THESIS

ROBERT COLLEGE GRADUATE SCHOOL
BEBEK, İSTANBUL

PAGE

ENTERPRISE SELECTION

by

YAŞAR MERİÇ

THESIS

Submitted to the Faculty of the
School of Business Administration
and Economics in partial fulfillment
of the requirements for the degree of
Master of Arts in Industrial Administration

ROBERT COLLEGE
Istanbul, Turkey
1970

PREFACE

Herewith I must state that I am indebted to my advisors Prof. Kenan Şahin, Mr. Metin Göker and Prof. Mustafa Dilber, whose names are written in the order of the times of consultation, for their invaluable helps in the preparation of the thesis.

I am also indebted to Türk Philips Ticaret A.Ş. for the permission granted in the use of company's printing devices.

I thank to the above mentioned names for their worthy efforts and participations in the accomplishment of this study.

Yaşar Meriç
1970

ENTERPRISE SELECTION

TOPICAL OUTLINE

DETAILED OUTLINE

PAGE

INTRODUCTION

In this study, enterprise is defined as a business organization formally established in accordance with respective laws for the attainment of an ultimate goal. Enterprise Selection is, accordingly, a strategy to be followed for the best solution of the problems involved in finding a particular business opportunity which is expected to yield optimum results so far as the attainment of the ultimate goal is concerned.

Purpose

In practice, the enterprise selection strategy is followed through a rather intuitive acceptance of a business opportunity and making a deterministic feasibility analysis of the validity and reliability of that opportunity. This thesis aims at the accomplishment of the following considerations:

1. Proposing a scientific procedure in the selection of the best business dopportunity by leaving less room for intuitive judgment, thus widening the perspective of the feasibility analysis.

2. Current feasibility studies are mostly made on a deterministici basis. This thesis gives due consideration to the probabilistic features of the problem.

3. Current feasibility studies lack some useful models in their contents which have newly been developed in the management science. The thesis tries to give some of those models through the chapters as being applicable in enterprise selection.

It is hoped that this work will be valuable to those in business field by filling the beforementioned gaps in current practices.

Scope

In this thesis, enterprise selection will cover the following areas:

1. Business Selection.

It involves finding the best business opportunity among many alternatives, which optimizes the satisfaction of the business objectives under the given conditions of environment and availability of resources.

2. Feasibility analysis.

This subject includes the interpretation and evaluation of the new business, and, formulizing the facts obtained through this study in a feasibility report which will be the base for business planning and external financing.

To discuss these two main topics , the following chapters have been developed in the thesis:

Chapter I - Business Selection:

In this chapter the following are discussed:

a. Determination of the factors of business which are the variables that ought to be taken into account in finding the best opportunity. They are business goal and objectives, available resources, states of environment and business opportunities.

b. Interactions among the factors of business, to find out the interdependencies among each other and their mutual effects on the selection of the opportunity.

c. Opportunity selection.
It implies the interpretation and evaluation of the alternative business opportunities, application of a decision model and choosing the best alternative that optimizes the satisfaction of the business objectives under the expected state of environment.

Chapter II- Feasibility Analysis:

Here, the factors of firm are taken into account and the business is evaluated precisely in relation to these factors in order to have a formal base for r business planning and external financing. The factors of firm, which are essential in evaluating the business , are the following:

a) Product/Service of the business
b) Technology of the business

c) Size of the business
d) Location of the business
e) Capitalization of the business

This chapter includes the procedure that is practiced in business in the handling of the above mentioned considerations in order to complete the feasibility analysis of the firm. However, the problems directly related to the factors of firm are discussed widely in the remaining chapters. After selecting the best business opportunity, the entrepreneur must refer to those chapters which ever are needed for the determination of the unknown factors of firm.

The opportunity which is chosen for making new business may be such that only its P/S (product /service) is known but technology is not known. Or, only the technology may be known, but the P/S may not be known. In the first case, a technology selection, in the second case , a P/S selection are necessary.

Also , the size and location of the business may need determination if they are not given beforehand in the state o the opportunity. Likewise, the total capital required for the business may not have been determined by the entrepreneur. In that case, a capital selection is necessary.

Chapter III- Product / Service Selection

A network is developed to follow in finding the P/S of the business which optimizes the objectives. There are two strategies applied in the chapter:

1) Strategy to find the best P/S among the present P/S's
2) Strategy to develop a new P/S through a research and development process. A PERT model is applied to illustrate the case. After developing the new P/S model its market survey is carried to find out its acceptability by the consumers. Then, if the results are satisfactory, organization for the actual development of the new P/S is formulated and exacuted.

In the evaluation and comparison of alternative P/S's with respect to their long-term returns, probabilistic discounted cash flow method can be used as illustrated in the chapter. Another but less accurate method is "payback".

Chapter IV- Technology Selection.

Technology selection pertains to the activities necessary to determine the technical equipment which are most appropriate for the performance of production functions for the given P/S of the new business.

In this chapter , a strategy for technology selection is developed. It begins with a technological forecasting, goes on with the consideration of actors of production to enable the entrepreneur to find the most efficient combination of those factors which are capital, land, labor, innovation and entrepreneurship.

The strategy continues with the discussion of two basic models: model for profit maximization , and model for cost minimization, and terminates at a make-or-buy decision for the technology to be used in the production. Both of the models are deterministic.

Chapter V- Size Selection.

The type of the P/S , the growth potential of the business and P/S-Market relationships influence the determination of the volume of the business which is called size selection. It includes the following considerations:

- A long-term demand analysis to find out the sales volume throughout the periods

- A forecast for demand estimation

- Determining alternative sizes and size-expansions to meet the probable demands. Here the volume of technology and the necessary capital for investment with respect to each alternative size must be calculated.

- A decision tree model is applied in the chapter to come to the solution.

- After finding out the optimum alternative size, expected life of the firm can be estimated by choosing a depreciation method applicable to the physical facilities.

Chapter VI- Location Selection.

Finding the best location for the firm is another problem. The chapter is presented with the introduction of the location theory. Then, the problem is discussed with models. Optimality model formulates theoretically the optimum location function. Cost model gives the total cost of tangible location factors and tries to approach the best location decision from cost point of view. It is also theoretical because, it does not consider intangible variables involved in location problem.

A practical approach is also developed covering tangible as well as intangible factors to find the right location of the firm. This approach is widely applicable in business for the solution of the location problem.

Chapter VII- Capitalization Selection.

Now, the entrepreneur is ready to predict the total cash outflows necessary to finance the business and determine the sources of finance to provide the required capital to invest in the business . For this purpose, he should look at the previous chapters to find the cash outflow factors and the financial market to determine his financial behaviour as to the composition and structure of the external and internal capital.

A feasibility report will summarize the above mentioned considerations performed in feasibility analysis upon which the new firm is evaluated by the creditors and investors, and the required capital is obtained . Then the real capital structure of the firm is formed.

Methodology

It depends on the type of the problem. However, mathematical methods are emphasized. In some cases, more than one model is given to widen the perspective of the reader.

Both deterministic and stochastic approaches are utilized whereever they are applicable.

Practical, as well as theoretical, aspects of the problems are discussed together.

Remarks

Of course, there may be methods, problems or subjects other than those mentioned and discussed throughout the thesis. However, only the most important ones are considered in this thesis.

Also, the sequence followed here is not the only one that could be applied. Priorities of subjects may be different according to the viewpoint of the analyst as well as the degree of importance of the subject in the enterprise selection decision. But the common attitude of the selection analysts should be that they have to deal with the subjects interchangeably.

Critical evaluation of models are not intended. Aim is just to give some insights to businessmen who face enterprise selection decisions.

CHAPTER I

BUSINESS SELECTION

CONTENTS

INTRODUCTION

Business selection is a hard task especially because it involves long-term uncertainty in its inherent problems. In business selection decisions one has to consider four major factors of new business :

1. Goal and objectives
2. Available resources
3. States of environment
4. Business opportunities

Those four factors are prerequisites to be dealt with before having a decision on a new business establishment. The first two are mainly internal , while the last two are largely external factors for the decision maker. The internal factors are more under the control of the decision maker as compared to external factors. While considering a decision on enterprise selection , the decision maker must take into account both the factors under his control and probable conditions of the factors outside his control. He must relate them to each other and determine the interrelationships so as to have an optimum opportunity selection.

Then, in the following pages, the above mentioned four major factors of business are discussed, first, seperately, in order to understand what they are, their characteristics and their effect on business selection decision. They are called "factors of business" in the sense that they are the variables affecting the selection of a new business.

Secondly, the interactions among those factors are discussed, so that their integral force on the new business decision can be visualized.

Upon the consideration of interactions of factors of business, the entrepreneur can evaluate and compare the opportunities with respect to his objectives and select the best one accordingly.

In opportunity comparison there are five decision criteria illustrated in the chapter any one of which can be used by the entrepreneur, depending on his personal preferences.

FACTORS OF NEW BUSINESS

New business selection depends on the consideration of four distinct variables which we call "factors of new business". They are as follows:

1. Goal and objectives
2. Available resources
3. States of environment
4. Business opportunities

The entrepreneur should determine his goal and objectives as targets to be achieved in the search of new business. He must determine the availbale resources, external and internal, to be used in the new business. He should forecast the future conditions of environment which are called states of environment, to estimate the probable outside influences upon his new firm decision.

Also , he must look for the business opportunities within the environment conforming to either one or more than one of the states of environment, to select the best one which optimizes his objectives under the predicted conditions of the environment that are expected to occur in the future.

In the following pages , we shall discuss each one of the factors of new business in detail.

GOAL

The entrepreneur must establish an ultimate aim for his new business which we call "goal". Goal originates with an idea and performes its function as a target to be reached . In our case, the idea is "making new business". The target, on the other hand, can be with respect to any one of the following goals:

1. Profit
2. Service to the society
3. Survival

There can be other goals not as common as those but applicable only in particular situations.

Profit can be measured in terms of Tl. . Therefore, it is rather easy to calculate the total profit of a firm for a given period. A profit-sealking entrepreneur tries to maximize its profit until he reaches the profit target he has set forth.

Service to the society can be measured in terms of units sold or in terms of customer satisfaction. A service-seaking entrepreneur minimizes his cost rather than maximizing his profit. He wishes to satisfy the demands of as many customers as his husiness capacity permits. Also he must set his prices so low as to allow this condition to happen. However, a moderately low profit margin is necessary to sustain his firm's continuity. On the other hand, increasing volume of sales will yield increasing returns.

A firm which seeks survival as its goal, gives every effort to stay continuously in the competitive market. It makes both profit increasing and cost decreasing efforts to be able to survive. But it never tries to maximize its profit or minimize its costs for it knows that it cannot attain those ends due to keen competition or low prices in the market or high cost in the company. Also, it may wish to survive only, although there is room for maximization or minimization.

The common point in those goals is that each one is by itself a target to attain. A profit target should be a particular amount of profit. A community service target should be number of quantities sold or an amount of cost. A survival target can be any one of those, depending on the type of the business, market, and desires of the owners. So, the results of goal-efforts must be measurable in terms of these target units.

OBJECTIVES

However, one goal is not enough to establibh a business. There must be other minor goals which we call "objectives" of the entrepreneur. He looks if those objectives are also satisfied through the expected results of the new business under the expected conditions of the environment.

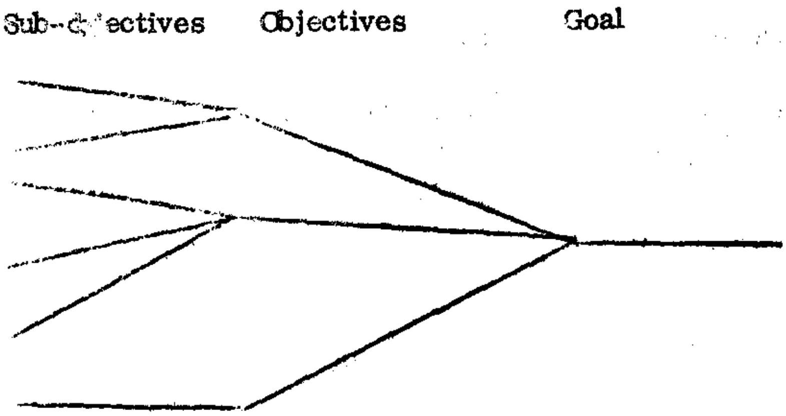
Achievement of the new business goal is multi-dimentional. Objectives represent these dimentions and determine the main characteristics of the new business. Some of those objectives can be further classified in to sub-objectives or secondary objectives depending on the desires, personality and preferences of the entrepreneur. The following are some dimensions which can be formulized as objectives:

1. Life of the business
2. Legal status of the business
3. Growth potential of the business
4. Minimum return of the business
5. Uniformity pattern of return of the business
6. Control of the business
7. Capital of the business
8. Type/quality of the business
9. Risk of the business
1 . Technology of the business
11. Labor of the business
12. Raw material/energy/real estate to be used in the business

The entrepreneur can choose some of these objectives or others and define them in specified terms. He may even divide those objectives into sub-objectives , and the picture may be seen as in chart I.

CHART I

TREE OF OBJECTIVES



Definition of Objectives

1- Life of the business is the length of time during which the firm functions in the market. Survival is the far extreme and it indicates that the firm will stand in the market perpetually.

2- Legal status of the business is the form of the business as allowed by the Commercial Law. The following forms are allowed in Turkey:

a. Collective company
b. Commandite company
c. Limited company
d. Corporation (anonimous company)
e. Cooperatives

Their differences rely on:

1. Personal responsibilities
2. Amount and shares of capital
3. Number of owners
4. Tax considerations

We shall not discuss these forms. However, the entrepreneur must select the one which maximizes his desires.

3- Growth potential of the business is the ability to develop or expand in size, in market volume or in diversity of P/S, which will yield different returns throughout the periods.

4- Return is the result of business operations per period. It can be measured in terms of TL., or rate of return on the basis of capital or sales.

5- Uniformity pattern of returs means the conformitiy among returns that result in each period.

6- Control of the business is the utilization of the power of authority on the business.

7- Capital amount is the total resources necessary to start and operate the business. Internal capital is obtained through the properties of the entrepreneur, and external capital is obtained from outside sources like creditors.

8- Type/quality of the business implies the area of occupation in which the firm operates.

9- Risk is the total probability of failure in the objectives of the entrepreneur. it can be measured in terms of losses.

10, 11-12- Technology- Labor- raw material, energy, real estate are the factors of production to be used in the business.

<u>Interactions of Objectives</u>

Life of the Business :

a) Life may be either perpetual or limited. If the entrepreneur chooses a perpetual life, growth of the business will follow the usual business life cycle pattern under normal conditions. Risk of the business must be low for a perpetual life. The business must use a technology and labor force at an advanced level or so flexible as to permit modifications when required by future technological and labor developments if the life of the business is going to be perpetual.

b) The person may wish to have the life go on as long as he lives, say, approximately 50 years. Or, the partners may wish to put an item in their aggreement indicating that the business will expire whenever one of the partners quits the business. In such cases where we have the limited life of business, legal status can be other than corporation. But control of the business can remain centralized. Risk can be as high as it allows for business to remain until the end of the life period. Technology and labor will not need so much flexibility and advancement. Growth potential may be low but return of the business will most probably be high if the selected business will have a limited life.

Legal Status of the Business:

a) If the objective is a proprietorship, then life of the business should be restricted at most by the owner's life. The owner will not accept great losses during the initial years of the business because his capital will be too small to bear the burden of great losses even during the initial years . Control of the business , on the other hand, will be solely by the owner himself.

b) If the objective is partnership , life of the business will again be limited if so indicated in the contract. Partners will desire to deal with high-return businesses, and won't desire such businesses yielding great losses during the initial years of the business for their capital is apt to be small and cannot bear the burden of great losses even during the initial periods. The business will be rather risky because they have the courage to take risks in order to gain high returns. Control of the business will be centralized in the hands of the partners.

c) In corporation, the business will follow its historical business life cycle by growing, stagnating and then declinig if the life of the corporation will be so long as to permit this trend to happen. Control of the business can be decentralized for the business will probably be large by using external as well as internal resources of capital. Technology and labor that are going to be used in the business should be advanced and flexible enough to cope with the market and adopt themselves to future technological and labor developments.

Growt Potential of the Business:

a) The businessman may wish to form a business having a potential to grow in the near future. Such business will yield high returns. It will also be a risky business. To allow for growth the technology and labor must be advanced and flexible to adopt themselves to future developments.

b) If the businessman desires no growth but is satisfied with a constant size of business, then , he must also accept low returns out of the business. Risk will be low too. Technology and labor, so called "productive factors of production", do not need to be advanced and too flexible.

Return of the Business:

The business establisher must set aside a minimum amount of return to be accomplished throughout the life of the business. Or, he must determine a minimum gross profit margin as his return objective. What he sets may be low or high in comparison to the prevailing conditions of the market. In both cases , life of the business should be long enough to permit at least the objective return to be realized. Low-return objective can be satisfied througn a business having stable returns. However, high-return objectives needs a high growth potential of the firm. There is a relationship between return and risk. Usually , in business when risk is high , return is also high. For high returns, technology and labor objectives should be towards highly developed and flexible ones.

Uniformity Pattern of Returns:

a) The entrepreneur may desire an always increasing pattern. This objective must be accompanied with "high growth potential", "increasing return " and "high-risk" objectives.

b) A stable-pattern objective implies stable growth, stable returns and low risks.

c) The entrepreneur may accept to have no returns during the initial periods, then, increasing returns thereafter. Growth potential of the business in this case must be high.

Control of the Business:

a) The entrepreneur may desire to have a centralized control by himself over the entire business. This objective should be accompanied by a limited life, noncorporate form of business, internal capital and stability in growth after a certain stage where his span of control goes beyond the limits of his capacity.

b) He may not be conservative and may desire to have his business under decentralized control. Or, he may wish so for he is not able to perform the control and administration functions. In that case , a large capital can be employed in the business to allow it grow, expand and diversify. He may then even use external capital and establish a corporate form of enterrprise owned by a number of persons.

Capital of the Business:

a) The entrepreneur may wish to finance the business through his own resources only. In that case, the amount of capital to be used in the new business is bound to be at most as large as the total amount of his effective resources. The total will probably be small. Therefore, size of the business will be small . If he uses his capital only, then, control of the busimess will remain on his shoulders, and life of it will be his remaining lifa So, he should accept a limited life, and a centralized organization for his internal capital objective.

b) However, if the entrepreneur wishes also to use external sources of capital, then, capital accumulation , and size of the business will be large. One man or team cannod control a large -size business. Therefore, the business should be decentralized. So, he must agree that the control of the entire business cannot be given to him if the business is going to be a large one financed through external as well as internal sources of capital.

Type of the Business:

If the entrepreneur has already decided upon the type and quality of the business , then, all other objectives must fit to the requirements and characteristics of this business. For example, he must have the growth potential, rate of return, uniformity pattern of returns, necessary capital, risk, technology, labor, material, energy and real estate objectives accompanying his type-of-business objective. He may have the type-of-business objective as a result of one of the following events:

1. A research and development study has concluded that a new business would be desirable.

2. He may persomally prefer to go into a particular business.

3. Available resources may require a particular business.

4. A special opportunity may encourage a business.

5. Prestige factor may be utilized on a particular business.

Risk of the Business:

a) The entrepreneur may not be courageous enough to embark on too risky businesses. He may wish to be involved in a business which has low risk of failure. In that case, his objective on returns must agree with low returns under normal conditions.

b) If he aims to have a high-risk business, that means, his return-objective also requires high returns under normal conditions.

Technology-Labor-Raw material, Energy, Real Estate:

The entrepreneur may aim to utilize a particular technology, labor or other factors of production. Then, his capital objective should allow the amount of capital which can buy those factors of production. His raw material, energy and real estate objectives must be in parallel so as to be used by the technology or labor efficiently.

