a project should have a financial structure in which the

owners supply a substantial part, usually the larger part, of the total cost of the project, including the cost of both fixed assets and net working capital.

- An important question is "What is a reasonable relationship between debt and equity in a new industrial project?" There is no rigid rule. A project with too much debt suffers from heavy burdens -- interest charges and principal repayments, neither of which arises in connection with money raised in the form of equity.
- The dangers of too much debt will be accentuated if a substantial part of the debt is of relatively short term. The term of proposed debt, therefore, needs investigation. A level of debt service which might be comfortably supportable after a new project has become well established might be enough to ruin the same firm during its first few years. There are two ways to lessen the debt service burden during the initial years. One is to arrange that the principal repayment installments do not commence for a specified number of years after the loan is made. The second way is to make sure that the loans are sufficiently long-term.
- The current assets-current liabilities relationship is next in importance to the debt-equity relationship in appraising the proposed financial structure. The cash, accounts receivable, inventories and prepaid expenses are called current assets if they are convertible into cash within one year. The commercial bank short-term loans and accounts payable are called current liabilities if they have to be paid fully in one year.
- The reliance on short-term financing entails heavy risks, and it is especially important in appraising a project to evaluate the minimum amount of working capital which should come from the firm's own resources, that is, its long-term capitalization. An approach to the working capital problem is to calculate the total current assets required and on the basis of the current ratio determine the amount of net current assets which should be financed as part of the capital cost of the project, leaving the balance to be financed by short-term credits.

4.4.4 *Financial Restrictions*

Attention always should be given to the possible need for making any loans or equity participation or other approval conditional on certain

financial restrictions. The purpose of such restrictions may be to protect directly the value of security pledged to a lender; to protect the lender or investor from unsound financial policies which might be followed by the enterprise; to ensure a healthy financial structure.

- If a loan is to be made for a project on the basis of a mortgage or other similar security, it may be important to require that the borrower agree that the debt so incurred will rank ahead of any other long-term debt which exists or may later be incurred.
- Conditions may take the form of restrictions on additional long-term borrowing or at least on additional borrowing which would increase the ratio of debt to equity in the capital structure of the firm or carry it beyond a specified relationship.
- Conditions may be designed to achieve or maintain adequate net working capital. Such terms are sometimes defined by an agreement to maintain a specified amount of net working capital.
- The maintenance of adequate working capital also can be promoted by an agreement that dividend payments will not be made for specified periods.
- It is often wise to safeguard a loan or participation by conditions which effectively limit or delay major expansion of the project until it has become thoroughly established on a sound basis.

4.4.5 *Existing Concerns*

Many industrial projects are new and completely independent entities, but related in one way or another to going concerns. In appraising any project which is not completely new and independent, it is essential to scrutinize the related firm or firms carefully and to consider their total situation.

Appraising a new project on the basis of past operations of a going concern is much easier than judging it on its own merits, for the performance of an existing company is a matter of record. What can be learned by such an approach may tell far more about the quality of management, the financial strengths involved, the market situation, and the intangibles of reputation and goodwill than one could ever learn about a new and independent project. This is one reason why expansion and subsidiary projects are successful more often than entirely independent ones.

(a) *Analyzing the Financial Position.* The best place to start in appraising the soundness of a parent company whose project is under review is to obtain its balance sheets, preferably for the end of each of the past five to ten years. In countries where published or "official" statements are designed to conceal rather than reveal, it is often necessary to insist upon being given true or internal financial statements.

- One of the most important things that can be learned from the balance sheet is the relationship between equity and debt.
- A second and often equally important thing that can be learned from the balance sheet is the short-term position of the company, the relationship between cash and other short-term assets and the short-term liabilities which must be paid within a year.
- Among the other points to watch are the size of the accounts receivable, which may indicate collection problems; the size of inventories, which may indicate sales problems; and the existence of large amounts for intangibles such as so-called goodwill.
- An appraisal of a company's financial position usually requires inquiry into other matters. A judgment should be made as to whether the valuation of assets is reasonable, too high (assets overvalued), or too low (assets undervalued). Overvaluation of assets is most likely to be due to failure to write off sufficient depreciation as an operating expense; in this case, the earnings will have been overstated in the profit and loss statements. Undervaluation of assets may be due to excessively high depreciation write-offs, to changes in price levels (inflation), or failure to record all assets of the business on the accounts.

(b) *Analyzing the Earnings Record.* The other major financial report -- the profit and loss statement -- is of equally great importance in determining whether a company is in healthy financial condition.

The main thing to be learned from the profit and loss statement is the amount of net profits earned. This amount, when related to the equity shown on the

balance sheet as of the end of the period, gives the rate of return on equity. Trends in the rate of return over a period of years are important to indicate a strengthening or a weakening of the company's position in the industry.

4.5 Management Competency

To ensure the success of a new industrial project, proper attention must be given to the importance of management. Both new and old, well-established industrial enterprises may fail for many reasons, but the most common reason is failure of management.

The financial analysis of a going concern provides a good, though indirect, way to measure the quality of its management. Obviously, a company which passed all the tests of financial soundness, profitability, market acceptance, and sales growth could hardly be badly run, for these are tests of good management.

It is extremely difficult to evaluate management and the management structure for a new industrial project. The following points offer some guidance in this difficult task.

- General Manager. Every business must have a chief executive with a proven record of performance which has been acquired through experience in management work in industry.
  - (1) Has the chief executive demonstrated a competency to structure and manage an organization?
  - (2) How strong is his motivation to succeed in this venture? What is the extent of his personal financial participation?
  - (3) Does he have other interests which detract from his attention to this venture?
  - (4) What personal expertise does he contribute (e.g., technical, marketing)?
- Supporting Management. Often one manager, usually of production-management level, is employed initially, and there is a common feeling that such a manager, alone or with a couple of experienced helpers, can do the job. The dangerous thing about this theory is that, with insufficient management, a plant can appear to operate well while it is, in fact, operating in an uneconomic way.

(1) If the nature of the enterprise necessitates management strengths in a particular area (e.g., production), are these strengths represented in the proposed management lineup?

(2) What is the financial commitment of each of the proposed officers?

(3) Will the proposed officers personally guarantee the venture capital loan?

(4) Are there any indicators of potential conflicts among the proposed officers?

- Experience of Management. Just as lack of quantity in management can be a threat to the success of a project, so is lack of quality. Intelligence, education, political acceptability, personality, enthusiasm, and even good technical training are no substitute for experience in an industrial management job.

- Management Accounting. Every industrial enterprise must have adequate accounting for control of costs and for providing management with facts upon which to make decisions. The accounting must be prompt, accurate, and meaningful in the sense that it provides the answers to the right questions.

- Marketing. The ultimate purpose of production is to make something which somebody will buy because it meets his needs. Each business needs to be market oriented and give proper emphasis within its organizational structure to advertising and marketing.

5 Social and Environmental Analysis

The appraisal of the social profitability and the environmental impact of the proposed project can be made in conjunction or separately.

5.1 Social Profitability

The exact procedure for calculating the social profitability will vary between countries. The purpose of the estimation of social profitability is the adjustment of market prices to reflect desired social objectives as outlined by the government. The previous section on financial analysis provided an example of how the social profitability can be determined. The final judgment as to value of a project to the economy should rest heavily on this mathematical estimate. However, the figure is only an approximate estimate; it does not and

cannot take into account many important factors which affect the value of a project to the country.