Chart of Objectives

On chart of objectives (chart II) , we see the types and interrelationships of the business objectives that the entrepreneur can have in his business decisions. Up to now we discussed the types and interrelationships of the business objectives. This chart summarizes what we have said before. The words in squares don't apply hundred percent to all conditions. However, they show the most probable results. There may be objectives other than those stated on the chart, which the entrepreneur has to take into account too.

Conflict among Objectives

The objectives set forth are interrelated to each other in the manner discussed above. However, the entrepreneur may find out that some of the objectives are conflicting. For instance, if the life objective is such that the entrepreneur wants a perpetual life for the business, and the risk objective is such that he wishes a highly risky business; these two objectives are then conflicting, because for infinite life of the business its risk of failure must be low. The entrepreneur must eliminate this conflict either by changing one of his objectives or eliminating one of them. In our example, he may change his life objective from infinity to limited life, or he may

CHART II
CHART OF OBJECTİVES

Objectives	Life	Growth	Return	Unifor. pattern of ret.	Control of the business	Capit.	Risk	Techno.	Labor
LIFE									
Infinit							Low	Flexible	
Limited			High				High		
STATUS									
Proprietor	Limited			No init. loss	Centra.	Small			
Partnership	Limit.		High	"	"		High		
Corporation						Large		FLEXIBLE	
GROWTH									
Increasing			High				High	Flex.	Advanc.
Stable			Low				Low	Nonfile.	Inadvan.
RETURN									
Low	Must	Stable					Low		
High	fit	İncrea.					High	Advanced	
UN. PATTERN									
Increasing		İncrea.	Increa.				High		
Stable		Stable	Stable				Low		
		Increas.							
CONTROL									
Centralized	Limited					Limited			
Decentral.						Large			
CAPITAL									
Internal	Limit				Centr.				
External					Decent.				
TYPE		Must fit				Must fit		Must fit	
RISK									
Low			Low						
High			High						
TECHNOLOGY						Must			
LABOR						fit			
RAW MATERIAL									
ENERGY								Must fit	
REAL ESTATE									

change his risk objective from high risk to low risk. If this sort of modification is not possible for him , he may then eliminate either one of these objectives. So, in general, the entrepreneur has two strategies to use in eliminating the conflicts among obj ectives:

1. Modify the conflicting objectives
2. Eliminate one of the conflicting parties.

Weighing the Objectives

-After having achieved a conformity among the business objectives, the entrepreneur must determine their limits and assign them weights for the purpose of comparing the opportunities . In the following chart , an example is given to clarify the case:

WEIGHING THE OBJECTIVES

BUSINESS OBJECTIVES	LIMITS	Minimum Weight	Maximum Weight
1. Life of the Business	Minimum 30 Years	10	10
2. Legal Status	Limited company	10	10
3. Growt potential	Growth for the first 20 years Stable later on	30	60
4. Return	Minimum 30% average gross profit margin annually, or, Tl. 1500 000 total.	100	200
5. Uniformity Pattern of return	Minimum : No return for the first year, 10% gross return for the second year , 20% for the later years	50	100
6. Control of the Busin.	By the partners, proportional to their capital shares	20	40
7. Capital Amount	Minimum: 500 000 Tl. (or maximum)	40	80
8. Type/quality of the Business	No objective	0	0
9. Risk of the business	Maximum: To lose the capital	100	200
10. Technology-labor-material energy, real estate of the Business	No objectives	0	0
	TOTAL WEIGHT	360	700

The explanations under the "limits" column are the outher extremes of the objectives of the person. He sets those limits independent of outside effects. His personal temperement, wishes, feelings and knowledge affect him determining those extremes. Those limits must be in conformity with the goal of the business as well as with each other. While determining those limits, however, he should consider such points as:

1. Number of years he will be effective on business
2. Legal types of business accepted by the government
3. Ambition for fame
4. Ambition for earning
5. Wish to earn quick
6. Ambition to lead a business and use the persional capability
7. Available capital
8. Specialized business area
9. Courage to take risk
10. Available technology
11. Available labor
12. Wish to help the development of the country.

Then, he must assign minimum weights for the lower limits of objectives and maximum weights for the maximum satisfaction of those objectives. Assigning weights is done upon subjective judgment.

RESOURCES

Resources are the available factors of firm which are at the disposal to be used in the establishment and operations of the business. They can be obtained internally, through personal properties of the business establisher, or externally, through borrowing, renting, or stock issuing.
Those resources may be counted as follows:

- Current assets
- Technology
- Labor
- Real estate
- Raw material
- Energy
- An already operating firm
- Intangible assets
- Courage
- Knowledge
- Any combination of those

Description of Resources

a- Current assets may be in form of ready cash or receivables.

b- Technology, labor, real estate, source of material or energy may be partly being used or not used at all.

c- The entrepreneur may have already an operating firm which has idle capacities in some of its factors of production.

d- He may have courage to take considerable risks, ambition to carry out [illegible] courage until his business goal and objectives are achieved, patience to bear hard times in solving difficuld business problems.

e- He may have a professional knowledge of science, experience or skill which can be utilized for a new business purpose. One thing that makes the business distinct from others is its ability to use the universal resource, knowledge in its business problems.

f- The person may have or expect to have any combination of those resources.

Properties of Resources

Those resources should have some properties in order to be used effectively in the same business:

1) They must be easily convertible to each other in order to utilize them most and have the best combination.

2) They must be adequate enough to cover the short-and-long term needs of the new firm.

3) They must be flexible enough to adopt themselves to future developments in their fields.

4) They must be appropriate enough to satisfy the requirements of the new firm,.

5) They must pass the minimum qualifications prevailing at the present with respect to productivity, efficiency and profitability.

) They must fit in character and performance of the same functions to each other, so that they can be used together in the same business for the same purposes

7) Their performances should also satisfy the business goal and objectives.

8) They must be obtained internally as much as possible in order to allow for minimum costs. Otherwise, high cost of borrowing will increase the total cost of capital.

9) They must have economic validity to allow for easy operations, minimum costs and maximum returns.

Interdependent Resources

Resources with respect to their interdependencies are classified into the following categories:

1- Independent resources
2- Mutually exclusive resources
3- Dependent resources

Independencies change according to the characteristics of the resources as well as the characteristics of the opportunity under consideration . It is possible that while some resources are independent for one opportunity, they may be dependent for another opportunity.

Independent resources cannot be employed in the same business , because their characteristics do not fit each other,

Mutually exclusive resources can replace each other but are not used together in one business. They are competitive alternatives, or, supplements to each other.

Dependent resources can either be used together or not used at all. They are complements to each other.

In order for the resources to be utilized most , they must be as much dependent as possible and fit the requirements of the best opportunity to be selected. Also it is possible that interdependencies of resources change when their interrelationships change.

Independent resources are compared seperately with the requirements of opportunities. Any change in one won't affect the other resource. On the other hand, mutually exclusive resources have further considerations. At first, they should be conpared with each other as different alternatives to do the same job or to satisfy the same purpose, and then, they must be compared with the requirements of the opportunities. The purpose of comparing them with each other is to find the most efficient combination for optimum returns. After finding this combination, then it is compared with the requirements of the opportunity to find the amount or quantity of the combination necessary.

There is little problem for dependent resources. Because, any way, they must be used together if they are appropriate, or, they must be abondoned as a whole if they don't fit the requirements of the opportunity under consideration. Interrelationships between resources are discussed below.

Interrelationships of Resources

1. Acquisition of tangible resources are directly dependent upon current assets.

2. Technology, labor, real estate, material and energy are variables dependent upon each other. Technology and labor can also be mutually exclusive variables if one of them can do the job of the other. In such a case, before comparing technology and labor with the requirements of the opportunities, one must compare them with each other to find the best combination which results in highest returns. However, if they are mutually exclusive, that does not mean that they are not dependent. There must certainly be labor to utilize a technology. But the quantity of labor and quantity of technology can be changed if they are mutually exclusive. Under this condition, it is likely that when labor increases, technology decreases and vice versa. A curve which demonstrates their relationships can be developed. This curve between technology (or capital) and labor is called Coub-Douglass Production Function as illustrated in the chapter on Technology Selection (chapterIV). With the help of such a relationship the optimum combination of labor and capital (or technology) could be determined.

3. Technology and real estate can either be independent or dependent. If they are dependent, the technology can be

used on that real estate. However, size of the technology should fit the size of the real estate.

4. If the resource technology can use the resource material, then they are dependent for the opportunity which requires those resources. Productivity of the technology determines the volume of material necessary per period. Quality of technology determines also the quality of material.

5. Specifications of the technology requires cerain type of energy. If we have that energy, then they are dependent resources for any kind of opportunity requiring that technology.

6. For technological development, knowledge of technology is necessary. Knowledge is also necessary to be able to adopt the technology to future developments. Knowledge of technology is also necessary to operate it. Without its knowledge, technology cannot be used. However, technology is more dependent on knowledge, because, a minimum level of knowledge is required for a given level of technology, whereas, once this minimum level of knowledge is acquired, greater quantities of technology could still be handled.

7. Labor versus real estate, material or energy can either be independent or dependent depending on the requirements of the opportunity. There is a certain quantity of labor which yields the highest return on a real estate. If the quantity is increased, then diminishing returns occur.

8. Quantity of material proportionally cpanges when the quantity of labor changes.

9. Amount of energy depends on the volume of technology, volume of business and quantity of labor used.

10. To determine the optimum quantity of labor with respect to other dependent or mutually exclusive resources, it is not only their capacities that we have to look for, but also the knowledge, skill, experience and other qualities of labor since its productivity and efficiency change according to those qualities. The higher the quality of labor the smaller would be the quantity essential for performing a given task.

11. Volume of real estate determines the volume of energy or volume of material that can be used in it for some business opportunities.

12. Raw material determines the type of technology and labor by which it can be used. Its volume determines the volume of business.

13. Energy has the same characteristics as material.

14. If there is an already established firm, its available factors of production are dependent on each other and can be used for the same purpose.

15. As far as the intangible assets are concerned, courage and knowledge are the resources in the entrepreneur himself. Courage implies risk bearing. Ambition to carry out the courage and patience to bear the outcomes are the dimensions of courage.

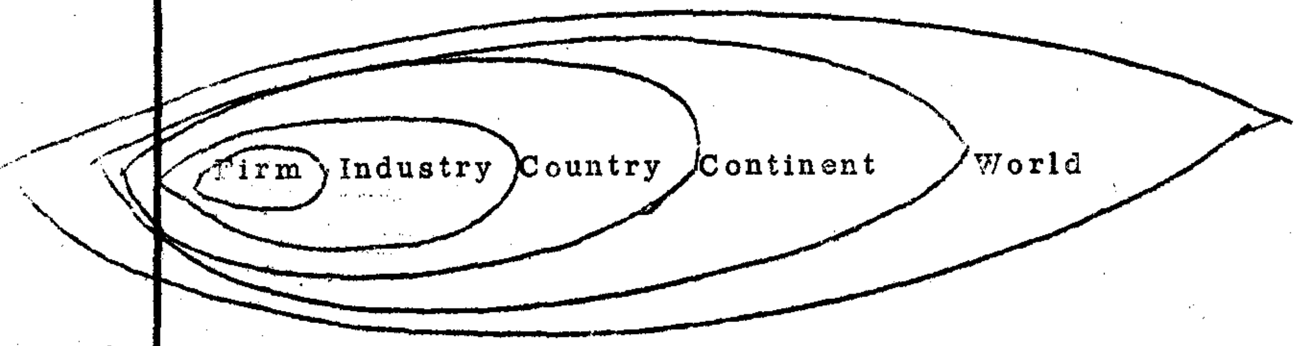
16. Knowledge is the knowledge of all factors of firm and environmental conditions. Its quality and amount determine the optimality of satisfaction of business goal and objectives.

ENVIRONMENT

Environment means the outside world which involves events independent of but affecting the decisions of the entrepreneur. However, in some cases strong entrepreneurs can create new events. Environment covers those areas, from the narrowest to the widest respectively, as follows: (figure 1)

1- Immediate market (Customers, and competitors)
2- Industry (plus: suppliers and dealers)
3- Country (plus: government and institutions)
4- Continent (plus: neighbourhood relations)
5- The world (plus: international relations)

FIGURE 1
Environment around the firm



Events which occur in the environment are of four kinds:

1. Social
2. Political
3. Economic
4. Natural

Those events create social, political, economic and natural conditions which the decision maker has to take into account before he has his decisions on enterprise selection and evaluate the results in the medium of those conditions.
In general, those events are independent of the behaviours of the enterpreneur, but they have degrees of dependencies amorg each other.

Some of the social events may be counted as follows:

- Labor disputes
- Student movements
- Educational developments
- Cultural changes
- Population increases

Labor disputes and student movements against current laws or systems have negative effects on business. Educational developments and cultural changes may have both negative and positive effects on business depending on their characters and nature and area of the business. Population increases directly have positive effects on business. But they may have indirect effects through other related social events.

Big labor disputes cause shut-downs or decline of businesses , impede industrial development and injure community welfare. Hazardous student movements against private or public institutions obstract their developments and scientific improvements. Educational development create new knowledge for the benefit of the industry. It may also create causes for student movements.

Cultural changes and exchanges demand new products or services , or they may lead to the abondoning of others. Population increase is a sign of more and better employees and customers for the business in the future.

Some of the political events may be counted as follows :

- New parliamentary elections
- New governments
- New international treaties
- Wars
- International disputes
- Revolutions in the country

New election is the beginning of a new government. The new government may be formed from another party, and this party will probably follow different principles, different politics, establish different laws in relation to business. The government may have new treaties with other nations. It may even enter wars or disputes with enemies. A revolution by army or people can also be possible if the politics of the present government is against the benefits of the respective bodies, or against the benefits of the nation.

New treaties facilitate industrial activities, may cause new markets, new materials or products to appear. Wars or disputes with enemies impede industrial development except in the fields of war industry. Revolution in the country causes the business activities to stagnate, financial market speculations to stop for a while. Firms will be in hard times in finding money even for their current needs. Revolution may even be directly against the economic system and its industry components.

Some economic events of the environment may be counted as follows:

- Economic treaties
- Development plans
- Increases in GNP and personal incomes
- Revaluation and devaluation in the currency
- New laws, customs, tariffs, taxess
- Inflationary and deflationary tendencies
- Economic policy of the government
- Financial market speculations
- Foreign trade

Government should lead the econoy of the country with respect to the economic treaties and development plans which have beend established. Business activities in the country must be carried out accordingly. Rate of development and levels of personal income are the measures of economic development. Devaluation or revaluation of money are made to cure some economic deseases . Foreign trade and prices will be influenced directly by those changes.

New laws, customs, tariffs, and taxes affect directly the business activities and earnings in the country. Inflationary and deflationary tendencies warn some unfavorable outcomes in the economy.

Government may follow a socialistic or capitalistic economic policy in the country. Financial market volume and the turnover of stock exchange are the indicators of business volume and business turnover. Foreign trade and balance of payments are indicators of the economic efficiency of the country.

Some natural events in the environment may be counted as follows:
- Earth quakes
- Fires
- Floods
- Drought

Some regions are vulnerable to earth quakes, which occur periodically. Forest locations, coal mines, oil resources are volatile to fires. Floods unexpectedly may come and destroy everything. Droughts may cause unbelievably low production.

States of Environment

Events of the environment are interdependent. Government may promulgate laws in order to work out labor disputes or student movements . Some international treaties may be established to develop the educational systems, economy and culture of the nations. Heavy population increases may be obstracted by birth controls.

Labor , student or public movements may cause new elections, new parliamentary regimes and new governments. Wars, international disputes or revolutions in the country may cause social and economic depression.

New economic treaties, development plans , may cause closer international relations and social developments.

Through these kinds of interrelationships the entrepreneur may be able to classify favorable and unfavorable events of the environment and put them into three main categories which we may call "states of environment": prosperity, stability, depression.

Prosperity implies social, economic, political and natural development. Stability implies their stagnent behaviour. Depression implies regressive effects of those states of environment on the business.

With these environmental events and under the conditions they create, one's decision on the type, character, size, location and other problems of the business changes.

Of course he will never be able to forecast some of the events. However, at least those events which he estimates as likely to occur with respective probabilities will have some effects on the characteristics of the future business. If he can be able to estimate the probabilities of the states of environment, then he will be able to select his future business effectively. Each one of those states will require different businesses to satisfy most the business goals and objectives.

BUSINESS OPPORTUNITIES

Environmental conditions will create business opportunities. Business opportunities are the chances which promise high returns for satisfaction of other business goals and objectives. Opportunities in the environmet are detected through information, knowledge and awareness of the facts. Such opportunities as follows may be present in the environment:

1. There is market which is new/ not satisfied/ high-priced/ undiscovered/ growing/ less competitive
2. There is labor force which is cheap/ productive
3. There is raw material source which is of high quality/cheap / extensive
4. There is technology /newly developed/productive/profitable
5. There is export-import opportunity of a P/S , a technology or raw material.
6. There is a new business field demanded by Common Market or, national development plan.
7. There is an active firm on sale or for merger / for consolidation / for joint venture
8. There is a professional knowledge/experience/skill/service
9. There is a real estate(building/land/ water)

10. There is cheap and extensive energy supply
11. There is a technology which is new /cheap/advanced/ productive
12. There is a new P/S obtained through research and development, which has a promising future.
13. There is a business offered by other persons under good conditions .
14. There is an expansion opportunity for the existing business
15. There is a site which promises a good business
16. There is a new tax/law/tariff/quota which encourages a business.
17. There is a cheap loan or rent to do ta particular business
18. There is war which demands supply of a certain P/S
19. There is a project by government which requires some main and subsidiary industries.
20. There is a new community which demands a business
21. Any combination of those.

Weighing the Opportunities

There may be other kinds of opportunities in the environment not mentioned in the above 21 kinds. However, in reality there will be just a few opportunities really worth to be considered. Others may either not exist at all, or, can not meet the minimum objective requirements, or not discovered.

By evaluating the the discovered opportunities the entrepreneur can find out whether they satisfy the minimum objective requirements or not. If we follow the example given on page 18 , we may relate the particular opportunity to the objectives and weigh as follows:

1- Life of the business is rather a matter of personal decision usually independent of the opportunity except a few specific opportunities which do not live long by their nature.

2- Legal status is also a matter of decision to be given by the entrepreneur independent of the opportunity effect.

3- Growth potential of the opportunity is dependent upon the type of the busi ess, long-term marketability of its P/S, and long-term development possibilities in its resources. The entrepreneur should estimate the growth potential of the business in those respects.

4- Return of the opportunity on a long-term basis is to be estimated by consideringthe growth potential of the business, its marketing volumes throughout the periods, andrespective probabilities . A total expected present value analysis may suffice to determine the return of the opportunity.

5 -Uniformity pattern of returns is dependent upon the type of the business. Its construction period, the type , price and newness of the P/S, the risk element, and the volatility of the business to environmental conditions are but a few important considerations in determining the uniformity pattern of returns.

6- Control of the business is dependent upon the minimum size of the opportunity and the desire of the business owner. Greater the size , greater the need for decentralization of control.

7- Capital amount required by the opportunity can roughly be estimated at the beginning. Its expected fixed cost requirements plus its working capital needs untilthe time of its operation are the components of total capital necessary to build the business.Capital intensive opportunities will require huge amount of capital than labor -intensive or material -intensive opportunities do.

8- Type or quality of the business can immediately be seen by looking at the opportunity P/S.

9- Risk of the opportunity is the counterpart of the business objectives such as growth potential, return , and uniformity pattern of returns. The total probability of their failure will give the total probability of risk of the business, if risk and those objectives change reversibly. If not, then, first the relationship between risk versus those objectives is found and probability of risk is calculated.

10- If the objective is the use of a particular technology , a labor, a material, an energy , or a real estate, then the opportunity under consideration will easily tell us if it can use those resources. And a small survey will be enough to indicate to what extent and at what level theresources can be used for that opportunity.

11- Kind of the business as suggested by the opportunity indicates if some factors of production should be imported in case they are not available within the country.