5.2 Social Profitability and the Nonmeasureable Factors

In applying the nonmeasurable criteria to appraising the project's value to the economy, the purpose should be to arrive at an opinion as to whether a project would be significantly more or less valuable than the calculated social profitability indicates. The nonmeasurable factors may be brought to light by asking various questions about a project.

- Is the project a part of a plan or a group of related projects in which the total value will be greater than the sum of its parts?
- Is the project one which will assist or provide a basis for other important development projects?
- Will the project fill a gap in a chain of related industrial developments?
- Will the project have unusually high value as an example which would stimulate other investments?
- Will the project be likely to attract foreign investment in itself or in other projects?
- Will the project be particularly important for training purposes?
- Will the project help to modify social patterns in a way conducive to further industrial development?

5.3 Environmental Impact

Although the environmental impact of a project might be integrated into the social profitability analyis, usually the environmental costs are difficult to quantify. Therefore, the proposal should contain documentation of possible environmental problems such as waste disposal. Included along with such documentation should be letters from the appropriate government agencies which acknowledge that they are aware of the possible environmental impact.

Attachment A

STANDARD APPROACH FOR EVALUATION OF A BUSINESS LOAN APPLICATION

I. Initial Contact

A. Background of applicants

B. Nature of the business planned

C. How far along is the applicant in the planning of the undertaking

D. Request that applicant bring all information available regarding the business to a pre-application conference

II. Pre-application Conference (To be attended by all interested parties)

A. Detailed description of the business undertaking

B. Information on the experience and background of the principals in the business and presentation of their management qualifications

C. Personal financial statements of principals and officers of the business

D. Financial resources of the principals which will be committed to the business and details of all other financial resources available to the business

E. Estimated total of funds required to carry out the planned business undertaking

F. Planned use of funds

1. Land
2. Building
3. Equipment
4. Working capital

G. List of collateral available to secure debt

H. Projected operating results, to include pro forma financial statements for the first three years of the undertaking and monthly cash flow projection for the first year or until break even is achieved if longer than one year

I. Determination of responsibility for completion of the above information

III. Feasibility Analysis

A. Background, historical development, general characteristics

B. Market for products

C. Distribution and shipping

D. Availability of raw materials

E. Manpower requirements

F. Capital requirements

G. Profit or loss and return on investment

H. Capabilities of management

I. Other

(See Appendix I for additional details on feasibility analysis)

IV. Preparation of Loan Application

A. Assemble the information covered in the pre-application conference in a report form

B. Complete application forms prescribed by the Farmers Home Administration

C. Assemble feasibility analysis in report form

APPENDIX I

FACTORS OF A FEASIBILITY ANALYSIS

I. Background, Historical Development, and General Characteristics of the Industry
   A. What has been the growth and stability of the industry
   B. Have there been any significant technological changes within the industry

II. Market for Products
   A. Is there already a demand for products
      1. What is the size of the total U. S. market
      2. Who are the principle consumers
      3. Who are possible new consumers
      4. Are products novelty items; are they likely to suffer from obsolescence -- technological or otherwise
      5. What is the size of the export market
      6. What is the projected trend in the overall market size
   B. Are the products oriented to regional markets
      1. How does the location of production facilities and the location of markets compare
      2. What constitutes the geographic dimensions of the market that can be serviced from the location involved
      3. What is the size of this market
      4. What is the projected trend in the size of this market
   C. Is penetration of the market possible
      1. How is the demand for the product now being satisfied
         a. What is the U. S. production capacity
         b. What percentage of the U. S. (regional) market is supplied by imports
      2. What are the major factors in product sales
         a. Price vs. quality
         b. Technology vs. merchandizing
      3. Will current and future markets absorb production of a new plant without price-cutting or other dislocations
      4. Is brand name important

III. Distribution and Shipping

A. Do distribution facilities for the product exist in the market to be served
   1. If not, can they be set up
   2. What would it cost to do so
B. Will the products be sold to
   1. Wholesalers
   2. Retailers
   3. Direct to consumers
   4. Government facilities
C. What shipping practices are common to the industry
   1. Who is responsible for freight cost
      a. Buyer
      b. Seller
   2. Is the product sold on a
      a. Delivered basis
      b. Freight equalization basis
      c. Point of shipment basis
   3. Are shipments normally by
      a. Rail
      b. Truck
      c. Air
   4. Is adequate transportation available
   5. Are typical shipments carload or less than carload
   6. Do commodity rates exist
   7. What are the freight rates from the different origins under consideration to the destinations

IV. Availability of Raw Materials
   A. What are the primary (secondary) raw materials
   B. Are these materials available locally in sufficient quantity
      1. Is the local materials market competitive
      2. Is satisfactory delivery of local materials assured at reasonable prices
   C. What materials must be imported
      1. Can they be purchased economically
      2. Can prompt delivery be obtained so that large inventories are not required

V. Manpower Requirements

A. What would be the total employment and job classification

B. Is a sufficient labor force available with the necessary skills

C. Are training facilities available

VI. Capital Requirements

A. What is the most favorable plant size and total capital cost

1. Fixed investment

a. What would be the cost for land, land development, and building materials

b. What equipment would be necessary, and what is the cost

2. Working capital

VII. Profit or Loss and Return on Investment

A. What is the total projected revenue that would be generated by the sale of products annually

B. What is the total amount of annual expenditures

1. Fixed annual cost

a. Management, selling, administrative

b. Depreciation

c. Interest on borrowed funds

2. Variable annual cost

a. Direct labor

b. Other manufacturing expense

3. Cost of raw materials

C. What is the projected annual profit or loss

1. Return on investment

2. Payout

VIII. Capabilities of Management

A. What is the business experience of those who will actively manage the project

1. Do they have successful backgrounds in

a. Similar ventures

b. Allied ventures

c. Unrelated businesses

2. Will outside interest detract from their attention to the project

3. Do they have other sources of income
4. To what extent are their own resources committed to the project

B. Is sufficiently skilled management available to handle
1. Selection of site, building, machinery, and equipment
2. Operation of the plant
3. Sales and merchandising
4. Cost controls
5. Accounting
6. Employee relations

IX. Other

A. What are the utility requirements and cost
1. Power
2. Gas
3. Water

B. Are needed support services available
1. Subcontracting
2. Maintenance and repair service for equipment
3. Engineering
4. Advertising
5. Others

C. Is a satisfactory site available for the plant
1. Are transportation facilities within easy access
a. Railroad
b. Highway
c. Waterway
2. Are utilities on site
a. Water
b. Electricity
c. Gas
d. Sewer

D. General environmental conditions
1. Legislative atmosphere
a. Attitudes of legislative officials toward industry
b. Laws affecting business and industry
c. Tax structure

d. Zoning regulations

e. Police and fire protection

2. Educational facilities

a. Schools

b. Libraries

3. Recreational facilities

Attachment B

FINANCIAL RATIOS

PART I, II, III, and IV

Each page of Parts I through IV of the Statement Studies is a "common-size" balance sheet and income statement for two different lines of industry. The statements are grouped according to either asset size, or contract revenues and then are combined in the All Sizes column. When there are less than ten companies in a particular size category, the data is omitted in that particular column but is incorporated in the All Sizes column.

Every item on the balance sheet and income statement is shown as a percentage, with total assets and sales, or revenues, respectively, equaling 100%. In some cases the figures appearing after the decimal point do not balance perfectly with the totals shown. This is due to rounding off the figures by the computer during the computation process. Credits and losses are indicated by a minus sign beside the value.

TREATMENT OF RATIOS; SIGNIFICANCE OF MEDIAN AND QUARTILES

Toward the bottom of each page are ratio presentations. These are not averages, but rather are shown as the upper quartile, median and lower quartile figure in each case. For any given ratio, in any size class, these figures were calculated by, first, arraying all the numerical values of that ratio in the order of the strongest to the weakest ratio. The figure which falls in the middle of the list of ratio values is the median. The figure halfway between the median and the best of the ratio values is the upper quartile. The ratio halfway between the median and the weakest is the third quartile. Ratios presented in this fashion preclude the undue influence of extreme ratio values which would result if merely an "average" ratio figure were presented. Also, and more importantly, they give the analyst some idea of the "spread" or range of ratio values in each case. This might be made even clearer by realizing that the total spread between its first and third quartiles by definition takes in "the middle 50%" of the companies represented. Ratio values greater than the 3rd quartile, and less than the 1st quartile, therefore, rapidly begin to approach "unusual" values with respect to these Statement Study parameters.

Two of the ratios, Sales or Revenues/Receivables and Cost of Sales/Inventory, have figures to the left of the main column. These show receivables turnover and inventory turnover, respectively, calculated in days.

The two profit ratios—Profit Before Taxes/Worth and Profit Before Taxes/Total Assets—are expressed as percentages. These calculations use the profit before taxes figure because of the differences in the calculation of income taxes for proprietorships, partnerships, and corporations. Since all three types of organization are included in the Statement Studies—even perhaps within the same industry—it would be misleading to come up with a single "typical" tax figure. However, in Part V we do present a figure for income tax as a percentage of net sales or revenues, but only for corporations. Please note that all corporations have been included here, whether reporting a positive, negative, or zero income tax figure for the year.

Finally, at the bottom of each page total sales, or revenues and total assets are shown in dollar amounts to enable the recasting of all the other figures into dollars if desired. To make this conversion, divide the dollar amount by the number of firms in a size class, then multiply the result by the percentages indicated for that category.

Source: Copyright, Robert Morris Associates, Annual Statement Studies, 1974 Edition (quoted with permission from the publisher). Complete copies are available for $10.00 a copy from Robert Morris Associates, Credit Division, Philadelphia National Bank Building, Philadelphia, Pa. 19107.

PART IV

This section includes only statements on contractors. Since there is more than one accounting method used by contractors, we have chosen to use only those statements using an accrual method of accounting on a percentage-of-completion basis in an effort to promote uniformity. In this section our size categories are determined by contract revenues instead of total assets with no upper limit placed on revenue size. The format of the contractor page has been changed somewhat from that appearing throughout the rest of the book.

PART V

The asterisk appearing beside the figure for Net Sales or Contract Revenues in Parts I, II, III, and IV indicates that additional profit and loss data and ratios for this particular industry appear in Part V. A separate index for Part V begins on page 36. The additional operating data is published whenever a sufficient number of statements for a particular industry are available which have Selling and Delivery Expense, Officers' Salaries, and Other General Administrative Expense broken out. In the case of the contractor industries, there must be an adequate sample of statements showing both General and Administrative Expense and Officers' Salaries.

In Part V note that the "number of statements" used in calculating the Depreciation and Amortization/ Net Sales or Revenues and Lease and Rental Expense/ Net Sales or Revenues percentages appear. This is the number of companies in each case which reported a positive figure for depreciation and amortization, lease and rental expense. It excludes companies for which these items were, or were claimed to be, zero.

As mentioned before, in calculating Income Tax/Net Sales or Revenues the "number of statements" includes all corporations, whether reporting a positive, negative, or zero income tax figure for the year. Likewise, the calculation Officers' Salaries/Revenues appearing in the contractors' section is based upon all forms reporting a positive figure for Officers' Salaries.

Cash Flow as used in these calculations means net profit after taxes plus depreciation and amortization. In calculating the ratio Cash Flow/Current Maturities of Long Term Debt, the "number of statements" indicates the number of corporations which reported all three component items, namely net profit after taxes, depreciation and amortization, and current maturities of long term debt. With the addition of lease and rental expense, the same items are used in the contractor section to determine the "number of statements" used in calculating Lease Expense Plus Current Maturities of Long Term Debt/Cash Flow.

PART VI

We are pleased to publish in Part VI of this book the Finance Industry Supplement. This contains composite data on finance companies compiled by two of the leading banks in this field. We wish to thank Mr. Hanns A. Jaeger of The Bank of New York and Mr. J. Russell Hanson of The First National Bank of Chicago for their cooperation in submitting the material for this part.

We are grateful to the National Statement Studies Committee and the many credit officers and analysts who have made this publication possible. We will try to improve upon it in the future. The Credit Division of RMA will be happy to answer any questions concerning this publication.

DEFINITION OF RATIOS

In calculating the Statement Studies ratios, we have found that arraying the ratio values from the highest to the lowest, or vice versa, does not always result in the values being in the order of the strongest to the weakest. Negative values for net worth and profits before taxes make it necessary to change the array for those ratios and percentages using these figures.

Therefore, we have arrayed the values for the ratios Fixed/Worth, Debt/Worth and Unsubordinated Debt/Capital Funds from the lowest positive figure to the highest positive figure and then from the highest negative to the lowest negative figure. Likewise, the array used in selecting the values for Sales/Working Capital and Sales/Worth goes from the highest positive to the lowest positive figure and then from the highest negative to the lowest negative figure. The percentages Profit Before Taxes/Worth and Profit Before Taxes/Total Assets are selected after arraying the values from the highest to the lowest positive and then from the lowest to the highest negative value.

In addition, in calculating the % Profit Before Taxes/Worth, all ratios are dropped from the array when there is a negative net worth figure. This is true even though the ratio may be positive due to negative values on both sides of the equation. In other words, negative values in this percentage should come from negative profits instead of net worth. Due to the dropping of some ratios in this particular case, it could be that some columns will contain less than ten values to array; in which case no quartiles or medians will be printed.

QUICK RATIO

Method of Computation: The total of cash, short-term marketable securities and net receivables for the industry composite was divided by the total of current liabilities.

Result: The ratio measures short-term liquidity available to meet current debt.

Principle: Also known as the "acid test" or "liquidity" ratio, it is of particular benefit to short-term creditors, as it expresses the extent to which cash and those assets most readily convertible into cash can meet the demands of current liabilities. Any value of less than 1 to 1 implies a reciprocal "dependency" on inventory or other current assets to liquidate short term debts.

CURRENT RATIO

Method of Computation: The total of current assets for the industry composite was divided by the total of current liabilities.

Result: The ratio is one measure of the ability of the industry to meet its current debt.

Principle: In comparing an individual company to the industry, a higher current ratio indicates that more current assets are free from debt claims of creditors and prompter payment can be expected.