Also, kind of the business may tell us if its P/S can be exported. Or, it may be the persomal objective of the owner , only, to make a business open to the outside of the country.

After the opportunities are related to the objectives, it could be easy to see if they meet the minimum requirements of the business objectives. Weights are given and those which fail in meeting the minimum requirements of objectives are dropped out. These which pass the minimum objective requirements can have weights as high as the maximum weight, given to the objectives. The minimum weight that an opportunity should have is 360 , and the maximum weight it can have is 700 in our example. The rest of the opportunity analysis will be discussed under opportunity evaluation.

INTERACTION OF FACTORS OF BUSINESS

Factors of business are interrelated to each other. objectives are established personally. However, environment and resources influence them from the viewpoint of modifying their minimum and maximum boundaries.

Use of resources is dependent upon the requirements of objectives, availabilities of the conditions of environmen and the demand from the opportunity under consideration.

Environment is independent in all aspects from the other factors of business. It plays its role on them without delay .

Business opportunities are the results of the conditions of the environment and availability of resources. They are screened and selected according to the yardstick objectives of the business. In the following pages, two by two interactions of the factors of business are discussed except that the interactions of the other factors with the opportunities are discussed. together due to the fact that opportunities combine all the interrelationships within their characteristics.

Objectives and Resources

In order to satisfy his objectives, the entrepreneur will firs look at his resources. For instance, he will try to use as much of his internal resources in the new business as he can. In this way his cost of capital will be smaller than the utilization of external resources. Of course, the internal resources should fit the requirements of objectives in order for them to be used in the business.

Characteristics of some resources will influence the intensities of some objectives.

Courage to bear risks affects the selection of the uniformity pattern of returns. The entrepreneur may select that kind of business which yields no returns during the initial periods, and high returns later on. This requires courage and patience to accept this condition.

The tangible resources which are to be used in the new business may determine themselves the type of business. In that case, what the individual has as his objectives must be in conformity with the requirements and characteristics of the business. If they do not fit each other, then he should either modify his objectives or change his resources to maintain the conformity. If he wants to use only his own resources, their characteristics have to be taken into account to see if they meet the requirements of his objectives.

Intensive knowledge enhances managerial ability to solve difficult business problems. With an extensive knowledge one may desire to widen his span of control on the business, enlarge the amount of capital for a sizable business, increase his courage to hadle risky opportunities. In short, the wider the knowledge of business the wider will be the limits of the business objectives. The entrepreneur will be more tolerable and objective in his decisions with greater knowledge.

While resources affect the intensities of objectives to change, their uses are directly dependent upon the requirements of objectives:

- Life of the resources should coincide with the "life" objective.
- Productivity and efficiency of the resource should be parallel to the return requirements of objectives.
- Resources should meet the requirements of the objective upon the type of the business.
- If there is an objective as to the use of a particular factor of production, then the available resources should

enable that factor to be used in the business. If there is a difference between the requirements of the objectives and the characteristics of the resources, then the entrepreneur should either modify his objectives or , if he can not, he should make a decision on rent/sell/abondone strategies for those resources that do not satisfy the objective requirements.

Environment and Objectives

Environment influences the attainment of objectives. For instance, in depression, life of the business has low probability of being perpetual due to lack of earnings and lack of capital . In a stable or progressive economy, probability of perpetual life is quite high and high respectively.

When passing from one state of environment to another, growth potential of the firm also changes accordingly. Growth potential increases as one goes from depression to progress for there will be more chances to grow.

Capital amount will also be very little in depression due to lack of money in the financial market. Or, the entrepreneur won't desire to use all of his resources in depression in order not to loze them all in case of shut-downs or bankruptcy.

Return will be low during depression, acceptable during stability and high during prosperity.

Uniformity pattern of returns will not be affected by the conditions of environmet unless unusual environmental conditions occur.

If the entrepreneur has an objective on utilizing a particular resource, its outcomes will be influenced by the states of environment. During depression, outcomes of the resorurces used in the business will be unfavorable, where as, during progress, favorable outcomes will occur if the resources are not of the kinds relevant to the opportunities that exist in depressions.

If the objective is to produce a certain P/S, the purchasing of its material requirements, and selling of its finished goods will be dependent upon the states of environment that will prevail in the future. Many P/S's will sell more in prosperity than they do in depression.

A degree of risk versus an amount of return combination may be one of the business objectives . The degree of risk may vary according to the nature of the business, as well as the conditions of the environment. Unfavorable social, political, natural or economic events will increase the risk of failure for the business. During depressionary times the environment will increase the riskiness. In progressive industries, risk effect will be small. The entrepreneur must be very courageous to invest in a business during depression which will continue for a long time.

In depression, employment will be low, the demand curve will shift leftward, sales will be less , earnings will be little, and there will be low capital accumulation. All of these will influence the business, and the probability of failure will rise. If there is a keen competition in the market, depression will eliminate weak and nonproductive firms.

Managerial inability increases the burden of risk on business. A good forecast of the environmental events and a vigilant effort to keep up with the risk effects of the environment will however reduce the burden of risk, and in turn, will result in high returns and greater satisfaction of business objectives.

The individual does not determine his business objectives according to the states of environment. He determines his objectives independent of the outside environment. The factors of objectives are the products of his personal beliefs , desires, feelings and satisfactions. But, he may modify his initial objectives according to the states of environment. Environment affects, however, not the types of objectives but the degrees to which they are satisfied. One may see the effect of the environmental conditions on the degrres of achievement of objective targets by looking at the opportunities that those environmental conditions are expected to yield. The opportunities at the cross-relationship of the states of environment and objectives satisfy the conditions of those states, and requirements of those objectives. Classification of business opportunities according to the conditions of environment and requirements of the objectives is made though a rough evaluation of those opportunities. Then, each opportunity will imply that it will satisfy a particular state of environment and business objectives. It may even satisfy more than one state of environment. Any way, it is the only factor which directly relates the environment to the objectives of the business.

Environment and Resources

Conditions of environment will affect the use of resources according to the following considerations:

1. Amount of resources invested into the business
2. Type of resources " " "
3. Profitability of resources " " "
4. Value of resources " " "

During depressionary times there will be a slack business period. Sales and returns will be low. People do not wish to invest their resources in business for they will not get high returns. They will use only those resources which are fixed assets and not immediately saleable at least in order to meet their cost of existence. The entrepreneur will try to make his resources as musch liquid as possible if he foresees a depression in the near future.

In depression, profitability of the resources will also be low, therefore, their value will be low. On the contrary, during prosperity , resources will yield high returns and hence , will be valuable. The entrepreneur tries to increase his satisfaction of objectives in prosperity. His courage to assume risks will increase in prosperity. Perhaps , knowledge is the only resource that can be utilized much even during depressionary times. It will be used to remedy the ills caused by depressionary conditions. It will lessen the burden of unfavorable events.

The above mentioned considerations will also be the same for the whole industry. Number of opportunities will be much greater in prosperity than in depression. amount of resorurces and profitability of resources used in prosperity times will be much higher than that used in depressionary times.

According to environmental conditions that are expected to come, one will choose an opportunity which satisfies best his goal and objectives, and also enables him to utilize his resources in the most appropriate manner. However, some of his resources may remain unused. Then, he must make a decision on whether to rent or sell or abondon them.

the duration of depression will affect the determination of the amount and type of resources not to be used in the future.

Also , enflationary and deflationary tendencies will cause fluctuations in the use of resources.

Again ,the decision maker will relate his resources to the environment through the opportunities that fall in each cell of the opportunity matrix where business objectives and states of environment cross each other (table I).

Business Opportunities and other Factors

Discussions so far have revealed the following conclusions:

1. States of environment occur independently of individual's decision, objectives and resources, and they create opportunities. They are interdependent only among themselves.

2. Business objectives are determined by the individual, indepen dent of the states of environment, opportunities in the environment and available resources. They are completely personal considerations. But their intensities (limets) may change under the effects of environment and resources. However, they can be modified to some extent by the entrepreneur to fit them better to the environment, opportunities or resources.

3. Resources are a function of the environment, opportunities and business objectives:

$$RS : f (EN , OP , OB)$$

Those variables will indicate what type and amount of resources are to be used and when.

4. Opportunities are a function of the environment, objectives and resources :

$$OP : f (EN , OB , RS)$$

The interrelationships can be seen clearly in both formulas

The common factor among objectives, environment, resources and opportunities which relate them to each other is opportunities.

Resources and environment create opportunities. The entrepreneur examines those opportunities in accordance with his opjectives to choose the best one for his new business.

Environment becomes more and more favorable in creating opportunities as one goes from depression to prosperity. Larger resources are likely to yield more opportunities. Objectives will be the yardsticks to measure the values of opportunities. Opportunities are measured qualitatively and quantitatively. Both terms can also be combined in utility measures. As illustrated in "objectives" section of the chapter, each objective factor is weiged according to its importance in the mind of the entrepreneur, Opportunities then are given weights according to their degree of satisfying the objectives. Those opportunities which pass the minimum weights are the alternatives that can be decided upon for making new business. Those which will fail in satisfying any one of the minimum requirements of objectives are to be disregarded. Thus , what remains in front of the decision maker are a few opportunities subject to further selection.

OPPORTUNITY SELECTION

As one can visualize from the opportunity matrix (table I.) , under prosperity, depression and stability states of the environment fall sone opportunities satisfying minumum or maximum requirements of the business objectives and utilizing optimally the tangible and intangible resources available at the disposal of the decision maker.

One can also see on figure 2 that the states of environment have different probabilities of occurances in the future, and some of the opportunities pertaining to each state will fall in other states too.

The third point that can be drown out of the figure 2 is that the quantity of opportunities in depression is lesser than that in stability, andquantity of opportunities in stability is lesser than that in prosperity.

Estimation of the probabilities for the states of environment is a matter of keen forecast of the future environmental conditions . Determination of the opportunities that are expected to or will exist in the environment requires a keen awareness of the business world in the environment.

I- First step in the selection of the best opportunity is

to bring the opportunities to a state where we can compare them. As we know already from the types of opportunities under the "opportunities" section, some opportunities are identified by the given P/S, some are identified by a given technology, and still some others are identified by other factors of firm, like labor, material, energy, real estate, etc. Comparison of opportunities can only be possible if we know what they produce and what technology they use. So, for those opportunities whose P/S' and technologies are not clear yet, the analyst should go into their P-S and technology selection activities and select the most beneficial P-S and appropriate technology. Chapter III: P-S Selection, and chapter IV: Technology Selection are the references for the analyst. In those chapter the pertinent problems are discussed starting from the very beginning. The analyst may not need to follow all the procedures given in those chapters, because some of them may already be known or not necessary for him at all depending on the present state of the opportunity that he is undertaking. At the end, he will have the P-S' and technologies of all the opportunities known ready for further analyses.

II- Second step in the selection of the best opportunity is

that each state of environment should be taken seperately and their pertaining opportunities should be screened and the best one should be selected. so as to allow for one opportunity to remain under each one of the states of environment. To do that, one must look at the weighted chart of objectives (page 18). There he will see some objectives like "life of the business", and "legal status" which each opportunity must satisfy any how. So, the analyst may not enter those into analysis since each opportunity in the analysis satisfies those objectives.

There will also be such objectives like "type/quality of the business", etc., upon which the analyst may have no decision; therefore, they won't have any weight. Thus, these objective criterion must also be excluded from the analysis.

There remain those objectives whose weihts have some ranges from minimum to maximum. Some of those objectives are qualitative, others are quantitative in character.

Opportunities must be evaluated in accordance with each one of the objectives and their total weights should be obtained. Qualitative evaluation is rather easier and one can have quicker decision than would be the case for quantitative evaluation which requires some further analysis.

Evaluation of objectives:

a- In order to evaluate the growth potential of an opportunity under a state of environment which we assume will prevail in the future as long as our business stays alive, we must relate the characteristics of the state to the characteristics of the opportunity. Clear answers to such questions as follows will help determining the growth potential of the opportunity:

1. On which customer group does the product of the opportunity belong?
2. What is the population-increase trend of this customer group?
3. What is the customer potential at the present?
4. What will be the potential in the future under the state of environment believed to occur in the future considering the present and future competition?
5. What are the probable changes in the state that may affect the business-?
6. What are the probable changes in the business itself with respect to the factors of firm to be used for this business?

Then, the decision maker can estimate a growth curve for the opportunity with respect to size of the business which can be measured in termes of amount and diversities of products expected to be sold in the market.

b- To estimate the long-term return of the opportunities, on the basis of the growth potential, one must estimate what the price and cost of the product will be. Price can be estimated by looking at the prevailing prices in the present market and their trends in the past. Cost can be estimated by looking at the prevailing competitors in the present market.

However, those estimates will likely be rough ones whose accuracy depends upon the data we obtain from those sources and reliability of our judgment. Then, gross profit margins can be calculated by relating the cost to the price.

c- Further, the uniformity pattern of returns is to be estimated by considering the construction period of the business, cuttomer awareness of the product, initial capital cost, environmental and seasonal effects, etc. Then, the analyst can assign gross profit margins to the product for each period throughout the life of the business. Ofcours, as the "return" objective suggests, the average of those margins must be satisfactory.

d- Evalüating the opportunity in accordance with the control of the business requires the following considerations:

- Desires of the owners
- Capital source of the business
- Size and growth potential of the business
- Knowledge of the business

First, it is a matter of peronal satisfaction. Second, if the total capital is going to be obtained through internal sources, the entrepreneur may want the entire control to be under his authority. However, thirdly, size of the business also affects this decision. Beyond a certain size control by one or a few persons is not possible. So , the minimum size required by the opportunity affects the satisfaction of the control objective. Future growth potential may imply a change in the span of control too. Fourthly, the greater the knowledge of business the mre control by one person can be possible.

With respect to the above considerations, the entrepreneur evaluates the opportunity under the assumed states of environment. The best opportunity is the one which satisfies most his"control" objective.

e- Objective about capital amount is affected by the minimum capital requirement of the business. The capital amount may be too much or just enough for the opportunity. If it is too much, then more than one size of that opportünity can be established. If it is just enough, then the probability that the requirement will exceed the total capital amount and the extent of excess must be determined. Upon those considerations one may base his evalutaion. of the opportunities.

f- If the entrepreneur has an objective as to the type and quality of the business, then he has already selected his business. -In this case there is no need for opportunity evaluation.

g- Under the assumed state of environment and future expected market conditions the entrepreneur must estimate the probability of not satisfying his other objectives and losing the business. Actually, the risk of the businss is (1 - probability of satisfying other objectives). So, having assigned weights for probabilities for satisfying his other ojectives the entrepreneur can find the probability of risk of not satisfying his "maximum risk" objective.

h- If he has aimed at utilizing a particular resource like technology, labor, raw material, energy or real estate, he must then look for the degree of satisfaction of this objective by the opportunity under the assumed state of environment. Efficiency, productivity and profitability of the resource can be measures to determine the efficiency of the opportunity with respect to the "resource" objective.

i- Through those kinds of evaluation the entrepreneur can determine the weights for opportunities pertaining to each objective. Then the total weight represents the total satisfaction of the objectives. By these numbers, the entrepreneur can compare the opportunities under each state of environment and choose the one under each state which has the highest weight.

So, the remaining picture is that there is one best opportunity under each state of environment. Before ending the second step in opportunity selection, it must be remembered that, if there are other objectives not mentioned here, they must also be considered in the analysis

III- <u>The third step in opportunity selection</u> is to select the best one among the three opportunities each one of which falls under different states of environment. We should select them again by screening through our business objectives. But this time it is wise to compare them quantitatively since all have satisfied our qualitative objectives successfully. So, we may exclude such objectives as "growth potential", "uniformity pattern of returns", "control of the business", and "capital amount" from the analysis. There remain two important objectives: (1) return (2) risk. First, we should calculate the total expected present values of return of each opportunity under the pertinent states of environment. Then we should apply our risk factor on those returns to come to a decision on the selection of the best alternative. Since risk is a qualitative measure and has different personal preferences, there are various decision criteria employed which will be discussed later in this chapter.

a- In calculating the total expected present values of returns, the following considerations and actions must be taken:

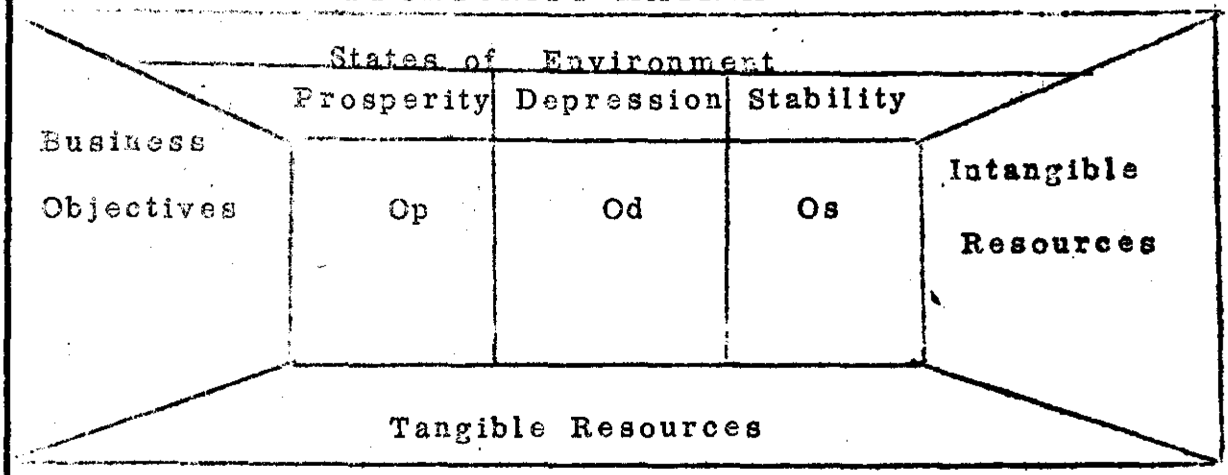
1. For comparison purposes, lives of the opportunities must be brought to the same base.
2. An interest rate for each state of environment must be selected to include the real opportunity cost of money in the calculation.
3. All costs of the opportunity (cost of construction, cost of operation, cost of expansion) must be estimated through the base period.
4. Unit cost and unit price of the product must be estimated
5. All returns through the base period must be estimated considering the size and market share of the business.
6. Probabilities should be assigned whereever possible.
7. Csh flow diagrams of the opportunities should be drown.
8. Total expected presen returns should be found.
9. Above stated eight procedures must be applied for each one of the three states of environment. That is, for instance, although Op is assumed to fall under prosperity, it is probable that if we choose Op for our business, depression or stability may occur. Bearing this possibility in mind we must calculate the return th rough above given eight procedures for the opportunity Op under depression and stability too.

10. Probability that each state of environment will occur in the future during the base period, is estimated. If our forecast indicates that for example both prosperity and depression will occur in the future during the base period, then this mixed state of environment should be taken as the fourth state of environment and put in the analysis. However, we assumed anly three states in our analysis for simplicity purposes.

IV- <u>The fourth step in opportunity selection</u> is cnstructing the decision matrix (tableII) by putting the figures that we have so far obtained.