FIXED/WORTH

Method of Computation: The net fixed assets (plant and equipment less reserve for depreciation) for the industry was divided by the tangible net worth.

DEFINITION OF RATIOS

Result: The ratio expresses the proportion between investment in capital assets (plant and equipment) and the owners' capital.

Principle: The higher the ratio, the less owners' capital is available for working capital. The lower this ratio, the more liquid is the net worth and the more effective owners' capital is as a liquidating protection to creditors. The presence of substantial leased fixed assets—off the balance sheet—may deceptively lower the ratio.

DEBT/WORTH

Method of Computation: The total debt for the industry composite was divided by the tangible net worth.

Result: The ratio expresses the relationship between capital contributed by creditors to owners' capital—"what is owed to what is owned."

Principle: Total assets or resources represent the entire capital at the disposal of a given company and consist of new worth or owners' capital, and creditor capital—that provided by those outside the business for temporary use. The proportion existing between debt and worth—or leverage—records the debt pressure. The lower the ratio, the easier the pressure and the greater the protection for creditors.

UNSUBORDINATED DEBT/CAPITAL FUNDS

Method of Computation: Total unsubordinated debt (all current plus senior long term debt) for the industry composite was divided by capital funds (tangible net worth plus long term subordinated debt.)

Result: The ratio expresses the proportion between senior creditors' capital and that provided by junior creditors and owners.

Principle: A common refinement to debt to worth which records debt leverage in relation to the capital base, sometimes referred to as the borrowing base. Gives recognition in the borrowing base to that capital provided by creditors whose rights are subordinated under instruments to other creditors. The use of subordinated debt capital does not altogether remove a corresponding amount of debt pressure from owners' capital, but it does provide an extra cushion for senior creditors who can then view leverage from this ratio.

SALES/RECEIVABLES

Method of Computation: The net annual sales for the industry were divided by the total of trade accounts and bills receivables.

Result: The ratio expresses the relationship of the volume of business to the outstanding receivables.

Principle: A higher ratio—a higher turnover of receivables as it is sometimes called—indicates a more rapid collection of sales during the period and a greater liquidity of the receivables.

Days' Sales

Method of Computation: The sales/receivables ratio was divided into 360 (the number of days in one year).

DEFINITION OF RATIOS

Result: This figure expresses the average time (in days) that sales are uncollected.

Principle: A comparison of this figure with the terms of sale for the industry will show the extent of control over credit and collections. The greater the number of days outstanding the greater is the probability of delinquencies in accounts receivable.

COST OF SALES/INVENTORY

Method of Computation: Cost of sales for the industry was divided by the total of inventory.

Result: The ratio expresses the proportion between cost of sales and inventory at the end of the fiscal period.

Principle: The physical turnover measures merchandising capacity. The higher the ratio the greater is this capacity and the more probable the freshness, salability and liquidating value of that inventory. Since profit has been eliminated, the cost of sales/inventory gives a more accurate measure of physical turnover than the sales/inventory. Other measures of physical turnover use average monthly inventory or an average of the inventories at the beginning and end of the period.

Days' Sales

Method of Computation: The cost of sales/inventory ratio was divided into 360 days.

Result: This figure expresses the average length of time in days that merchandising inventory remains in the company before it is sold.

Principle: This number of days should correspond closely with production time.

SALES/WORKING CAPITAL

Method of Computation: The net annual sales for the industry composite were divided by the net working capital or excess of total current assets over current liabilities.

Result: The ratio expresses the turnover or annual activity of that portion of net capital not devoted to fixed or other non-current assets.

Principle: Net working capital represents the basic support for those assets undergoing conversion cycles (as inventory-receivables-cash) during the selling year. Relating sales to working capital suggests the number of turns in working capital per annum. A low ratio may indicate unprofitable use of working capital while a very high ratio often signifies overtrading—a vulnerable condition for creditors.

SALES/NET WORTH

Method of Computation: The net annual sales were divided by the tangible net worth.

Result: The ratio reflects the activity of owners' capital during the year.

DEFINITION OF RATIOS

Principle: Capital is invested in an enterprise in the hope of a substantial return. The probability of such a return is largely dependent upon a reasonable activity of the investment. This ratio is one measure of this activity. When the relation increases from year to year, it indicates that owners' capital is being used more frequently during the year. A very high ratio may indicate undercapitalization (lack of sufficient ownership capital) or overtrading.

PROFITS BEFORE TAXES/WORTH

Method of Computation: The amount of net profit before taxes was divided by the tangible net worth.

Result: The ratio expresses the relationship between the owners' share of operations before taxes for the year and the capital already contributed by the owners.

Principle: Capital is usually invested in a company in the anticipation of a return on that investment—in the form of a profit. This hope of a profit is the attraction for original and new capital. The higher the profit before taxes to worth, the greater is the probability of making appreciable addition to owners' capital after payment of dividends and taxes.

PROFITS BEFORE TAXES/TOTAL ASSETS

Method of Computation: The amount of net profit before taxes of the industry were divided by the total assets for the industry.

Result: The ratio expresses the owners' share of the year's operations before taxes related to the resources contributed by both owners and creditors.

Principle: The relationship indicates the net profitability of the use of all resources of the business.

CASH FLOW/CURRENT MATURITIES LONG TERM DEBT

Method of Computation: The net profits plus depreciation and amortization were divided by the current portion of long term liabilities.

Result: The ratio expresses the ability to retire term debt each year from cash generated by operations.

Principle: Cash flow or "throw-off" is the primary source of regular repayment of long term debt, and this ratio measures the coverage of such debt service. Often much if not all of the depreciation will be needed for fixed asset replacements and expenditures but similarly some part of net profits may be committed to dividends. Although thus misleading to think that all cash flow is available for debt service, the ratio is a valid measure of the optimum coverage and a very useful calculation in all considerations of term lending.

SIC NUMBERS APPEARING IN THE STATEMENT STUDIES

SIC No.	Page	SIC No.	Page	SIC No.	Page
0161	190	2327	49	3321	83
0181	189	2328	49	3322	83
0211	186	2335	51	3324	83
0212	185	2337	52	3325	83
0251	187	2341	52	3361	84
0781	189	2342	51	3362	84
0782	189	2351	47	3398	82
0783	189	2352	47	3411	87
1211	186	2371	47	3421	85
1311	188	2391	46	3423	85
1381	197	2392	48	3425	85
1442	188	2394	45	3431	85
1521	195	2421	70	3432	85
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1622	196	2452	69	3444	90
1711	199	2511	65	3451	90
1721	198	2512	66	3452	90
1731	193	2514	64	3462	83
1741	197	2515	63	3465	88
1742	199	2522	64	3466	88
1743	201	2541	65	3471	84
1752	194	2542	65	3494	91
1761	200	2621	92	3496	89
1771	193	2631	92	3523	76
1791	200	2642	91	3531	75
1794	194	2643	91	3532	75
2011	61	2648	91	3533	78
2013	62	2651	92	3541	78
2016	61	2652	92	3542	78
2021	59	2653	92	3544	79
2022	59	2654	92	3545	78
2023	59	2655	92	3551	79
2024	59	2711	96	3552	79
2026	59	2721	96	3553	79
2033	59	2731	94	3554	79
2034	59	2732	93	3555	79
2037	60	2751	94	3561	77
2041	60	2752	95	3562	75
2048	62	2761	95	3564	77
2051	58	2789	93	3566	77
2065	58	2791	97	3567	77
2074	63	2821	57	3573	76
2075	63	2831	54	3585	74
2076	63	2833	54	3612	71
2084	53	2834	54	3613	71
2085	53	2841	57	3621	71
2086	187	2844	56	3631	72
2087	53	2851	56	3632	72
2211	101	2873	55	3633	72
2221	101	2874	55	3634	72
2231	101	3021	98	3635	72
2241	104	3111	68	3636	72
2252	102 & 103	3143	67	3545	74
2253	103	3144	67	3646	74
2254	103	3161	67	3651	73
2257	103	3171	67	3662	73
2258	103	3172	67	3671	71
2261	102	3251	98	3672	71
2262	102	3271	99	3674	71
2282	104	3272	99	3676	71
2311	50	3273	100	3677	71
2321	50	3295	99	3711	107

MANUFACTURERS OF—VALVES & PIPE FITTINGS, EXCEPT PLUMBERS' BRASS GOODS

33 STATEMENTS ENDED ON OR ABOUT JUNE 30, 1973
33 STATEMENTS ENDED ON OR ABOUT DECEMBER 31, 1973

MANUFACTURERS OF—ENVELOPES, STATIONERY & PAPER BAGS

28 STATEMENTS ENDED ON OR ABOUT JUNE 30, 1973
62 STATEMENTS ENDED ON OR ABOUT DECEMBER 31, 1973

ASSET SIZE	UNDER $250M	$250M & LESS THAN $1MM	$1MM & LESS THAN $10MM	$10MM & LESS THAN $50MM	ALL SIZES	UNDER $250M	$250M & LESS THAN $1MM	$1MM & LESS THAN $10MM	$10MM & LESS THAN $50MM	ALL SIZES
NUMBER OF STATEMENTS		17	29	13	66	11	25	37	17	90
	%	%	%	%	%	%	%	%	%	%
ASSETS										
Cash		4.1	4.6	5.8	5.4	5.6	6.3	4.0	4.2	4.3
Marketable Securities		.7	1.2	.4	.6	.0	.0	.8	.0	.2
Receivables Net		28.9	20.1	23.3	22.7	30.2	24.3	26.1	23.6	24.2
Inventory Net		37.5	38.7	40.0	39.6	27.2	28.7	29.6	24.9	26.1
All Other Current		.9	1.3	.8	.9	.7	2.5	2.0	.7	1.0
Total Current		72.1	65.9	70.3	69.3	63.7	61.8	62.4	53.4	55.8
Fixed Assets Net		24.1	28.1	23.0	24.3	30.0	29.6	32.0	41.6	39.0
All Other Non-Current		3.8	6.0	6.7	6.5	6.3	8.6	5.6	5.0	5.2
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
LIABILITIES										
Due To Banks-Short Term		8.3	6.7	7.9	7.6	11.9	4.3	8.4	3.4	4.6
Due To Trade		20.8	12.7	14.1	14.0	20.6	11.7	9.8	12.4	11.8
Income Taxes		2.8	2.4	2.8	2.7	.7	1.4	1.9	2.2	2.1
Current Maturities LT Debt		4.4	2.0	1.4	1.6	4.9	3.5	2.8	2.0	2.2
All Other Current		7.2	6.7	6.7	6.7	9.3	7.7	7.6	3.7	4.7
Total Current Debt		43.5	30.4	32.9	32.6	47.4	28.6	30.5	23.8	25.6
Non-Current Debt, Unsub.		19.9	10.2	12.8	12.4	21.2	15.3	15.2	18.8	17.9
Total Unsubordinated Debt		63.4	40.7	45.7	45.0	68.6	43.9	45.8	42.6	43.4
Subordinated Debt		3.3	1.4	3.0	2.6	.4	1.6	1.9	1.1	1.3
Tangible Net Worth		33.2	57.9	51.3	52.4	31.0	54.6	52.3	56.4	55.3
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
INCOME DATA										
Net Sales		100.0	100.0	100.0	100.0*	100.0	100.0*	100.0*	100.0	100.0*
Cost Of Sales		72.2	70.9	76.6	75.0	71.0	76.6	81.4	77.7	78.8
Gross Profit		27.8	29.1	23.4	25.0	29.0	23.4	18.6	22.3	21.2
All Other Expense Net		23.4	22.6	17.4	18.9	25.8	20.0	14.9	17.7	17.0
Profit Before Taxes		4.4	6.5	6.0	6.1	3.1	3.4	3.7	4.6	4.3
RATIOS										
Quick		1.1	1.5	1.0	1.2	1.5	1.6	1.4	1.3	1.5
		.7	.7	.8	.8	.8	1.0	1.0	1.1	1.0
		.5	.6	.7	.6	.3	.7	.9	.9	.7
Current		2.6	2.7	2.6	2.8	2.1	3.4	3.0	2.6	3.0
		1.7	2.1	2.3	2.1	1.4	2.0	2.3	2.3	2.2
		1.3	1.6	1.8	1.6	.9	1.4	1.6	1.6	1.5
Fixed/Worth		.4	.2	.4	.3	.2	.3	.4	.6	.3
		.6	.5	.4	.5	.6	.6	.6	.9	.6
		2.1	.8	.7	.8	3.1	.9	.9	.9	.9
Debt/Worth		.7	.5	.4	.5	.7	.4	.5	.6	.5
		1.9	.9	.7	1.1	1.8	.7	.8	.8	.9
		7.3	1.6	1.2	2.7	6.5	2.3	1.6	1.0	1.7
Unsub. Debt/Capital Funds		.7	.5	.4	.5	.7	.4	.5	.6	.5
		1.6	.9	.6	1.0	1.7	.7	.8	.8	.8
		3.0	1.3	1.1	2.0	6.5	1.4	1.5	1.0	1.5
Sales/Receivables	42	8.6	43 8.3	50 7.2	41 8.7	33 10.9	32 11.2	38 9.6	40 8.9	35 10.3
	49	7.3	51 7.0	61 5.9	51 7.0	49 7.4	42 8.5	42 8.5	48 7.5	43 8.3
	63	5.7	54 6.7	66 5.5	64 5.5	68 5.3	54 6.7	51 7.0	53 6.8	54 6.7
Cost Sales/Inventory	62	5.8	84 4.3	95 3.8	67 5.4	39 9.3	46 7.9	44 8.1	55 6.5	44 8.1
	103	3.5	124 2.9	144 2.5	124 2.9	51 7.0	57 6.3	61 5.9	68 5.3	60 6.0
	133	2.7	190 1.9	180 2.0	171 2.1	97 3.7	72 5.0	95 3.8	75 4.8	80 4.5
Sales/Working Capital		8.1	7.2	5.1	7.2	15.5	11.2	8.8	9.9	10.5
		5.6	3.9	3.8	4.7	6.3	6.9	5.6	6.3	6.3
		2.9	2.2	2.9	2.9	-7.0	4.2	4.3	4.9	4.3
Sales/Worth		11.8	5.1	3.1	7.0	9.8	9.0	5.3	3.3	6.7
		6.6	3.1	2.4	3.7	5.8	4.3	4.1	3.0	3.9
		4.4	1.7	2.1	2.2	2.4	3.1	3.1	2.8	3.0
% Profit Bef. Taxes/Worth		65.3	27.6	24.9	35.1	34.3	18.8	27.2	20.4	25.9
		19.8	17.0	21.8	18.8	28.7	9.7	21.7	15.0	19.3
		9.3	6.1	3.7	6.4	5.5	1.5	15.3	11.6	8.4
% Profit Bef. Taxes/Tot. Assets		13.0	15.3	14.2	16.8	9.8	12.0	16.3	11.9	13.9
		8.4	10.0	8.8	9.6	7.3	4.8	11.2	9.0	8.7
		3.6	2.9	2.1	2.9	-2.2	.4	4.7	5.9	4.2
Net Sales		$21001M	$170391M	$481478M	$674925M	$4703M	$39738M	$320417M	$690858M	$1055716M
Total Assets		10624M	112191M	335227M	459031M	2101M	16507M	117505M	377183M	513296M