TABLE I

OPPORTUNITY MATRIX

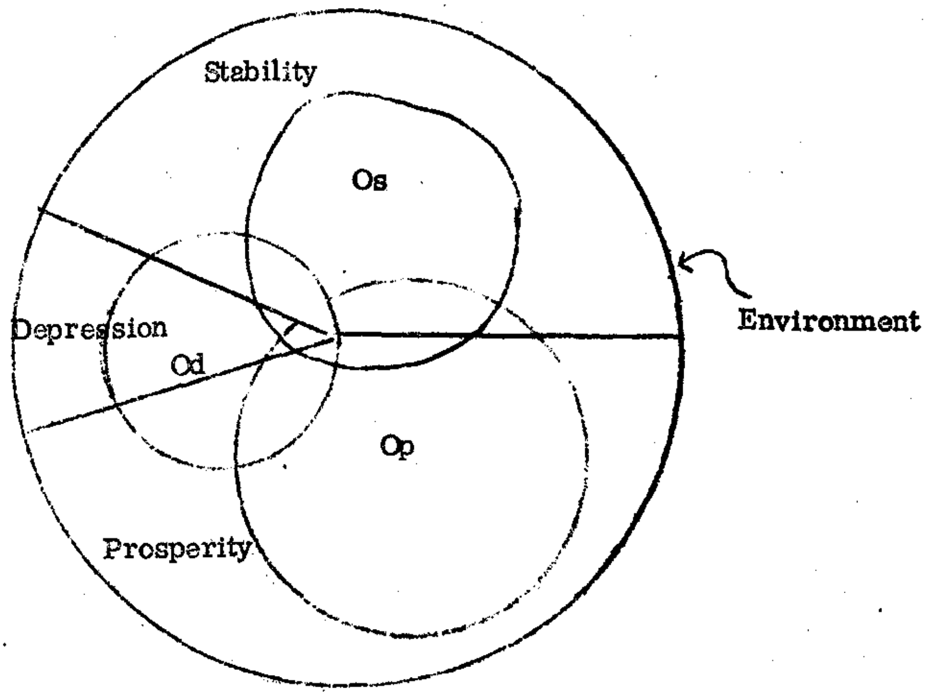


Op : Business opportunities in prosperity
Od : " " in depression
Os : " " in stability

p, d, s : 1, 2, 3, ..., n

FIGURE 2 .

STATES OF ENVIRONMENT AND RELATIONSHIPS OF OPPORTUNITIES



In the followin matrix, opportunities are now our strategies, prosperity, depression and stability are again the states of environment. The figures in the squares are the total expected present returns of each strategy under each state of environment. Under the row of states of environment we have their reshective probabilities which add up to unity. Return figures arein thousands. It is seen that one of them has minus sign, indicating that there is loss under the respective condition.

There are many decision criteria to include the risk facior in the analysis according to pessimistic, optimistic, rationalistic , regret, and etc., thinking. Those are used in decision making under uncertainty. Wald's criterion, Hurwicz's criterion, Hurwicz α criterion, rationality criterion and Savage's criterion , respectively , will be used in our example given in decision matrix I. However-, before starting to discuss those criteria, we must develop the decision matrix II. To find it we multiply the probabilities of the states of environment with the corresponding figures in their columns in decision matrix I. The obtained figures, then are the weighted figures which are going to be used in our further analyses. In the following , the decision criteria are discussed seperately upon the data on decision matrix II.

TABLE II
DECISION MATRIX I

(In thousands)	Prosperity	Depression	Stability
Probabilities	.45	.20	.35
Strategies			
Op	5 000	-500	2 000
Od	500	4000	600
Os	2 500	0	2 500

DECISION MATRIX II

(In thousands)	Prosperity	Depression	Stability	Total Expected Value
Strategies				
Op	2 250	- 100	700	2850
Od	675	800	210	1685
Os	1 125	0	875	2000

DECISION CRITERIA

I- Wald's Criterion (Pessimistic approach)

In this criterion, the worst outcome for each strategy is considered. The best of those outcomes indicates the opportunity to be selected. In our example, the procedure is as follows:

Strategy	Worst outcome
Op	-100
Od	210
Os	0

Since 210 > 0 > -100 , the opportunity Od must be selected. In this way, the analyst maximizes the minimum outcome. The total expected value of the opportunity is 1 685 thousand Tl.

His character is such that he is more concerned about the minimum outcome of the business rather than the maximum. Thu utility of money is larger than the effect of risk. He is not courageous enough to bear more risky opportunities. At worst he will gain as minimum as Tl. 210 thousand which is the biggest among the three minimum outcomes.

II- Hurwicz's Criterion (Optimistic approach)

In this criterion, the analyst will look for the maximum outcomes of each strategy and select the maximum. So, he will maximize the maximum. In our example the procedure will be like this:

Strategies	Maximum Outcomes
Op	2 250
Od	675
Os	1 125

Under this cndition, he will select the opportunity Op since
2 250 > 1 125 > 675

Hurwicz's criterion is used by those who are optimistic and courageous enough to bear probable risks. The total expected value of the opportunity Op is Tl. 2 850 thousand . If he accepts Op, then the worst oucome will be Tl. 100 thousan loss. However, he is more concerned about the highest return instead of the lowest return. Utility of money is smaller than the utility of risk. So, he will accept the opportunity Op for its risk is the largest and therefore the outcome is the largest too.

III- Hurwicz α Criterion

Both pessimistic and optimistic approaches discussed in the first and second criteria are combined by assigning weights to pessimism and optimism. Let us say that the entrepreneur likes to have 60% pessimism and 40% optimism in the analysis. Then, the calculation is made through the following presentation:

Strategies	Pessimism	Worst Outcome	Total	Optim.	Best Out.	Total	α Crit.
Op	.60	-100	-60	.40	2250	900	840
Od	.60	210	126	.40	800	320	446
Os	.60	0	0	.40	1125	450	450

If we look at the last column, 840 is the largest outcome (840 > 450 > 446) . Thus the strategy Op must be selected. The result changes according to the weights given to pessimism and optimism. The more weight is given to pessimism the closer we are to Wald's criterion.

IV- Rationality Criterion

The entrepreneur is more rational in his decision and selects the opportunity whose total expected value is the highest. So, in our example, the case is like this:

Strategies	Total expected value
Op	2 850
Od	1 685
Os	2 000

Since 2 850 > 2000 >1 685 , the analyst will select the opportunity Op.

V- Savage's Criterion (Criterion of regret)

Here , we consider the regret that we feel in case where we have not selected the best strategy according to the state of environment that occured. The regret can be measured by subtracting each cell value from the highest value in that column. So, the example will be like this:

Strategy	Prosperity	Depression	Stability	Maximum regret
Op	0	900	175	900
Od	1575	0	665	1575
Os	1125	800	0	1125

Since the minimum regret among the maximum regrets is 900 (900 < 1125 < 1575) , then the opportunity Op is selected.

SELECTION OF THE BUSINESS

If we look at the results of the five decision matrices, the following table will show the summary:

Criterion	Best opportunity	Total expected 7
Wald's	Od	1685
Hurwicz	Op	2850
Hurwicz	Op	2850
Rationality	Op	
Savage	Op	2850

Now, we should compare the minimum return requirement of our business objective with the result of the decision criterion that we have applied. If we applied Wald's criterion , then Tl. 1 685 thousand must be above our minimum objective requirement. If we look at the weighted table of objectives, there we find that our minimum objective requirements for returns is Tl. 1 500 thousand which is lower than Tl. 1 685 thousand . So, we accept that opportunity for new business. If the amount of the return objective were bigger than Tl. 1 685 thousand , eiher we should accept to apply another criterion or give up making new business.

CONCLUSION

The purpose of this chapter was to find the best business opportunity . To accomplish this purpose, first we analyzed the factors of business which would enable us to evaluate the opportunities. Then we compared the opportunities by using some decision criteria and selected the best one for the new business. In the next chapter , the interpretation of the new business is made.

BIBLIOGRAPHY

01. Milton H. Spencer
Managerial Economics-Text, Problems, and Short Cases
Richard D. Irwin, Inc., Homewood, Illionis, 1968

02. Erich Jantsch
Technological Forecasting In Corporate Planning
Paper Presented at te Conference on Technological For.
18-22 March 1968, in Washihgton, D.C.

11- Peter F. Drucker
Managing for Results-Economic Tasks and Risk-Taking R.
Harper and Row, Publishers, N.Y., 1964

12. Exacutive Decisions and OR
David W. Miller, Martin K. Starr
Prentice -Hall, Inc., Englewood Cliffs, N.J., 1960

13. Editors: Edward C. Bursk, John F. Chapman
New Decision Making Tools For Managers
Harvard University Press, Cambridge, Massachusetts, 1963

14. Jay W. Forrester
Industrial Dynamics
The MIT press, Cambridge, Massachusetts, 1965

15. Translators: Lütfullah Tenker, Imdat Osmanagaoğlu
İktisadî Kalkınma Projeleri için El Kitabı
Birleşmiş Milletler, Ankara, 1967

CHAPTER II

FEASIBILITY ANALYSIS

INTRODUCTION

Feasibility analysis in current practice involves the activities which will help finding and formulating the relevant data and facts about the selected business for business planning and the use of creditors and investors. However, theoretically, the feasibility study should also cover the business selection activities. The purpose of seperating this chapter from the previous one is to make it comparable to the actual business practice.

As a result of business selection, the entrepreneur has acknowledged the type of the business. The product and technology are known. However, the production volume, the specifications of the technology, the size and location of the business, the total amount of capital required for investment, the financing and organization sides of the enterprise selection problem are not yet clearly defined and formulated. These functions are covered by the feasibility analysis of the business.

As a result of feasibility analysis , a feasibility report is prepared summarizing the above mentioned findings. The businessman needs the feasibility report for either his further use in forecast, decision and planning for enterprise operations in the coming years, or creditors' knowledge to evaluate his new business, investors' information to be prepared for the amount of the necessary capital, and to have the authorization from the official bodies for the establishment of the business.

A feasibility analysis normally involves the following areas (115) :

1. General definition and description of the problems
2. Market survey
3. Project engineering
4. Size of the project
5. Location of the project
6. Calculation of the capital required for investment
7. Budget of the project
8. Financing of the project
9. Organizational activities
10. Feasibility report

We shall not discuss those problems in detail in the thesis. The reader may refer to other sources (115) to learn how a feasibility analysis is carried. However, after describing the contents of those ten problem areas , we shall skip the routine parts, and focus on the most important and interesting problems through the remaining chapters.

As a result of the feasibility analysis a feasibility report is prepared. Its contens cover the feasibility analyses as discussed below (115):

1. Summary of the Project

The following data summarize the key facts which specify the business:

a. P/S to be produced
b. Capacity to be built
c. Total demand volume
d. Location selected
e. Volume of investment
f. Income-expense budget
g. Unit cost
h. Break-even point
i. Profitability
j. Social evaluation multipliers
k. Financial sources

The creditors and investors evaluate the new business by interpreting the data given in the feasibility report. After this the amount of capital is actually known. The last job of the entrepreneur is the application of the feasibility analysis project. In the following pages we discuss the mentioned problems.

2. Market Survey

It is the process of estimating the price and demand projections fo the P/S of the firm throughout the years. It covers the following points:

1) General presentation
a. General information
b. Consumption areas for the P/S
c. Statistical information about production-consumption, export/import, national and personal incomes, and population movements.
d. Types and characteristics of the customers
e. Geographical dispersion of the market, competitors, methods of marketing (costs and prices, present supply

sources, competitive P/S')
f. Economic policy in the country
g. Probable political and social changes

2) Total , current, actual and expected demand determination

3) Marketing of the P/S (sales organization, distribution channels, transportation problems, method of P/S presentation, probable need for sales promotion, requirements for technical service)

4) Effect of the economic policy on the market (price determination)

5) Demand projection s

3. Project Engineering

It is the scheduling and accomplishment of the technical problems related to construction and production, continuing until the assembly of the factory. Its problems are as follows:

1) Preliminary research, tests, patents

2) Explanation of the production processes

3) General description of the construction and production equipment
4) Buildings and their distribution in the project area

5) Positioning of the factory

6) Productivities of the physical sources

7) Activity program (final researches, transition phases, ... assembly)
a. Determination of the problems at the stage of establishment and finding solutions for these problems.
b. Scheduling the investments which will be base for financial study on the project.
c. Preparing an initial plan for the activities in the testing period.

4. Size of the Project

The size problem involves the determination of the volume of sales and volume of production and arrangement of

the facilities accordingly. The following considerations are taken:
1) Market volume
2) Demand
3) Geographic seperation of the market
4) Size versus the technology and investment
5) Size versus location
6) Size versus finance

However, in practice, feasibility analysis of size selection problem is made not much scientifically. The chapter on size selection (chapter V) is hoped to widen the knowledge of the reader. There, he will read the theory behind this problem and then be confronted with some models applicable to practical situations.

5. Location of the Project

It involves the location considerations to find the best place for the factory so far as marketing, material, shipment, labor, etc., are concerned. The following points are mentioned in the report :

1) Location
2) Distributinn
3) Minimum cost of shipment
4) Sources as to:
a. Raw material
b. Labor force
c. Fuel oil
d. Energy
e. Water
5) Housing, health, education, living conditions, climate, etc.

Usually, location is assumed given or discussed shortly without scientific elaboration in feasibility reports. However, it needs due consideration as widely discussed in chapter VI.

6. Calculation of the amount of Investment

It is the process of reviewing the investment areas and determining the amounts of physical investments and working capital needed to finance the investment requirements of the project. It includes the following considerations :

1) Fixed assets (their composition and volume)

2) Fixed investment expenditures

a. Expenditures for preliminary investigations and project studies
b. Machinery and equipment, buildings and auxiliary facilities and installations
c. Set-up costs, patents
d. Land and natural resources
e. Engineering and administrative expenses
f. Expenses in the testing period
g. Expenses in the construction period
h. Facilities for preperation
i. Miscellaneous expenditures

3) Working capital

4) External and internal capital composition of the investment

5) Investment program

7. Expense Budget of the Project

An annual budget is prepared to cover the expenditures other than investments. Such items as follows fall in the budget:

a) Raw material
b) Energy and fuel oil
c) Labor force
d) Tax, insurance, rent
e) Selling expenses
f) Depreciation
g) Consumption of natural resources
h) Interest
i) Sundry expenditures

8. Finance of the Project

It covers the process of determining the times of acquisition of funds, the sources of finance, schemes for sources and consumption areas, and financial ratios. Thus, the following considerations are to be taken:

1) Acquisition times of capital shares

2) Sources of finance
a. Fixed assets
b. Working capital

c. Credits (sources, obligations, types, terms of payment, interest rates, calculation of interest, guarantees)

3) Local and foreign investment

4) Flow of funds statement (sources and uses)

5) Financial ratios

9. Organization of the Project

It covers the activities related to legal formalities, ordering of the machinery and equipment, contracts for building the plant facilities and employment of the personnel. The following considerations are to be made dear in the report:

1) Legal status of the business and the justification
2) Legal, patent, licence, problems of the project
3) Structure of the organization and the justification
4) Ordering the machinery and equipment
5) Making contracts for the construction of the plant
6) Recruitment, selection and training problems of the technical and administrative personnel
7) Other

10. Conclusion of the report

Final remarks about the project and its outside effects in the community and in the development of the country, are mentioned. The procedure in the preperation of the report, sources of information and methods of collection and analysis of information are explained.

FIRM (PROJECT) EVALUATION

In relation to the feasibility report, the creditors will use the following financial analyses for project evaluation purposes in order to decide properly on the amount and terms of loan to be granted to the businessman for his establishment of the new business:

a- Break-even analysis
b- Cash flow estimates
c- Flow of funds statement
d- Performance statement
e- Income statement
f- Financial ratios (liquidity, leverage, etc.)

With the help of those documents , the creditors may determine the following tests or criteria to evaluate the firm:

Tests for evaluating the project:

1. Profitability
   a. Socio-economic
   b. Private
2. Productivity
3. Net return
4. Share in industrial development of the country
5. Vulnerability to environmental changes
6. Balance of payments and effects
7. Influence on the community development
8. Competitive ability and experience
9. Capital turnover

As we can visualize, the tests are made in two respects:

1- Social evaluation
2- Business evaluation

Weights given to those factors change according to the aims and requirements of the creditors. For example, government and State Planning Organization will look for the social side of the evaluation more than the private creditor does. That is why, there is not a formal procedure to evaluate the projects in practice because of the changes in aims and characteristics of the creditors and official institutions. However, the above mentioned tests are commonly used.

The creditor will evaluate and weigh the result of each test according to his understanding and preference and find the total weight of the project as a base for his decision on the amount and terms of his financial assistance to the applicant. The financial power and policy of the creditor, and the conditions of the environment at the present and future will also influence the creditor's decision on the amount, terms and obligations of the capital loan.

PROJECT APPLICATION

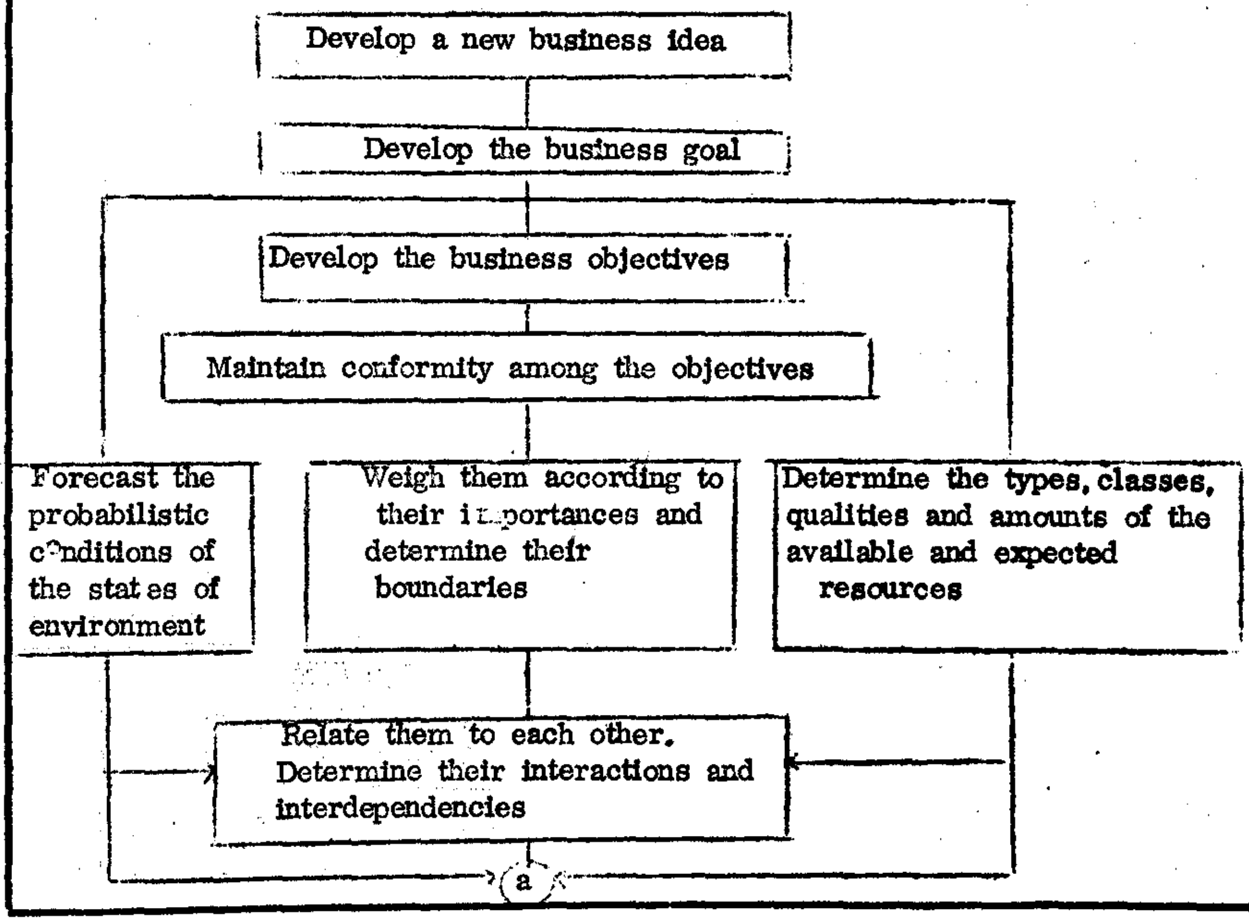
Upon the decision of the creditors, the businessman will find out how much of and in what terms his total financial requirements has been met through external sources