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*See Footnote Page 45

INSTRUCTOR'S SUPPLEMENT

This program is planned to develop the participants' ability to conduct a feasibility analysis for a new industrial venture and/or appraise the investment risks of a proposed industrial venture. In particular, it should be of interest to the following:

- o Industrial development professionals
- o Potential entrepreneurs
- o Loan officers of lending agencies making small business loans

The importance of small industries in industrial development is widely recognized. Because of this importance, most countries have a number of organizations which provide development assistance. Among other activities, these organizations (1) attempt to identify and analyze opportunities for new industrial ventures and (2) provide assistance to entrepreneurs in the analysis of venture ideas and the preparation of investment proposals for projects which appear to be commercially profitable. This course will be useful to these professionals.

The entrepreneur will find the course useful in his efforts to analyze the potential profitability of the enterprise which he would like to start. According to loan officers, entrepreneurs frequently approach them with requests for funds and little except their own enthusiasm to support the request. They are, of course, convinced that their proposed project has potential for huge profits and feel that obtaining financial backing should be an easy task. Unfortunately, they have no data or analysis to back up their starry-eyed claims. Moreover, according to the loan officers, they do not know how to prepare the necessary feasibility analysis and present the results in a form which would convince a lender.

Finally, the loan officer who must appraise investment proposals and pass judgment on their commercial worthiness also will find the program helpful. He will learn what goes into a feasibility analysis, what assumptions to question, and where he may find information to verify the claims which are made.

1 The Course Format

It is generally recognized that people learn faster by "doing." Hence, the format of this course is intended to involve the participant in performing

the steps of a feasibility analysis and in group discussions. A recommended outline and schedule is shown in Table 1. Following registration and prior to the first group work session, each participant should be assigned to a work group of five to six persons. Assignments should be made only after a careful review of individual professional experience and educational background. The objective is to provide, if possible, a mix of experience and knowledge in each work group which will be beneficial to the learning experience.

Each afternoon's task assignment is concerned with the topic which is to be discussed during the following morning. Experience has shown that the relevant course notes should not be distributed until after the group reports. The participants are thus forced to struggle with the task, using whatever knowledge and experience they already possess. Since the participants are likely to have diverse backgrounds, their collective knowledge usually is adequate. If the work groups are properly chosen, the result will be that the participants learn a great deal from each other. In addition, the experience of discussing a problem of mutual interest from differing points of view results in a stimulating and enjoyable interchange of ideas.

Each work group is required to select a spokesman who will be prepared to present their work to the entire class during the morning of the following day. Visual aid materials must be made available for use in preparing these presentations. The order of presentation by the work groups is randomly selected and each presenting group is allowed a specified time. It is best to encourage questions or comments during any presentation. Other participants may want to question the approach taken and/or the results obtained. In fact, the instructor may find it useful to take the role of the "devil's advocate" and thereby encourage discussion.

Following the group presentations, the instructor should (1) discuss topics not adequately covered during the group presentations and (2) clear up points where misunderstanding was indicated by the group discussions. Work group presentations and resulting discussions prior to the instructor's lecture on a subject serve several useful purposes:

- o They encourage discussion and exchange of ideas among participants.
- o They provide a means for participants to know each other. This often results in personal relationships which may be useful to individuals in the class.

Table 1

SEMINAR OUTLINE AND SCHEDULE ANALYSIS
AND EVALUATION OF INDUSTRIAL PROJECTS

Day	Session	Time	Topic	Methodology
Mon.	I	9:00- 9:30	Opening Ceremonies	
		9:30-10:00	Coffee Break	
		10:00-12:00	The Investment Proposal	Lecture/Discussion
			Overview-Process for Industrial Project Analysis	Lecture/Discussion
			Generation and Screening of Venture Ideas	Lecture/Discussion
	II	1:30- 4:00	Market Analysis	Group Work Sessions
Tues.	III	9:00-11:30	Market Analysis	Group Reports, Discussion & Lecture
	IV	1:00- 4:00	Technical Analysis	Group Work Sessions
Wed.	V	9:00-11:30	Technical Analysis	Group Reports, Discussion & Lecture
	VI	1:00- 4:00	Financial Analysis	Group Work Sessions
Thurs.	VII	9:00-11:30	Financial Analysis	Group Reports, Discussion & Lecture
	VIII	1:00- 4:00	Appraisal of Investment Proposals	Group Work Sessions
Fri.	IX	9:00-11:30	Appraisal of Investment Proposals	Group Reports, Discussion & Lecture
	X	1:00- 3:00	Course Evaluation	
		3:00- 3:30	Closing Ceremonies	

- They disclose gaps in knowledge or misunderstandings which the instructor can remedy.

2 Work Session Tasks

In order to accomplish their intended purpose, the tasks assigned to work groups should meet the following requirements:

- Each task, although possibly consisting of several parts, must be specific (e.g., develop a sales forecast).
- The tasks must be challenging (nontrivial) but accomplishable, or nearly so, in the allotted time.
- In order to do the task really well, a thorough knowledge of the relevant subject material should be required.

It is not necessary that all work groups be assigned the same task(s). However, the participants will be better prepared to enter into the class discussions if they have all worked on the same problem.

The last task requirement stated above implies that flawless performance is not expected. In some instances, the participants may feel frustrated and possibly resentful over the fact that they have been given an assignment for which they are not prepared, but their efforts to perform will place them in a better learning position when the subject is subsequently discussed.

It is recommended that work group tasks be developed by selecting an actual feasibility study which was done in the country where the course is being conducted and obtaining the basic data behind the study. This basic information is furnished to the class, and work session assignments direct the groups through computation and analyses which parallel the original feasibility study. The suggested tasks used in these notes are based on a feasibility study for a project to manufacture ladies' blouses and pants for a domestic market. The plant location, in this case, was specified, but this need not be done. As the final work assignment, the groups are given an investment proposal and asked to appraise its merits from the standpoint of an investment agency.[1/]

1/ The task assignments presented in these notes were developed in cooperation with the Institute for Small-Scale Industries at the University of the Philippines, Quezon City, Republic of the Philippines.

During all work sessions, the instructor or other appropriate resource person should be available to answer questions and provide guidance to the work groups. Accurate and complete performance of assigned tasks is not expected.

3 Discussion Hints and Work Session Assignments

3.1 Session I

The entire first session is largely introductory in nature. Following the formal opening ceremonies, it is advisable to discuss with the class the objectives of the course and also the format and procedures for conducting the course.

Lecture and discussion during Session I deal with the following subjects and objectives:

- The Investment Proposal

  To develop a perspective for the role of feasibility analysis in preparation of investment proposals and in the development process.

- Overview of Industrial Project Analysis

  To provide an introductory overview of what goes into a feasibility study and the basis on which industrial projects are evaluated.

- Generation and Screening of Venture Ideas

  To develop a checklist to assist in obtaining industrial venture alternatives with potential commercial profitability.

Text materials for these topics can be given to the participants immediately after the formal opening.

3.2 Session II - Work Session on Market Analysis

During the morning session, assignment of participants to work groups can be made as described earlier. Suggested market analysis group tasks are the following:

a. List the types of information needed for the study of the market for ladies' blouses and pants.

b. Examine the national market trends. Analyze the national production, exports, imports and consumption of garments in general. (If

information is available, examine the national market for ladies' blouses and pants.

c. Identify types of individuals and organizations to interview and construct a questionnaire to be used for personal interviews.

d. Examine the transportation costs, competition and other factors to identify the boundaries of the proposed domestic market for garments.

e. Estimate the total market for all clothing in the market area (also show the geographical subdivision of the market area).

f. Estimate the segment of the clothing market for ladies' blouses and pants (also show the geographical subdivision of the market area).

g. Estimate the market penetration which the proposed garment manufacturer can achieve in each subdivision.

h. Extend the above analysis to estimate the firm's share of the market for the next five years.

i. List information needed and not available and possible sources.

In order to accomplish these tasks, the participants must be provided with a brief background concerning the project and market-related information extracted from available secondary information sources. Examples of such information are as follows:

- o Total family income and percentage used for clothing by state or region.
- o Projected population by five-year age group.
- o Growth trends in the production of wearing apparel.
- o Number of apparel manufacturers by size and product.
- o Apparel manufacturers by geographic location (region) and estimated share of market.
- o Export trends in wearing apparel.
- o Data on transportation costs.
- o Miscellaneous market-related information pertaining to the apparel industry (e.g., results of published surveys).
- o Bibliography of market-related publications and reports locally available.

The market analysis tasks listed above are probably more than can be accomplished in the time shown in Table 1. The instructor must modify the list to fit the available time.

3.3 Session III - Market Analysis Group Reports, Discussion and Lecture

Experience with the course has indicated that approximately one hour should be reserved for the instructor's lecture and interaction with the class. However, time required will depend on how satisfactorily the subject is covered during the group presentation and discussions and upon weaknesses and misconceptions which the instructor is able to perceive during these discussions. The selection of work groups to make presentations should be random, with all groups eligible.[2/] The instructor should encourage class discussion by appropriate challenges and questions to not only the presenting group but also to other participants. It will be found that each succeeding group contributes fewer new ideas and that class discussion becomes shorter. After two or three presentations, the instructor may wish to lead the discussion himself.

The objective is to provide the participants with an understanding of what goes into a market analysis so that they can develop the ability to perform such an analysis and/or appraise its weaknesses.

The instructor should distribute the text material and discuss the steps of the market analysis shown on page 4-2, spending time only on those topics not adequately covered during the preceding discussions.

3.4 Session IV - Work Session on Technical Analysis

Utilizing the sales projections obtained from the market analysis, the work groups must now consider the technical analysis. Specific tasks are suggested as follows:

a. Develop a flow process chart for the manufacturing process.

b. Select machinery and equipment and determine space requirements.

c. Design an appropriate organization structure.

d. Calculate the following cost estimates:

- o Fixed investment costs
- o Manufacturing costs and expenses

2/ It is advisable to make this selection at the *close* of the work session and announce the results at that time. This encourages those groups to prepare visual aids and encourages groups who know they will not make presentations to enter into discussions more freely. The selection of groups who will make oral presentations should not be made before the close of the work session, since those not selected may be inclined to do a less thorough job.

- o Selling and distribution expenses
- o General and administrative expenses

e. Determine inventory requirements and a production schedule.

f. Estimate working capital requirements.

If time permits, cost estimates should be made on a monthly basis during the first year and on an annual basis for the four succeeding years.

Information required in doing these tasks is as follows:

- o A description of the manufacturing process
- o Cost and performance data on equipment alternatives
- o Materials requirements and costs
- o Direct and indirect labor costs
- o Factory overhead costs
- o Selling and distribution costs
- o Costs related to start-up

In addition, a sales projection must be provided so that all groups start with the same forecast.

It is very difficult to obtain and furnish all the detailed data which are required in the technical analysis. The work groups no doubt will be required to make assumptions and estimate missing information. The instructor or other technical resource person must be available to answer questions and assist the groups during the work session. Hand calculators are necessary to facilitate the computations which are required.

It is particularly important that work groups who are selected to make oral presentations prepare flip charts or transparencies prior to the morning session. The use of a blackboard during the presentation is unnecessarily time consuming.

3.5 Session V - Technical Analysis Group Reports, Discussion and Lecture

The objective of this session is to develop each participant's ability to prepare the technical analysis and cost estimates for a feasibility study.

This session should be conducted in the same manner as Session III. The work group presentations and accompanying class discussion will provide an excellent opportunity to examine cost elements, assumptions and their effect upon the adequacy of cost estimates.

The financial analysis, on which the decision to start the enterprise or to abandon the idea must be made, depends upon the market, and technical analysis requires choices among alternative processes, equipment, organization structure and materials. In actuality, the technical analyst may have to make a "rough design" of the proposed enterprise in order to estimate costs needed for the financial analysis. Unfortunately, the failure of many new businesses can be traced directly to inadequacies in the technical analysis. Most frequently, the inadequacy has to do with failure to accurately estimate costs.

Following the group presentation and discussions, the instructor should distribute the course material and review the steps in performing a good technical analysis. Some of these steps are highly technical (e.g., equipment selection) and, in practice, may require the use of engineering consultants. However, the participants need to be aware of all that must be done.

Several checklists are provided in the text notes. Their primary purpose is to assure that all important factors are considered in the selection of appropriate equipment and in making cost estimates. It is not advisable to spend class time on the checklists.

3.6 Session VI - Work Session on Financial Analysis

The results of the marketing analysis and technical analysis must now be summarized and arranged into financial statements and projections which can be interpreted by the entrepreneur and leaders of capital. The tasks for the work session are:

a. Prepare a schedule for total project cost.

b. Prepare the following pro forma financial statements:
   - o Income statement
   - o Blance sheet
   - o Cash-flow projections

   The first two should show monthly (or quarterly) figures for the first year and annual figures for the succeeding four years. Cash-flow projections should be made monthly for the preoperating period and the first year and on an annual basis thereafter.

c. Perform a break-even analysis

d. Calcualte the following:

- o Return on tangible net worth
- o Return on sales
- o Pay-back period

e. Rank and discuss major threats to profitability. Do you think the project is a good risk? Why or why not?