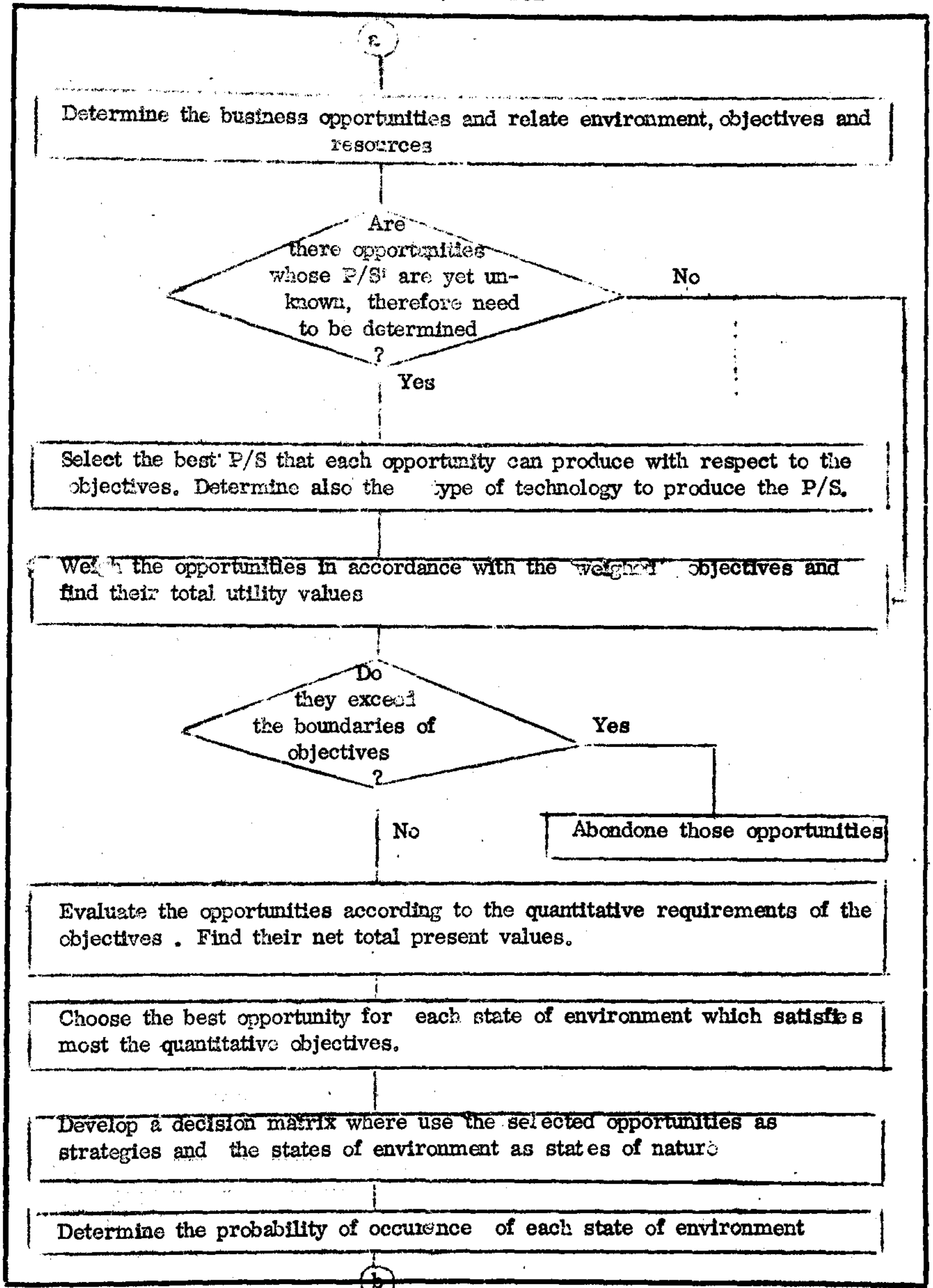
The total requirement can then be completely satisfied, partly satisfied, or rejected. If his requirements are completely satisfied in favorable conditions, then that would mean that, he has selected an opportunity also satisfactory for the creditors, that his feasibility report and answers to creditors are accepted, and most important of all that he is trusted by the creditors. He can then immediately undertake his investment program and carry out the relevan activities via his activity programm.

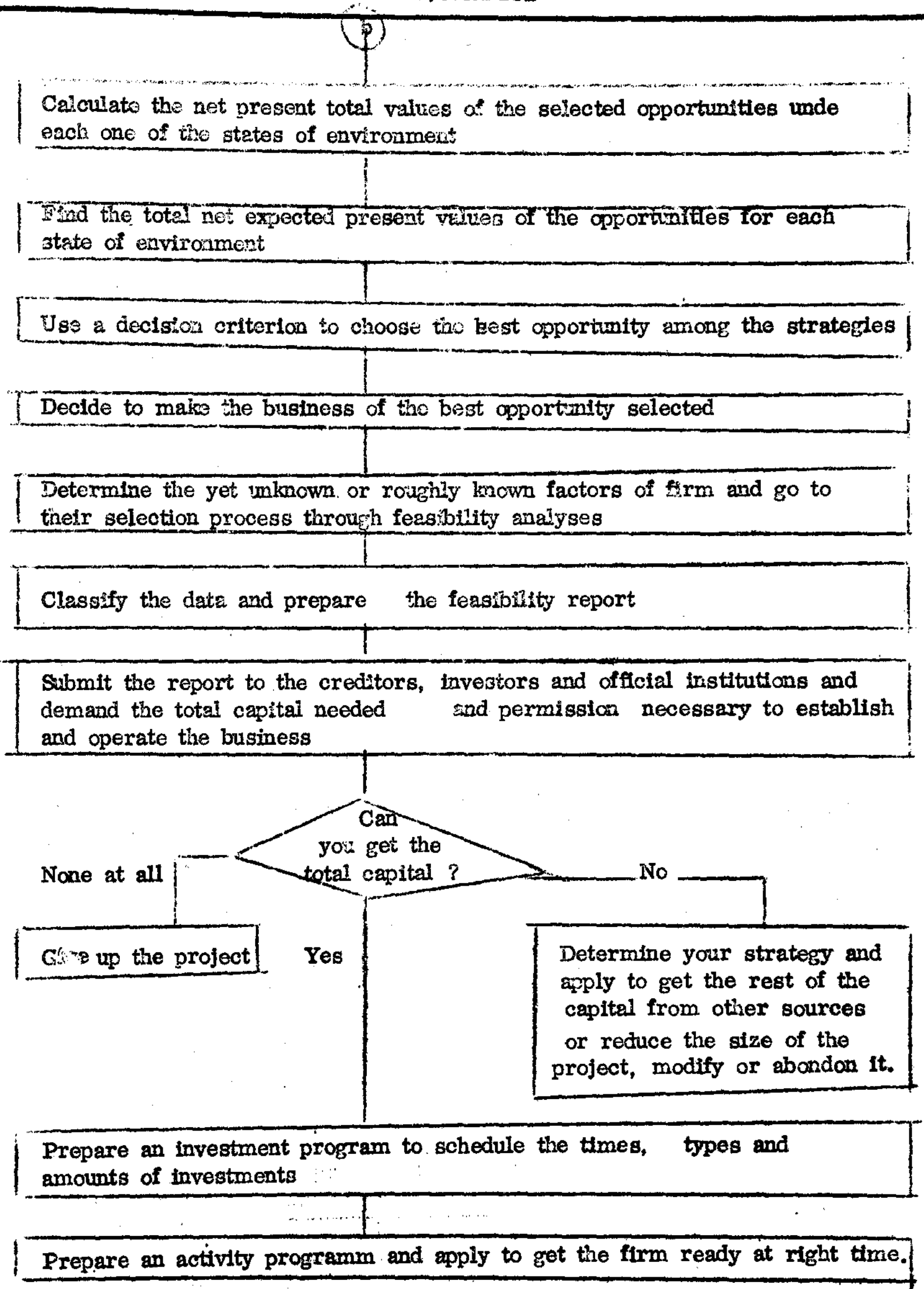
If his project is partly financed through the loans of creditors, he will apply some of the following strategies to get the rest of the capital:

1. Modify the project
2. Give up the project
3. Look for other creditors
4. Borrow at a high cost
5. Reduce the size of the project.

FLOW CHART OF ENTERPRISE SELECTION ACTIONS




a
Determine the business opportunities and relate environment, objectives and resources
Are there opportunities whose P/S' are yet unknown, therefore need to be determined ?
No
Yes
Select the best P/S that each opportunity can produce with respect to the objectives. Determine also the type of technology to produce the P/S.
Weigh the opportunities in accordance with the weighed objectives and find their total utility values
Do they exceed the boundaries of objectives ?
Yes
Abondone those opportunities
No
Evaluate the opportunities according to the quantitative requirements of the objectives . Find their net total present values.
Choose the best opportunity for each state of environment which satisfies most the quantitative objectives.
Develop a decision matrix where use the selected opportunities as strategies and the states of environment as states of nature
Determine the probability of occurence of each state of environment
b


5
Calculate the net present total values of the selected opportunities unde each one of the states of environment
Find the total net expected present values of the opportunities for each state of environment
Use a decision criterion to choose the best opportunity among the strategies
Decide to make the business of the best opportunity selected
Determine the yet unknown or roughly known factors of firm and go to their selection process through feasibility analyses
Classify the data and prepare the feasibility report
Submit the report to the creditors, investors and official institutions and demand the total capital needed and permission necessary to establish and operate the business
Can you get the total capital ?
None at all
No
Yes
Give up the project
Determine your strategy and apply to get the rest of the capital from other sources or reduce the size of the project, modify or abondon it.
Prepare an investment program to schedule the times, types and amounts of investments
Prepare an activity programm and apply to get the firm ready at right time.

CONCLUSION

1. By feasibility analysis we aimed at finding the unknown facts and formulating the relevant data of the selected business. At the end we prepared our feasibility report for our use and information of the creditors and investors to obtain the external and internal capital needed. Then we submitted the report to the concerned parties, and if necessary , to official bodies too.

2. Financial bodies to whom the report was given, evaluated the project in the report and had their decisions on whether and how much to finance the proposed firm.

3. According to their reactions and degree of satisfaction of our financial requirements we developed a strategy to make out the financing of the business.

4. If we have obtained a satisfactory amount of capital, then we decided to go on establishing the selected business.

5. We prepared a final investment program to schedule the times, types and amounts of investments.

6. Prepared an activity programm to carry out the necessary works and formalities in time so that the firm will be ready in accordance with the program schedule.

7. Finally we drew the flow chart of enterprise selection actions to summarize the preceding decisions.

The rest of the thesis covers individual subjects as have been occassionally referred to in this and the previous chapters. They are the subjects covering the selection processes of factors of firm as necessary for enterprise selection and feasibility report preperation. The reader may refer to the detailed outlines of those chapters at the beginning of the thesis to acknowledge what topics of interest they cover.

BIBLIOGRAPHY

115. (See pp: 48)

116. (A Join Venture project)

CHAPTER II

PRODUCT / SERVICE SELECTION

INTRODUCTION

This chapter discusses P/S (product/service) selection from two dimensions: (1) Selection of existing P/S. (2) Selection of new P/S. For selecting the present P/S, industrial research approach is used. For selecting the new P/S : (1) P/S policy is formulated. (2) P/S research activity is carried. (3) Organization for P/S development is set up.

STRATEGIES FOR MAKING NEW BUSINESS

It is clear on chart III, that there are three possible ways of action from product/service (P/S) point of view to come to a decision. Whatever our initial position is, we follow either :

1. The path of already existing products, or,
2. The path of non-existing products

The products that are not yet developed or diversified require research and development activities to come into being. On tho other hand , we make industrial research on prevailing commodities in the market if we want to choose the most advantageous one for our new business. Then comes the P/S selection and implementation.

INDUSTRIAL RESEARCH

It implies the analysis in the industry market.

<u>First step:</u> Differentiate the industries.

Industries are mainly divided into two groups with respect to uses of goods:

1, Producer goods industries
2. Consumer goods industries

Generally , producer goods industries are more capital intensive, require larger plants, more subject to economies of scale, but have moderate growth pattern in comparison with consumer goods industries. The more a product is basic the less risky it is. It gives less returns but its certainty of profit is high. The demand for that kind of product is the aggregate of the demands for the later goods that depend on its production.

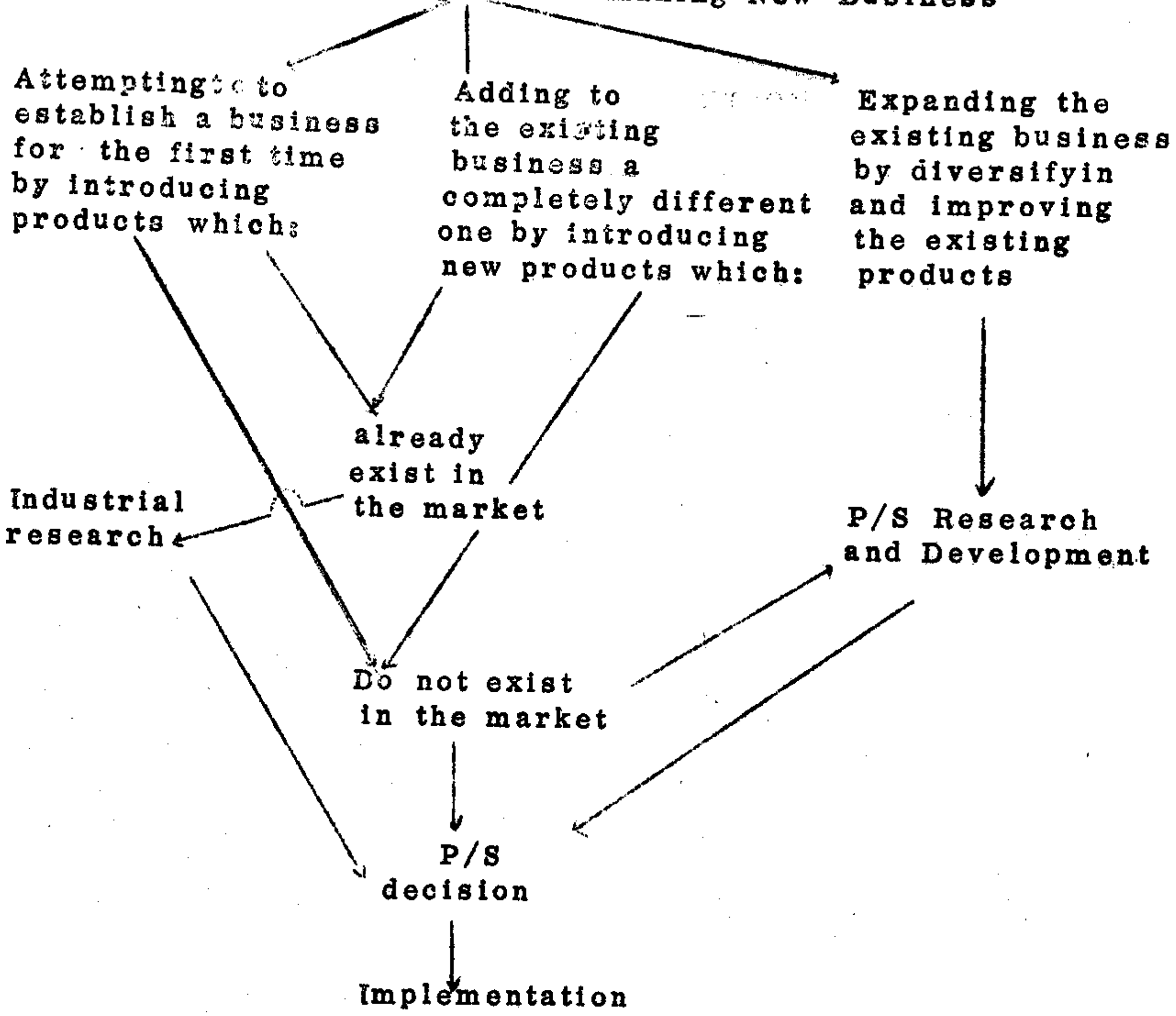
<u>Second step:</u> Divide those industries further into sectors.

They may follow the below pattern:(9) :

1. Mining
2. Manufacturing
3. Construction
4. Energy

CHART III

Product/Service Strategies For Making New Business



5. Transportation
6. Communication
7. Tourism
8. Other services

Third Step: Those sectors are also divided into branches. Each branch is a particular field of industry. The most voluminous sector is the manufacturing sector which may be divided into 30-50 branches, according to the basic raw material used. The products peculiar to each branch show similar characteristics in:

1. Production processes
2. Use of output

and make groups to be analyzed together in research.

Fourth Step: Cost structure of branches.

Enterprises are divided into three categories according to their cost structure:

1. Capital goods-dependent
2. Labor -dependent
3. Material-dependent

First category of enterprises requires huge investment and long periods to generate profit whereas, labor-intensive enterprises require great labor, less investment but more working capital. Material-intensive enterprises are in between. Also, there are two more points to be considered other than labor, material and capital, which are transportation costs involved in the purchasing of materials and sales of finished goods, and growth potential of each branch in the long-run.

A capital good-dependent company is defined as the one whose cost of sales consists 50% or more of capital goods. And the same definition applies respectively for material-intensive and labor-intensive enterprises. Costs of labor, material, capital and transportation for branches can be found out from official or private periodicals or reports.

Growth potential and pattern of growth can likewise be detected through statistical surveys of branches. As a result of this kind of preliminary analysis, we come to a decision point, where, by comparing the capital-labor-material-transportation requirements with what we plan to have in hand as funds and in the light of respective government regulations and policies it may become easy fo us to give up some of the branches but retain more promising ones subject to our more detailed studies.

Fifth Step: Commodities of each branch are tabulated. They fall in either one of the following:

1. They are locally produced
2. They are imported
3. They are both locally produced and imported
4. Certain parts of them are locally produced and certain parts imported. The marketing of those commodities will be mainly under (1) perfect or (2) imperfect competition.

As we go from (1) to (4) risk and profitability will increase. Moreover, if the item is not imported, that may mean that the competition in the market is high and the demand and supply curves for those items are met around optimum price level in the long-run. The items already being imported show good opportunities for new businesses within the country.

Sixth step: Demand Determination.

There are four major methods to estimate the demands for commodities(8) :

1. Using demand elasticities
2. Analyzing size and composition of consumer groups (Demographic analysis)
3. Adopting minimum consumption standards for essential consumer goods.
4. Projection of future demands through use of past trends.

According to the nature of the commodity, one or a composite of those methods are applied to determine the demands in quantitative terms . The total demand formula for each good is as follows:

$$D : C + G + I + E + X$$

Where, D : The total demand for the good
C : Private consumption
G : Government consumption
I : Investment
E : Export
X : Intermediate demand

In order to find the amount of D the quantities pertaining to each element of the right-hand side of the formula should be multiplied by the respective equilibrium prices that prevail in the market.

Seventh step: Supply determination

Again, it is in three parts:

1. Determining the aggregate quantities supplied by existing firms plus imports
2. Finding out the prices
3. Finding the amount of supply for each product by multiplying the quantities by respective prices

Supply : Imports + Local production + Stocks

The higher the supply the higher the competition and the lower the business opportunities in the market.

<u>Eighth Step:</u> Demand/Supply (D/S) Ratio

D/S ratio will give us proportions with respect to long-term average demends and supplies.

$D/S > 1$ indicates business opportunity

$= 1$ indicates equilibrium in the market

< 1 indicates high competition and high risk if we would enter the market in that P/S field. If we don't want to take risk, we eliminate all those commodities from our analysis which show a D/S relation equal to or less than one. There remain those products whose $D/S>1$.

<u>Nineth step:</u> To select the best of those promising alternative p/s's, the criterion of return on capital is a good measure. The highest ratio gives the most advantageous one, but which should also be analyzed with respect to risk. This ratio is simply :

Return on capital = (Output - Material - Maintenance - Depr'n - Labor) / Capital

Or, = Profit / Investment (1)

Optimums of those ratios for each branch of sectors have been calculated by some institutions. If we can also obtain the actual ratios, we compare the actuals with standards, and then, we find, as well, which industries are behind the efficiency target. The result tells us about the productive efficiency that we should attain for success should we enter the market. The actually inefficient branches in the industry are the ones for development and improvement, and have good opportunities. We may mention some of them for Turkey:(1):

1. Opportunities in the Fish Canning and Processing Industry
2. " " " Chemical "
3. " " " Oil Burner "
4. " " " Refractories "
5. " " " Citrus-fruit Processing "
6. " " " Pump "
7. " " " Fertiliser "
8. " " " Internal Combustion Engine "
9. " " " Rayon "
10. " " " Hand tool "

Up to now we analyzed the industrial research activities step by step, which were related to the already existing commodities in the market. Now we turn to new P/S analysis

NEW P/S POLICIES AND DECISIONS

Marketing function of an existing company with respect to customer deman stimulation falls into four major dimensions:

1. P/S policies and decisions
2. Promotional policies and decisions
3. Pricing policies and decisions
4. Place considerations

Since it is directl related to this chapter, here, we chall concern ourselves only with P/S policies and decisions. P/S policy is formulated to hep systematically and effectively carrying out the fonctions of P/S development which are:

a. P/S innovation
b. P/S modification

P/S policies serve as guides in deciding what kinds of P/S or P/S lines a firm must sell so as to enable the management for effectively stimulating an optimum amount of P/S in the market.

If the internal conditions of the company can be equalized to the external conditions in the market, then optimality in product policies and product competition in the market ar obtained . But since many variables cannot be measured quantitatively, such an optimality perhaps can never be achieved. However, the firm should seek to achieve that target. There are two possible srtategies for it:

1. Keep the P/S constant and modify the resources to equalize the internal economies to external economies. This can be achieved by better engineering and marketing methods.

2. Keep the resources constant and diversify or modify the P/S or P/S line to better capitalize on the existimg resources. This can be achieved by P/s development which we have categorised before as (1) P/S innovation and (2) P/S modification. P/S policy is related to these functions and it formulates the ways to be followed in order to achieve the ends of these functions.

P/S innovation function requires research and development (R-D) activity which will be discussed later on. P/S modification function first requires the identification of the attributes of the present P/S subject to modification.

P/S ATTRIBUTES

There is an infinite number of P/S attributes. The major ones affecting P/S competition are as follows(103) :

1. Product diversification
2. Patentability
3. Quality
4. Style
5. Color
6. Size
7. Packaging
8. Branding

P/S diversification implies P/S line which is a composite of P/S's having different attributes. If the management has a P/S line, then it will try to achieve an optimum composition. Several OR models such as dynamic programming, decision tree, can be applied to determine the optimum P/S line composition which will allow for minimum cost, maximum profit or optimum market segmentation.

Some of those P/S attributes can be modified to make the P/S a new P/S. The ones which can make it new require full attention, for they will be the variables affecting P/S competition in the market. In the following section those attributes are further divided into more specific characteristics but in a different set-up so that it can be possible for the decision maker to detect correctly the attributes which will be the determinants of marketing success of the P/S.

NEW P/S

The new P/S may be new to the company, to the country or to the world. It may be entirely new, or new in some of its attributes. There are mainly 14 attributes for a P/S that can make it new(93) :

a- Six of them are positive in favor of P/S
1. Lower price
2. Greater convenience
3. Better performance

4. New availability in place and time
5. Conspicuous consumption possibilities
6. Easy credibility of benefits

b. Four characteristics are negative, make the market development costlier:
7. New but different methods of use
8. Unfamiliar patterns of use
9. Unfamiliar benefits in terms of the customer's understanding
10. Costliness of a possible error in use

c. Four other features have double effects, negative or positive:
11. New appearance
12. Different service
13. Different channels of distribution
14. New construction, packaging or composition

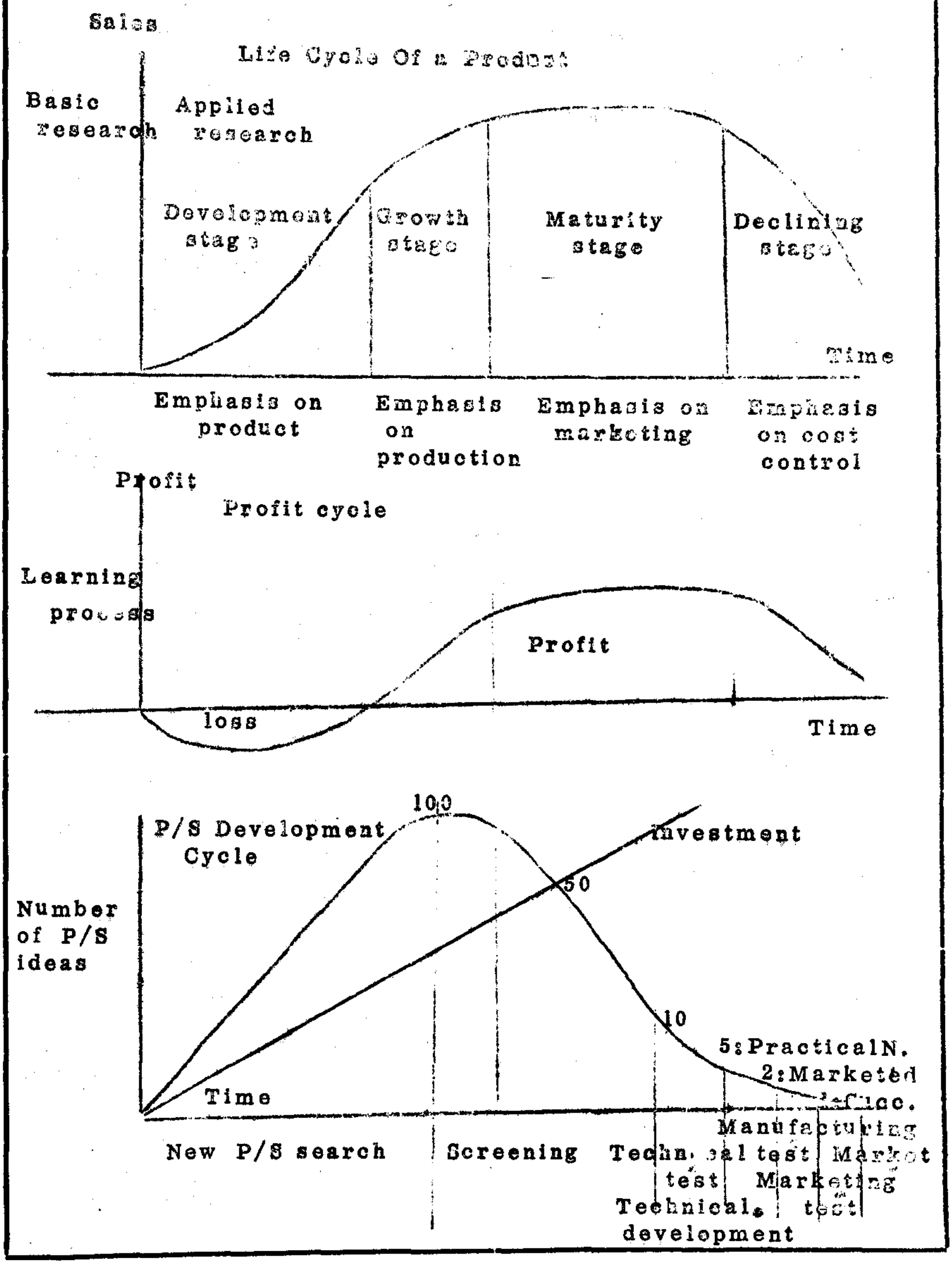
Determination of the novel aspects of a new P/S is no a simple mechanical process. What is new depends solely on what the prospective customer perceives or can be brought to perceive in the new P/S. Determining such potentical aspects require a high order of imagination and understanding of human attributes. The dominant and continuous human character in this respect is his always increasing interest for more convenience, comfort and novelty. For this reason, there has always been a sequential series of obsolete and demoded P/S's and new ones replacing them in the market (chart IV). And only a very small percentage of new p/s's introduced into the market are likely to succeed in gaining customer acceptance. The new attributes inherent in them are perceived by the customers. The ones we see for a long time in the market are only the commodities which have succeeded, perhaps consisting only of as little as 1% of the whole multitude of P/S's tested in the market. Chart IV will demonstrate the case more precisely.

Behaviours of opinion leaders (leadership elite) towards the introduced or proposed P/S's indicate roughly the future accessabilities. Before introducing a new P/S , appealing to the appropriate opinion leaders will help estimating the future consumption probabilities.

To improve and develop new attributes in the P/S researches are carried out. About 50% of researches in this field goes to new P/S's, 40% to improving existing P/S lines, and 10% to improving or developing new processes.

The new attribute which is planned to be integrated

CHART IV


Sales
Life Cycle Of a Product
Basic research
Applied research
Development stage
Growth stage
Maturity stage
Declining stage
Time
Emphasis on product
Emphasis on production
Emphasis on marketing
Emphasis on cost control
Profit
Profit cycle
Learning process
Profit
loss
Time
100
P/S Development Cycle
Investment
50
Number of P/S ideas
10
5:PracticalN.
2:Marketed
Time
New P/S search
Screening
Technical test
Technical development
Manufacturing test
Marketing test
Market

into the P/S will either:

a. Improve the P/S in ge eral use , or,
b. Bring about an improvement for very specific purpose which appeals to a certain part of the consumer market.

To integrate the new attributes into the P/S We should develop a procedure for this purpose. Usually, the procedure carried out in relation with P/S implies research and development (R-D) activity which is a partial implementation of new P/S policies and decisions.

P/S RESEARCH AND DEVELOPMENT

In general , R-D covers all activities and related cash flows from the stage of setting overall P/S policies through planning of those policies, including all the laboratory and field works that are carried out for continuous manufacturing and marketing of the new P/S. Research is mainly divided into two classes:

1. Basic (fundamental) Research
2. Applied Research
   a. Preproduction research
   b. Follow-up research

Basic research is the one that does not immediately result with commercial applicability. It is rather carried out to develop know-how in areas of major importance. It requires diligently scientific study. Its managerial purpose is not profit but the improvement of knowledge. Applied research on the other hand, implies profit-seeking. Therefore, private business enterprises usually deal with applied research, and, scientific institutions with basic research.

INVESTIGATION FOR R-D

How much should we spend on R-D is a very hard question to answer. If the environmental information we are aware of have a high validity, and we feel ourselves capable of the task it will be easy for us to decide whether to enter into the area of new P/S R-D. In order to decide, how much we can use as working capital for this purpose is the first consideration. Since we have not yet determined the size and composition of our capital in detail at this stage, in order to beware of where and how long we will go through in R -D , we must estimate :

1. The minimum funds that we should spare for R-D
2. The maximum amount of funds that we should consider
3. The most likely amount of funds that we should spend for R-D.

CHART V
P/S Performance

Spheres of Performance	Relative weight(A)	P/S Compatability (B)	A x B
Marketing	.40	1.0	.40
R-D	.20	.8	.16
Personnel	.10	.5	.05
Finance	.10	.7	.07
Production	.05	.4	.02
Location	.05	.1	.005
Purchasing	.03	.2	.006
Image	.07	.9	.063
	1.00	Total performance index:	.774

Relative weights reflect the shares of performances/on P/S success. P/S compatability values reflect the estimated successes of the given new P/S on the respective performances. 77.4% indicates the overall evaluation.

Another method, as illustrated below/in chart VI, is more P/S oriented as can be understood from the intangible factors under consideration. Those factors are again weighted according to relative importances; their products are taken with found P/S factor values; those products are totalled, and the result gives the total intangible factor index number for that particular P/S to be compared with other new P/S proposals.

CHART VI
P/S Performance

Intangible factors	Relative weight(A)	Found factor walue (B)	A x B
Marketability	.5	.700	.3500
Durability	.3	.602	.1806
Productivity	.1	.400	.040
Growth potential	.1	.100	.0100
	1.0	Total factor index :	.5806

Fctor values are found by dividing the factors into subfactors and by assigning weights and probabilities. Chart VII illustrates the case for durability.

One important disadvantage of both methods is that the estimated figures are subjective. To make them more objective further researches may be carried out.

CHART VII
Durability Evaluation

Weights of criterion:		1.0		.5		.2			
P/S:x / Criterion :		Excel.		Good		Poor		Total	Weighted
Subfactors	Weight	EV	EP	EV	EP	EV	EP	EV	TEV
Tension	.4	.3	.3	.25	.5	.04	.2	.59	.236
Compressinn	.1	.2	.2	.25	.5	.06	.3	.51	.051
Deterioration	.3	.5	.5	.25	.5	-	0	.75	.225
Obsolescence	.1	.1	.1	.10	.2	.16	.8	.36	..036
y	.1	.2	.2	.30	.6	.04	.2	.54	.054
	1.0			Found Factor Value				:	.602

The final decision in selecting the P/S falls upon the total index numbers. To evaluate them, we must have a yardstick , say, minimum 70% total perf ormance is required to select. So, the P/S in the first method is selected

Suppose that the above two methods are applied for the same P/S and the given results are obtained. The first method will say "yes" and the second method "no" for P/S selection as far as the 70% minimum performance requirement is concerned. In such cases a further resear ch of unknown facts or unclear data is desirable to increase the reliability. Those P/S's which pass this kind of screening are subject to further investigation as follows.

Step six: Determine and evaluate the requirements of and decide on whether to carry out, the technical research projects of the proposed and selected ideas. Then, go on to the technical development study.

B- Technical Development Study

Technical development study differs according to the nature of the P/S. In the following example we want to develop a high-pressure pumping system for a certain engine used in presses of more than 10 tons. The method we shall use is PERT(program evaluation and review technique)in which there are three considerations:

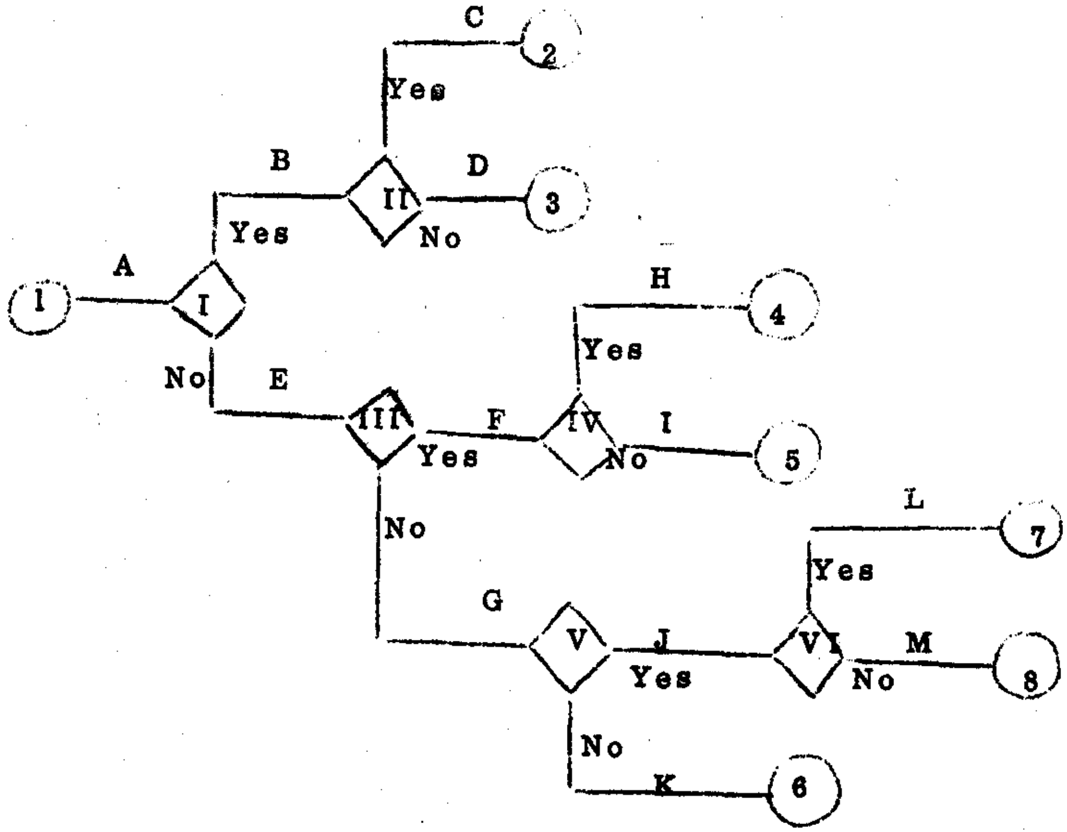
1. Events : States of nature
2. Activities : Our strategies
3. Outcomes : Decisions

There are three alternative activities we want to do:

1. Electrical,
2. Pneumatic,
3. Fuel-oil set-up.

CHART VIII

Step one :   Decision Box Network Analysis



Events:

I : Electrical control feasibility is/not perfect
II : Cost of the unit $\leqslant$ market price
III : Pneumatic control feasibility is /not perfect
IV : Cost of the unit $\leqslant$ market price
V : Fuel oil control feasibility is/not perfect
VI : Cost of the unit $\leqslant$ market price

Activities:

A : Electrical control feasibility study
B : Economic fasibility study
C : Report the favorable project
D : Report the unfavorable project
E : Pneumatic control feasibility study
F : Economic control feasibility otudy
G : Fuel oil control feasibility study
H : Report favorable project
I : Report unfavorable project
J : Economic feasibility control

K : Report unfavorable project
L : Report favorable project
M : Report unfavorable project

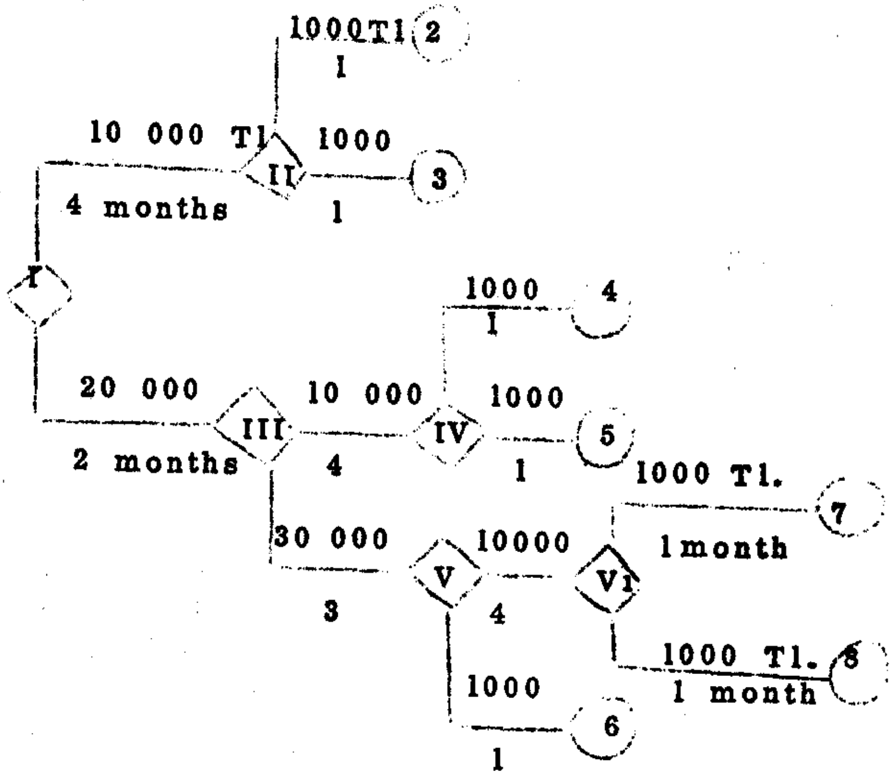
Outcomes:

1 : Project model ready
2 : Accept the project
3 : Drop the project
4 : Accept the project
5 : Drof the project
6 : Drop the project
7 : Accept the project
8 : Drop the project

CHART IX

Cost Network (Tl)

Schedule Network (Months)



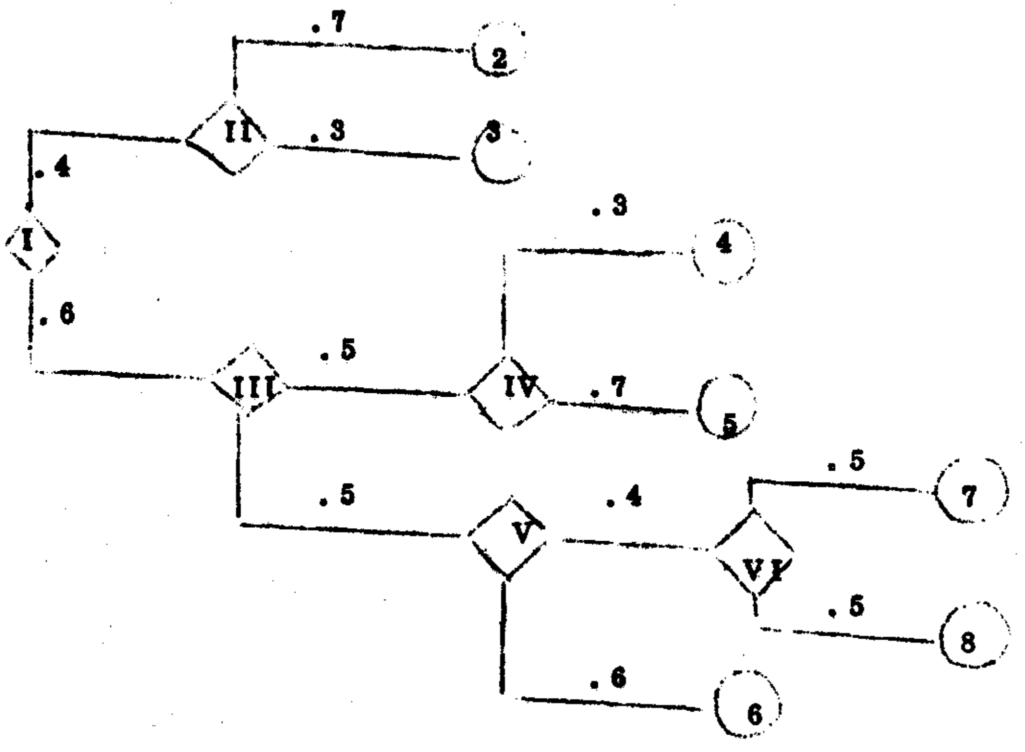
Step two: Cost Network Analysis

The costs according to each activity are estimated by using one of the criteria utilized in decision making under uncertainty. For example, if we use Hurwicz criterion, first we determine the greatest possible cost, then the least possible cost with associated probabilities of occurances, then find the most likely cost to be used in our analysis. Chart IX presents cost network analysis. Since acti ty A is common to all events it is excluded for simplicity purposes.