The completion of these tasks requires assumptions concerning owner's capital, loan interest, repayment schedules and plant operating efficiency. The instructor or other resource person should be available to assist the work groups. Calculators will be needed for financial computations and visuals should be prepared by the work groups in order to save time during the oral presentations.

3.7 Session VII - Financial Analysis Group Reports, Discussion and Lecture

The financial analysis utilizes the sales estimates from the marketing analysis and the cost estimates from the technical analysis in the assembly of pro forma statements which serve to guide the project feasibility decision. The group oral reports will stimulate discussion concerning the proper format for financial reports and their interpretation.

Following the reports of the work groups, the instructor should distribute text materials and discuss those points which were inadequately dealt with during the earlier discussion.

3.8 Session VIII - Work Session on Appraisal of Investment Proposals

The preceding sessions have been planned to lead the participants through the steps of preparing a feasibility study for a new venture. Thus, they should now have a good appreciation for what should be in a well-done project feasibility study. They should know where to look for weaknesses and how to obtain data for verification of claims which are made in a study submitted in support of an investment proposal which they may be asked to appraise. However, a number of important considerations in investment proposal appraisal have not yet been covered.

The purpose of this work session is to provide an opportunity for the participants to apply their newly attained understanding of project feasibility analysis and to stimulate thought and discussion concerning other important factors in the appraisal of investment proposals.

In order to achieve these objectives, each work group is provided with a copy of a complete investment proposal. This should be different from the proposal which served as the basis for the task assignments. It should be an actual proposal with all supporting documents, so that it is complete and realistic. Most important, it should provide a challenging appraisal task. The feasibility study assignments have been demanding and an appraisal task which is obviously trivial will result in an undesirable "letdown."

The work groups are given the following tasks:

a. Make an appraisal of the investment proposal from the viewpoint of a lender of capital and make a decision as to whether or not you would grant the loan requested. Justify your decision in detail.

b. What specific information needs to be verified and what would be some possible data sources?

Work groups should be told that they are free to obtain data or other information from any source known to them.

3.9 Session IX - Appraisal of Investment Proposals Group Reports, Discussion and Lecture

The group reports and discussion provide an excellent opportunity to bring out a number of points concerning appraisal of investment proposals which are important to both the entrepreneur and the lender. Some of these are:

- Information which the lender wants in the investment proposal (i.e., contents and format of the proposal).
- Important checkpoints to verify claimed commercial profitability.
- Appraisal of management.
- Consideration of threats to profitability not mentioned in the proposal.
- Consideration of social profitability.

It is unlikely that any one investment proposal will be relevant to all of these points. Therefore, after the case has been discussed, the instructor should distribute the text notes and review the important considerations in the appraisal of investment proposals.

3.10 Session X - Review and Closing Ceremonies

A portion of the final session of the course may be used as a question and answer period in order to clarify unresolved questions. A good approach is

to obtain a panel consisting of an entrepreneur, an industrial development professional, and a loan officer to answer questions put by the class.

It is good practice to obtain the participants' evaluation of their learning experience. Further recommendations concerning this matter are given in Section 5.

4 Other Suggestions

(1) Insist that reporting work groups prepare visuals before the morning sessions so that class time is used effectively.

(2) Allow free discussion, but do not permit the discussion to drift or dwell on trivial points.

(3) Do not permit one or two participants to monopolize the discussion. If this begins to occur, interject comments such as "I'd like to hear what some others have to say about this question."

(4) Ask each work group to prepare the task assignment in writing. Collect these following the discussions and place them in a notebook so that interested participants can examine calculations or other details.

(5) If evening sessions are possible or if you feel that time can be made available prior to the work sessions, invite guest speakers who can contribute personal experiences to the class.

(6) The course notes are in outline form and are meant to provide a framework for discussion and reference. They should be supplemented by relevant local practices.

5 Course Evaluation by Participants

Most instructors feel that it is very desirable to obtain feedback from the participants regarding the quality and value of the course. This is best done prior to the closing ceremonies.

In order to be useful, the participants' comments should be specific. The course and lecturer evaluation forms in Attachment A were supplied by the Institute for Small-Scale Industries at the University of the Philippines and are recommended for use in this course.

Attachment A

COURSE AND LECTURER EVALUATION FORMS

These evaluation forms were furnished by the Institute for Small-Scale Industries, University of the Philippines

COURSE EVALUATION

SEMINAR TITLE: _____

Duration : _____

1. Relevance to participant/sponsor

   1.1 Did the contents of the course programme meet your objectives in taking the course?
   Yes _____ No _____ If no, why? _____
   _____

   1.2 Did you learn what you wanted to learn from the course?
   Yes _____ No _____ If no, why? _____
   _____

   1.3 Do you feel that your participation in this programme had made you more qualified professionally?
   To a great extent _____
   Somehow _____
   No _____

   1.4 Did you find the programme relevant to the situation in your company/agency?
   Very relevant _____
   To some extent _____
   No _____

   1.5 Do you think that you could use the acquired knowledge in your company/agency?
   Yes _____
   No _____

2. Instructional procedures

   2.1 What was the level of the programme?
   Too theoretical _____
   Good combination of theoretical and practical aspects _____
   Inadequate on the theory side _____
   Inadequate on the practical side ____
   Entirely inadequate _____

   2.2 How would you evaluate the teaching materials and aids used by lecturers?
   Satisfactory _____
   Need improvement _____
   Inadequate _____

2.3 What do you think about the course materials issued?
Satisfactory _____
Need improvement _____
Inadequate _____

2.4 How would you evaluate the facilities of the Institute?
Satisfactory _____
Need improvement _____
Inadequate _____

3. Exchange of Experience

3.1 Did you have sufficient time for a professional exchange in views?

a. with lecturers Yes _____ No _____
b. with fellow participants Yes _____ No _____

3.2 Did you benefit from the exchange?

a. with lecturers Yes _____ No _____
b. with fellow participants Yes _____ No _____

4. Summary

4.1 What would you want the composition of the participants to be?
From similar lines of work _____
From different lines of work _____

4.2 How would you rate the whole programme, in general?
Excellent _____
Good _____
Poor _____

4.3 Other comments

_____
_____

[illegible]

[illegible]

1. [illegible]
   [illegible] ... 1 2 3 4 5 ... Irrelevant

2. Is the lecture correlated to the overall program?
   Very correlated ... 1 2 3 4 5 ... Not correlated at all

3. Could you understand the lecture?
   Very well ... 1 2 3 4 5 ... Not at all

4. Did the lecturer speak loud enough? ... 1 2 3 4 5 ... Can hardly be heard

5. How well did the speaker present his topic?
   Excellent ... 1 2 3 4 5 ... Very poor

6. How well did the speaker conduct class discussion?
   Excellent ... 1 2 3 4 5 ... Very poor

7. How well did the speaker satisfy inquiries and/or questions from participants?
   Excellent ... 1 2 3 4 5 ... Very poor

8. How did you find the subject presentation and discussion?
   Practical ... 1 2 3 4 5 ... Theoretical

9. How do you judge the subject discussed in general?
   Easy ... 1 2 3 4 5 ... Difficult
   Valuable ... 1 2 3 4 5 ... Worthless
   Interesting ... 1 2 3 4 5 ... Uninteresting

10. What is your overall rating of the lecturer?
    Excellent ... Very poor

[illegible]

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