Step three: Schedule Network Analysis (chart IX)
Time periods for each activity are determined in the same way costs are determined. The longest path gives the duration of the project. In our example, the longest path is 12 months.

Step four: Probability Network analysis (chart X)
Each decision box involves two probabilities: yes, or, no. Therefore the total of the probability components at each decision box is 1.0. Probabilities are assigned by the technical persons or committee who undertake this project and are familiar with all its features, so that, bias will be very low in the determination of probabilities. If a probability cannot be estimated for a decision box, then, equal probabilities are assigned.

CHART X
Probability Network



Step six: Probability of outcomes Analysis
Expected probabilities of outcomes are calculated as follows:

Outcomes	Probability components	Expected probabilities
2	.4 x .7	.28
3	.4 x .3	.12
4	.6 x .5 x .3	.09
5	.6 x .5 x .7	.21

6	.6 x .5 x .6	.18
7	.6 x .5 x .4 x .5	.06
8	.6 x .5 x .4 x .5	.06
		1.00

Since only the outcomes 2, 4, and 7 are accepted according to the decision box network analysis, their total probability

.28 + .09 + .06 : .43

indicates that 43% of the time our R-D program is successful. Among those three acceptable outcomes the one with electrical control feasibility has the highest probability of success as 28%. And the least probable success is that of fuel oil control feasibility.

Step seven: Costs of Outcomes Analysis

Below, the analysis is given.

Outcomes	Cost components	Total cost	P	Exp. C.
2	10 000 + 1 000	11 000	.28	3 080
3	10 000 + 1 000	11 000	.12	1 320
4	20 000 + 10 000 + 1000	31 000	.09	2 790
5	20 000 + 10 000 + 1 000	31 000	.21	6 510
6	20 000 + 30 000 + 1 000	51 000	.18	9 180
7	20 000 + 30 000 + 10 000 + 1 000	61 000	.06	3 660
8	20 000 + 30 000 + 10 000 + 1 000	61 000	.06	3 660
			1.0	30 200

The greatest R-D cost is 61 000 Tl.
The least possible R-D cost is 11 000 Tl.
The most likely R-D cost is 30 200 Tl. as found out above.
Those figures are the answers to the three questions previously asked.

30 200 Tl. is the project cost alnne. There are other costs also associated with it. In the next stap the total R-D cost is calculated.

Step eight: Total Cost of R-D Analysis

R-D program of this sort involves also such costs other than the project test cost as :

	Most Economic Cost
Industrial design	5 000 Tl.
Engineering design	10 000
Prototype and testing	4 000
Tooling	2 000
Machine tools	3 000

Vendor development		6 000
	Total :	30 000

Weighted model cost : .43 x 30 000 : 12 900 Tl.
Weighted R-D project evaluation cost 30 200
Total R-D cost : 43 100 Tl.

The figures under the "most economic cost" column are found using dynamic programming method either with hand solution or computer approach.

43 100 Tl. is the total R-D cost involved. Will it be feasible to spend this amount? What shall we gain if we spend? A revenue analysis gives the answer to this question.

Step nine: Revenue Analysis
A long-term projection is done , say , for five years, depending on the life of the investment, grace period of the economy and the desire of the decision maker. The longer the undertaken period the more reliable will be the result. In the worked out matrix below such analysis is made for the period stated.

(Figures in Tl. '000)

Year	Estimated Market(Tl)	Estimated market penetration	Sales (Tl)	Estimated cost of sales	Est. Rev.	EP of Suc.	Exp. Rev.
1	500	.7	350	300	50	.43	21500
2	600	.6	360	300	60	.43	25 800
3	1 000	.5	500	400	100	.43	43 000
4	800	.4	320	300	20	.43	8 600
5	800	.4	320	300	20	.43	8 600

The last column "expected revenues" gives the year-end revenues for the corresponding periods. However, without a present value analysis one cannot see the profitability of the project. In order to eliminate difficulty of estimating an interest rate required by the present value method, below, another method namely "return on investment analysis" is used.

Step ten: Return on Investment Analysis
The present value of our total R-D cost was 43 100 Tl. To find the return on investment that eqates our future revenue inflows to R-D outflows we use the discounted cash flow technique.

CHART XI
Cash Flows

0	1	2	3	4	5	.	.	.	Time
-43000	21500	25800	43000	8600	8600				Tl.

When the cash inflows are equated to cash outflows:

$$43\,100 : 21\,500 V_{1q} + 25\,800 V_{2q} + 43\,000 V_{3q} + 8\,600 V_{4q} + 8\,600 V_{5q}$$

by itiration it is found that at q:48%, present values of cash flows is zero:

$$43\,100 : 21\,500 \times .6757 + 25\,800\ .4565 + 43\,000\ .3085 + 8\,600 \times .2084 + 8\,600\ .1408 : 43\,100$$

That is to say, 48% is the rate of return that equates cash inflows for R-D to cash outflows of R-D. We compare the opportunity cost of money with 48%. If 49% is larger, then, the product under R-D study is acceptable for the new business.

As an alternative to step ten, payback analysis can be used. It involves the following formula:

$$\text{Payback index} : \frac{E \times S\,(P - C) \times G}{W + M + I + D}\ ,\ (\text{years})$$

Where, E : Probability of commercial success
S : Estimated number of sales units per year
P : Estimated sales price per unit
C : Estimated cost per unit
G : Estimated grace period (period of no change in the market) in number of years
W : Additional working capital need
M : Marketing development cost
I : Additional capital expenditures
D : Production development cost

The smallest payback period indicates the best P/S as the most profi-table. However, its disadvantage is that it does not consider time value of money.

Upto now we followed a sequence of steps to evaluate the new P/S. In the final step we decided upon what kind of P/S we shall produce or render. However, there is an other point worth mentioning which is related with the reliability and accuracy of our estimates.

MARKET SURVEY

Suppose that the new P/S is selected. Then it is ready for developmental organization. However, before going into the organization for developing the new P/S, management might feel that the market-related estimates such as market share, sales, and revenues, as given in the above mentioned R-D analysis, need further investigation to increase the certainty.

In that case, it will probably want to go into a market survey to discover more information about the new P/S . For that purpose it will first want to compare the pay-offs of two actions : market the P/S ; abandon the P/S, say, for one period. An EVPI (Expected Value of Perfect Information), or the same thing, EOL (Expected Opportunity Loss) analysis will show the comparison.

Assume that the below chart is relevant to those actions for the first period.

	Sales revenues (Tl. '000)						Total
	Forecast 1		Forecast 2		Forecast 3		EV
Action	EV	EP	EV	EP	EV	EP	
Abondon P/S	0	.35	0	.20	0	.45	0
Market P/S	-300	.35	100	.20	300	.45	50

If we market the P/S , our total expected revenue will be 50 000 Tl. And if we abondon the P/S our revenue will be zero. Whereas , -300 x .35 : -105 thousand Tl. is the EOL under perfect information. Management then will think that if it makes a market survey : at most it can save 105 thousand Tl. at a survey reliability of 100%, and 73 500 Tl. at a reliability of 70% . If this amountis considerable, then management will carry out a market survey, A CPA (Critical Path Analysis) procedure can perfectly be used for this purpose to evaluate the results of market survey(106).

One more activity is left for discussion. How will the management deal with the management of the new P/S development? Who will participate in this development? What are the principal considerations? All are the subjects of the next section.

ORGANIZATION FOR THE DEVELOPMENT OF THE NEW P/S

It implies all management functions from planning up to control directed towards the activities starting from the time of the decision on new P/S idea until time it is developed. There are several steps involved:

Step one: Evaluate the P/S according to technological newness and marketing newness to determine the functional responsibilities and actions to be done further until the P/S is developed. A chart like the following presents the result of step one:

CHART XII
Organization for new P/S Development

(Next page)

P/S requires:	No change in the present technology	İmprovement in the present technology	New technology
No change in the present market	No problem	Reformulation (R-D)	Replacement (R-D)
Market improvement	Remerchandizing (Mktg)	Improved P/S (joint)	P/S line extention (joint)
New market	New use (Mktg)	Market extension (joint)	Diversification (joint)

As apparent from the chart above, out of the arising problems due to P/S requirements, two are the responsibilities of the R-D, two of marketing, and the rest are of both R-D and marketing departments. After determining the departments which will be involved in the development process, then go to step two.

<u>Step two</u>: Assign responsibilities, authorities, and determine the channels of communication.

The following principles should be considered:

1. Originator of the new P/S idea shoul participate until it is developed.
2. Marketing department should participate in the process.
3. R-D personnel should participate in the process.
4. There must be a top management representative who will coordinate the activities and be responsible of the decisions.
5. Top management should be the final authority.

<u>Step three:</u> Budgeting the expenditures.

While carrying out the development process actual expenses should be compared with the budget figures, variations should be reasoned and necessary corrective actions should be formulated.

<u>Step four:</u> Select a name for the new P/S .

There are no hard rules for name selection. However, the following principles should be considered:

1. Name should be easy to remember.
2. It should reflect customer satisfaction.
3. It should indicet quality.

<u>Step five:</u> Packaging considerations.

There are three categories of considerations:

1. Marketing considerations
   a. From manufacturer's point of view
   b. From retailer's point of view
   c. From customer's point of view
2. Product protection considerations
3. Economy considerations

An effective review of those considerations will make it possible to have an optimum package.

Step six: Product testing

When the new P/S is developed it should be tested before the production or servicing is scheduled. This is necessary to make sure of good performances of its pertinent attributes. Some of the testing types are

1. Life tests
2. Destructive sample testing
3. Simulated environmental testing
4. Consumer testing
5. Radiographic testing

Selection of the test to be used depends on the character of the P/S. P/S testing is the quality control of the new business.

CONCLUSION

P/S selection isa topic of a book. Nonetheless, this chapter gives a brief summary of the problem.

In the preceeding pages, P/S selectinn problem is taken from two points:

1. Selection from among already present P/S's
2. Selection of a new P/S, either completely or partly new.

The first point is explained through industrial research analysis. The second point is explained in a different way.

First, a new P/S policy is formulated. Then, general P/S attributes and also new P/S attributes are considered as starting points for new P/S ideas. Afterwards, P/S R-D study with a PERT application is based upon those ideas.

Finally an organization is set up for the implementation of favorable results obtained through R.-D. This organization will end up when the P/S is marketed, or, it will merge probably into a new department called " new product (service) department" in the company.

Next chapter will discuss the techniques and technology which are going to be hired and used for the processing of the new P/S. They will take the mission from the point where the new P/S is developed untill the life cycle of the P/S is terminated. At this point the mission is again of the new P/S. department.

BIBLIOGRAPHY

1. Investment Promotion Publicatinn Series No. E-3/12, 1964
Investment Promotion and Information Center, Ankara.

2. Peter C. Fichburn
Decision and Value Theory
ORSA, Publication in OR, No. 10
John Wiley and Sons, Inc., N.Y. , 1964

3. Hartley Withers
Hints About Investment
Eveleigh Nash and Grayson Limited, London, 1926

4. Harold Bierman, Saymour Smidt
The Capital Budgeting Decision
The Macmillan Company, N.Y., 1963

5. Irwin D. J. Bross
Design For Decision
The Macmillan C. N.Y., 1959

6. Robert O. Ferguson, Lauren F. Sargent
Linear Programming: Fundamentals and Applications
McGraw-Hill Book C. , Inc., N.Y., 1958

7. H. Igor Ansoff
Corporate Strategy
McGraw Hill Book C. , 1965

8. Report by a Group of Experts
Formulating Industrial Development Programmes
UN Economic Commission for Asia and the Far East, Ban. 61

9. Kalkınma Planı- İkinci Beş Yıl, 1968-1972
TC Başbakanlık DPT , Ankara, Kasım 1967

10. Baldwin M. Woods, E. Paul Degarmo
Introduction to Engineering Economy
The Macmillan C., N.Y., 1957

11. Pearson Graham
Profit Probability Analysis of Research and Dev. Expendit.
The J. of Industrial Engineering, V:XVI, NO. 3, May-June 1965
American Institute of Industrial Engineers, USA

12. Donald W. Collier
How Much Should Your Company Spend on Research and D.
Business Management, V:34, May 1968
Management Publishing Group Inc., USA

13. Metin Göker
Dynamic Programming / Decision Theory
Robert College, Istanbul, Autumn, 1967

14. Pearce C. Kelley, Kenneth Lowyer
How to Organize and Operate a Small Business, 3rd edit.
Prentice-Hall Inc., Englewoods Cliffs, N.J., 1961

93. Chester R. Watson
What is new about a new Product
J. of Marketing, July 1960

94. Theodor Levitt
How to Exploit the Product Life Cycle
HBR, Nov.-Dec., 1965.

103. Kenneth R. Davis
Marketing Management - Chapter 8: Product Pol. and Dec.
The Ronald Press Company, N.Y., 1961

104. Ralph Westfall
Psychological Factors In Predicting Product Choice

105. Jung Wong
CPA for New Product Planning
J. of Marketing , Oct., 1964

106. Philip G. Carlson
Quantitative Methods for Managers- CPA, pp:94-109

CHAPTER III

TECHNOLOGY SELECTION

INTRODUCTION

This chapter attempts to find out a technology which will optimize the future outcomes of the firm. for the P/S selected in the previous chapter.

Technology means the type of machinery and equipment and the level of techniques that are used in the production or rendering of the selected P/S.

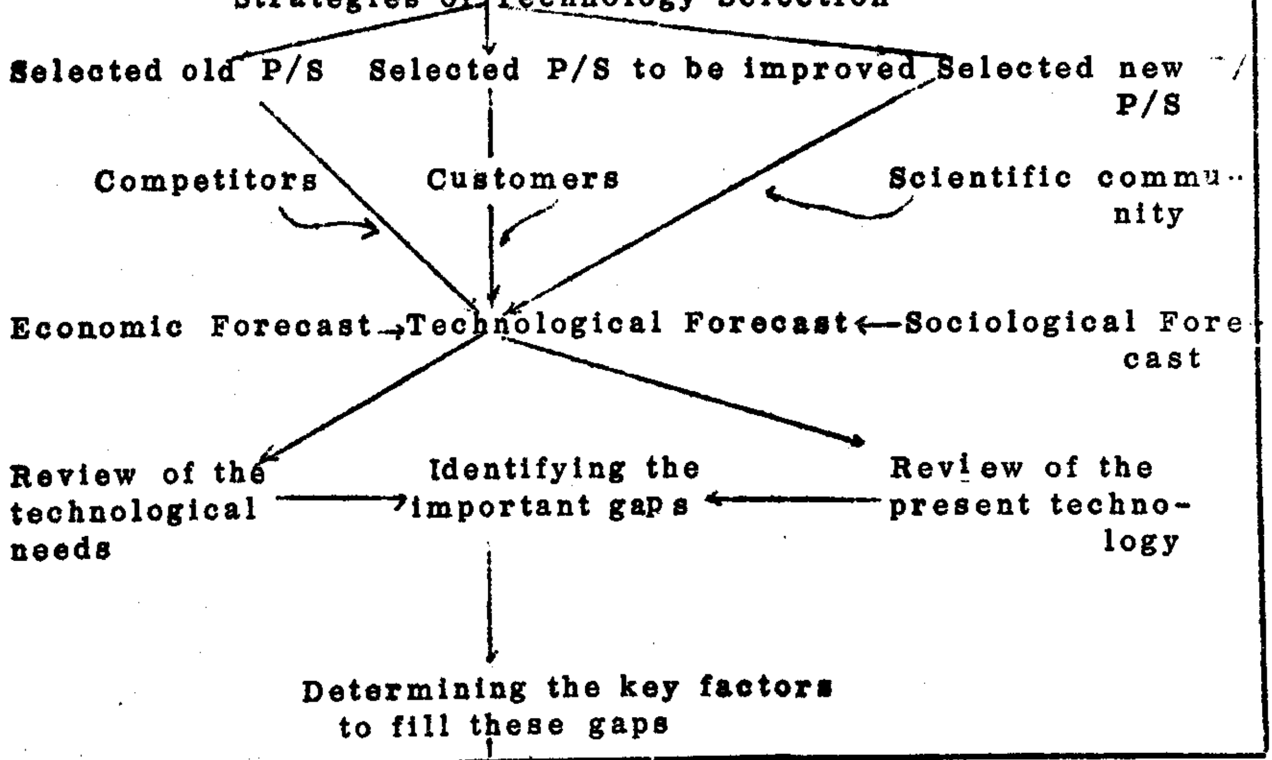
The processing involves factors of production. Their scarcity in the environment and quality of performances are the first constraints of the problem. So, in the following pages first, factors of production considerations are discussed. Upon their optimum combination technology selection models are applied.

Two deterministic models are considered, and at the end, with a discussion on make-or-buy decision, which is necessary to implement the solutions, the chapter is concluded.

STRATEGY OF TECHNOLOGY SELECTION

Chart XIII illustrates the strategies for technology selection.

CHART XIII
Strategies of Technology Selection



When Where How If Which How much
can these facts be found or discovered ?

Evaluation of the impacts of those factual discoveries on the potential Product/Service-Customer-Market-Industry strategies

Research Strategy

For major programmes

For Pending programmes

Project selection

For present P/S selected

For P/S to be improved

For new P/S selected

Factors of production consideration

Two-factor model

Multi-factor model

Comparison of technologies

Evaluation of technologies

Make-or-buy decision

Implementation

TECHNOLOGICAL FORECASTING

So far, we have selected one or more of the following P/S :

- Old P/S
- P/S to be improved
- New P/S

They are subject to come into existence and be improved or developed by the technologies best fitting to our over-all objectives. Our over-all ovjectives or goals outline the coverage of the technology to be used. The selected P/S identifies its specifications. Determination of these specifications in clear terms requires technological forecasting.

Technologies are developed to match needs. Their capabilities in meeting needs depend on the level of technological forecasting (chart XIV). Technological forecasting (TF) is also a non-deterministic process like business planning. TF stimulates fundamental research and provides guidelines for it. It is an integral part of long-range business planning, and it should be integrated to that vertically (through policy-strategy-tactic levels) and horizontally (on system-wide basis). There are several techniques related to TF (102) :

1. Techniques related to exploratory TF, such as trend extrapolations, computer models, gaming, systems analysis.
2. Techniques related to normative TF such as decision matrices, decision theory, OR models.
3. Techniques for improving the consensus of intuitive thinking, such as brainstorming.
4. Techniques for the pocessing of TF , such as economic analysis, discounted cash flow techniques.

Those techniques provide tools for horizontal as well as vertical integration of TF to long-term business planning.

Technological forecasting at policy-planning level : It focuses on basic scientific technological potentialities and their limitations. The most common tool is intuitive imagination.

TF at Strategic planning Level: It focuses on the recognition and comparative evaluation of alternative technological options. The most common tools are industrial dynamics, and systems analysis.

TF at Tactical Planning Level: It focuses on the probabilistic assesment of future technology transfers. The most common tools are network, discounted cash flow techniques, OR models.

TF is supplemented by :

a. Economic forecasting, which illuminates:
   1. At what level the research can best be carried, and
   2. The future probable technological improvements and developments.

b. Sociological forecasting, which covers the information on social factors with respect to past-present-and-the future, such as:
   1. Population-income-customer considerations
   2. Utility changes or shifts of customers in factors of production
   3. Traditional and cultural changes
   4. Upgrading of employees
   5. Government policies
   6. International affairs

Both of these supplementary forecasting activities are also the basic factors for P/S and other strategies too.

TF utilizes data obtained mainly from three sources:

1. Competitors, and their present P/S data
2. Customers, and their social and economic value changes, which will permit the improvement of P/S
3. Scientific community, and its studies and conclusions towards new P/S targets.

Utilization of those data comprehensively requires little mathematics . Because, at this stage, it is useless and inconvenient to get into mathematical elaboration. However, it requires as requisites:

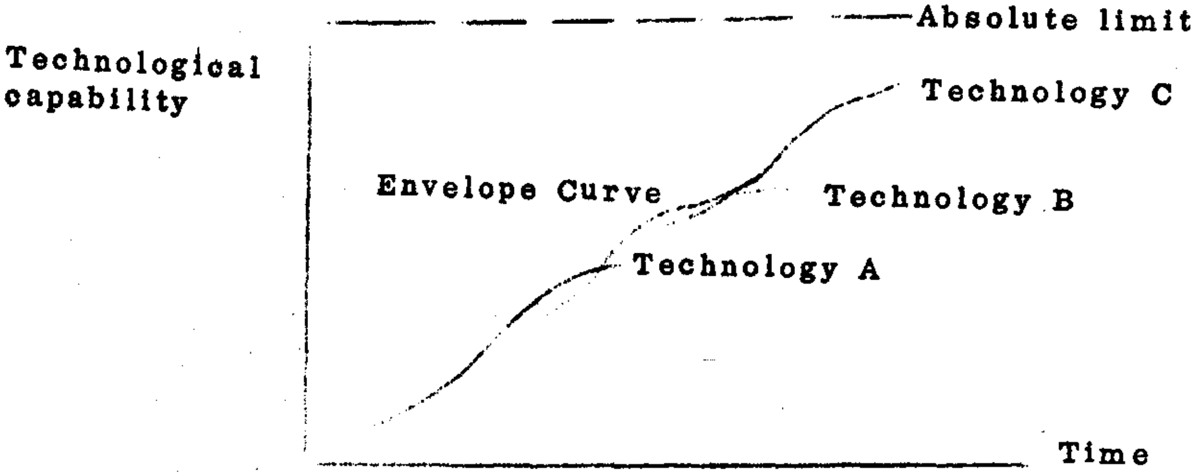
1. Human judgement and imagination
2. Knowledge of the science and its economic and social implications.

On the basis of these requisites , the present technology is found out through review of the available development programmes from various sources. Then, technological needs of 5-10 , more than 10, perhaps a decade ahead are estimated. The gaps between the present and the needed technology are determined. The key facts that will fill these gaps are identified. The questions :

- When can these facts be found?
- Where can these facts be available?
- How can these facts be discovered?
- Whether can these facts be obtained?
- Which one of these facts can more probably and successfully be achieved?
- How much of these facts can be benefited from?

are answered. And evaluated in the angle of P/S-customer-market-industry strategies. Shortly, how they fit in

CHART XIV



As a particular technology approaches its inherent limits, another new one replaces it to carry out the envelope curve towards the future. This process is permenantly carried only through TF.

---

will be considered on thees pages. The model will be developed to find the best combination, so that, we shall be able to see the required amount of capital which will produce the desired technology. The technology, then, will be analyzed with respect to its components, and the set up will be organized , The final consideration is make-or-buy decision which implies what products or product components , and the services should better be bought outside and which internally produced on the constructed technology so far as the capacity and limitations of it are concerned. The final decision and implementation conclude the chapter.

FACTORS OF PRODUCTION CONSIDERATION

Assumptions:

1. Consider one product
2. Consider two scarce factors: labor and capital .
3. Two factors are perfectly substitutable.

The well known and most popular Cobb-Douglas production function(3) is:

$$V = (1-\varepsilon)^t a^{\lambda} k^{\mu}$$

Where, V : Production volume

ε : Annual rise in efficiency with the aid of constant quantities of labor and capital

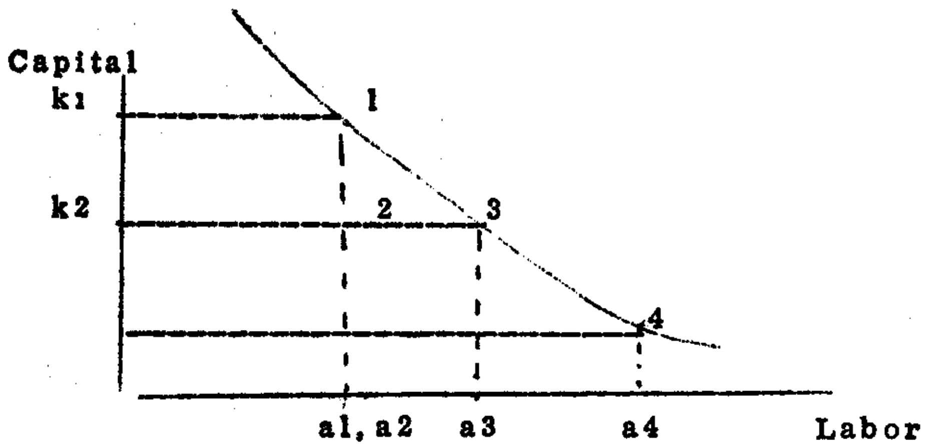
t : Time
a : Quantity of labor used
λ : Elasticity of production with regard to labor
k : Quantity of capital used
μ : Elasticity of production with regard to capital used

The production function represents a collection of technological possibilities with respect to labor and capital. If:

$\lambda+\mu < 1$: There is a favorable economies of scale, meaning increasing returns at ε = constant.
$\lambda+\mu = 1$: There is an equilibrium , and no economies of scale, meaning constant returns at ε=constant.
$\lambda+\mu > 1$: There is a poor economies of scale, meaning decreasing returns at ε = constant.

<u>Illustration:</u> Consider one unit of product, and labor versus capital as scarce factors of production. The below graph can be charted:

CHART XV
Two Factors of Production



If the points 1 and 3 are compared, 3 consumes more lobor and less capital than 1 ($a3 > a_1$, $k2 < k_1$ respectively). A shift from 3 to 1 will shift capital requirements upward and labor requirements downward. If we go beyond 3 and settle at 4, labor is needed more and capital less. 1-3-4 curve represents the Cobb-Douglass production function. If 3 is compared with 2, both need the same quantity of capital, k2, but 2 uses less labor ($a2 < a3$) . This condition results where and when labor efficiency and productivity are increased.

In this case, λ will decrease and μ will stay constant, thus , $\lambda+\mu$ will be smaller than its previous value; therefore, increasing return will occur. It is vice versa if 1 and 2 are compared. In that case, capital will decline from k_1 to k2, labor won't change , meaning that μ has decreased; therefore, economies of scale has become better incurring higher returns. Efficiency and productivity of capital have risen.

There are more than one technological possibility in the process, which can be pointed on the graph, and sufficiently be represented by a curve what is also called "curve of technological possibilities". The Cobb-Douglass curve is an example, and, in the simplest case, when efficiency does not change, it takes the form , for one unit of product:

$$1 = G a^{\lambda} k^{\mu} \qquad (2)$$

Since $\lambda + \mu = 1$ in equilibrium, we can write (2) as:

$$1 = G a^{\lambda} k^{1-\lambda}$$

Dividing both sides by a , and simplifying, we get :

$$1/a = G\left[a^{\lambda-1} k^{1-\lambda}\right]$$

Where, G is constant Douglass production function.

Left-hand side gives the productivity of labor. By a change in technological knowledge, the curve will shift leftward. Since the formula contains only the parameters G (when there is not a constant efficiency), (a) and (k), there are two or three types of changes to be realized. A rise in G implies a rise in general efficiency, a leftward shift on the curve, a new combination of factors of production. If such a rise occurs at a uniform rate, G can be given the form:

$$G = (1 + \varepsilon)^{t}$$

The second change may occur in λ or μ. When λ decreases, a labor-saving , when μ decreases, a capital-saving change occurs. However, a change in λ and/or μ will not
always contribute a saving in technology. But if total elasticity declines , it will mean technological progress which will contribute an addition to the product. Such changes , $d\lambda$ and $d\mu$ must obey the condition:

$$a^{\lambda + d\lambda} k^{\mu + d\mu} > a^{\lambda} k^{\mu}$$

or,

$$d\lambda \ln a + d\mu \ln k > 0$$

for technological progress. The result is , that it is possible to find the best conbination of labor and capital by using those formulas. The same procedure applies for other factors of production as well. However, the fourth and fifth factors of production, namely, entrepreneurship and innovation, cannot accurately be dealt with by this method because of their different features for the reason that they don't obey proportionality laws. Utility approaches explain the entrepreneurial behaviour; research and development activities may take innovation as a target. For the first factor of production, land, it is possible to apply the above constructed method taking capital or labor as the other extreme of the graph. Also, we can consider the best combination of capital and labor as one factor, and, land, as another, and use the model to find the best combination of land, labor and capital. However, we shall not go into that, but, after having determined our optimum amount of capital that we shall allocate for technology, k, also leaving labor, a, aside, as the next step we shall determine the components of k, that is, allocate k through the best courses of alternative equipment to be used in production.

EQUIPMENT INVESTMENT ANALYSIS

The analysis involves the consideration of cash flows pertaining to the capital equipment that will be bought and used throughout their lives. The model to be constucted to determine the best mixture of equipment should reflect:

1. The economic soundness
2. Ease of hanling even by those who are not so familiar with the experience of the problem. Here, our main concern is to deal with the problem in two approaches:

1. Model for profit maximization
2. Model for cost minimization

Model for Profit Maximization

There are two types of equipment with respect to efficiencies they provide:

1. Constant-efficiency equipment
2. Diminishing - efficiency equipment

First types of equipment are those which don't need maintenance or any other current costs during their lives. For example, light-bulbs. Lives of such equipment are estimated through life tests. The second type of equipment need maintenance expenses to prolong their useful lives. Their efficiencies , however, diminish until they are replaced by new ones. Anyway, whatever the type of equipment, the value of the investment in the equipment is given by the formula(18):

$$V : \int_0^t \left(R(t) - E(t) \right) e^{-it}\, dt + S(t) e^{-it} - B \qquad (3)$$

Where, V : Present value of the return on investment
t : Life of the equipment
R(t): Revenue function of the equipment with respect to time
E(t): Expense function of the equipment with respect to time
e : 2.71828, value of natural logarithm
i : Annual rate of interest
S(t): Salvage value at time t
B: Installation cost of the equipment

e^{-it} expression in (3) represents a continuous discounting at a compound interest rate , i, which is the minimum rate acceptable to to firm. We might use a discrete compounding instead of instantaneous, and revert (3) into:

$$V : \sum_{t:1}^{T} \frac{R_t - E_t}{(1+i)^t} + \frac{S_t}{(1+i)^t} - B \qquad (4)$$

However, the benefit of using continuous formula is the great convenience afforded by the use of integral. Furhermore, income [illegible] streams are continuous, not discrete.

To find the economic life , t, we take the derivative of (3) with respect to t and equate to zero. So,

$$\frac{dV}{dt} : \left(R(t) - E(t) \right) e^{-it} - iS(t)\, e^{-it} - S'(t)\, e^{-it} \; : 0$$

Or,

$$R(t) - E(t) - iS(t) - S'(t) \; : \; 0 \qquad (5)$$

By determining each function of t in (5) we can calculate t. The functions of t may take linear forms like :

$$R(t) \; : a - bt$$

Where, a is the beginning annual revenue,

$-b$ is the slope of the revenue. Since it is minus, it means that revenue decreases when t grows. This is normal for those equipment of diminishing-return type.

$$E(t) : a_1 + b_1 t$$

Where, a_1 represents the beginning operating and maintenance expenses,

$+b_1$, the slope of change of expenses when t grows.

$$S(t) : a_2 - b_2 t$$

Where, a_2 is the beginning salvage value

$-b_2$ is the slope of change in salvage value as time t changes.

However, in usual life it is rare for those functions to follow linear patterns, although they are assumed so in many cases for simplicity purposes. In some other cases, they are divided into multi-linear forms. They may take any form as likely to be exponential. Putting the functions in terms of t into their places in (5) and solving the formula in relation to t we find the economic life of the equipment. Then, putting the value of t in (3) or (4), the present value of the equipment is found.

Up to now we assumed one kind and one unit of equipment that will not be replaced at the end of its economic life, but the business will end up by shutting it down.

<u>A Chain of Machines</u> : If we assume a continuous business, therefore, an infinite series of equipment of the same type and power, (3) will be:

$$V : \left(\int_0^t (R(t)-E(t))e^{-it}dt - B + S(t)e^{-it} \right)(1 + e^{-it} + e^{-2it} + \dots)$$

The extreme right portion is a geometric series. So,

$$V : \left(\int_0^t (R(t)-E(t))e^{-it}dt - B + S(t)e^{-it} \right) \frac{1}{1-e^{-it}} \qquad (6)$$

And, (5) becomes:

$$R(t)-E(t)-iS(t)-S'(t)-\frac{1}{1-e^{-it}}\left(\int_{0}^{t}(R(t)-E(t))e^{-it}dt-B+S(t)e^{-it}\right):0 \quad (7)$$

If we write /6) in discrete form:

$$V:\left(\sum_{t:1}^{T}\frac{R_t-E_t}{(1+i)^t}-B+\frac{S(t)}{(1+i)^t}\right)\left(1+\frac{1}{(1+i)^t}+\frac{1}{(1+i)^{2t}}+\dots\right)$$

Or:

$$V:\left(\sum_{t:1}^{T}\frac{R_t-E_t}{(1+i)^t}-B+\frac{S(t)}{(1+i)^t}\right)\left(\frac{(1+i)^t}{(1+i)^t-1}\right) \quad (8)$$

If we take dV/dt in (7) and equate to zero, we find the economic life of the equipment. Then we substitude this value either in (6) or in (8) to find the present value of the equipment, assuming that each equipment will be replaced at the end of its economic life.

The same procedure applies for any kind of capital investment. If some of the alternatives are mutually exclusive, the highest present value yielding alternative is chosen. Instead of present value analysis of this kind, we might have referred to tabular presentations of investment analysis and solve the problem more easily. On the other hand, in the above analysis, we have assumed a fixed interest rate or cost of capital effective to the concern. This rate should be chosen correctly. Otherwise, the results would be wrong or misleading.

There is another method to be followed, which is through finding the rates of returns of technological investment alternatives. The greatest return indicates the right alternative to be selected. In this method the bias of not being able to assume the rate or interest fairly accurately is eliminated. But, it brings out some other limitations, such as burdening work to find the rate of return by trial and error procedure. After the rate of return r is found, it is compared with the opportunity cost of investment in the industry; if it is greater than that, the alternative is acceptable.

In the construction of profit maximization model there are, as we say, four variables:

1. Revenue function

2. Corresponding expense function
3. Salvage value function
4. Proper rate of interest

The accuracy of the model depends highly on the accuracy of those variables. Since all include risk in themselves, their accuracy is below 100% .

<u>A Cost Minimization Model</u> : If the revenues from several alternatives are the same throughout the years , then it is advisable to use this model and compare the alternatives only in terms of different expenses that they require. For a single alternative the cost function is

$$C : (B-S(t)e^{-it}) + \int_0^t E(t)e^{-it}dt \qquad (8)$$

Assuming again, that it will not be replaced afterwards. However, taking into consideration an infinite period throughout which the old equipment will be replaced by the new ones of exactly the same type and operating performance, and assuming that interest rate, i, will be the same, the cost model will be:

$$C : ((B-S(t)e^{-it} + \int_0^t E(t)e^{-it}\, dt) (1 + e^{-it} + e^{-2it} + \dots)$$

Since the far right portion of the equation is a geometric series,

$$C : ((B-S(t)e^{-it} + \int_0^t E(t)e^{-it}\, dt) \frac{1}{1 - e^{-it}} \qquad (9)$$

Taking dC/dt :0 to find the economic period for the capital good, we get the following expression :

$$E(t)+iS(t)+S^{1}(t) : \frac{i}{1-e^{-it}} ((B-S(t)e^{-it}) + \int_0^t E(t)e^{-it}\, dt) \qquad (10)$$

This expression means that, a machine should be replaced in that period when its expenses plus interest on its salvage value plus decline in salvage value are equal to the interest on the present value of all the future costs. Given that the subfunctions within this expression, t is found and substituted in (9) to find the present value of expenses. The alternatives are compared as to their present value of costs and the least present value indicates the alternative to be chosen.

Also we could have used a discrete model for this case, using the formula:

$$C = \left(B - \frac{S(t)}{(1+i)^t} + \sum_{i=1}^{t} \frac{E(t)}{(1+i)^t} \right) \frac{(1+i)^t}{(1+i)^t - 1} \tag{10}$$

Tables are available for each component in (10). If some of the alternatives require overhaul costs at certain times, then:

$$C = \left(B - \frac{S(t)}{(1\ i)^t} + \sum_{i=1}^{t} \frac{E(t)}{(1+i)^t} + \frac{M(t')}{(1\ i)^{t'}} \right) \frac{(1+i)^t}{(1+i)^t - 1} \tag{11}$$

Where, $M(t')$ is the overhaul cost function at time t'. If it is useful to find also the average annual returns or costs of investments it is necessary to multiply the V and C functions only by i, that is all.

<u>Make-or-buy Decision</u> : After having determined the technology vs. labor ratio and found out the alternatives to be selected within the technology, it is the right time to decide upon howmany of those technology equipment should be bought. This requires capitalization analysis, so that we determine the share of technology in our capital structure. Another point is, that a comparative analysis be made between the cost of the product or component our technology will produce during that given time, and the respective vendor prices of same goods. All other conditions being equal, given that the prices are lower, than it is better to buy. In this decision some other important intangible factors are involved like utilization of capacity, increasing labor quality, maintenance of labor, experience in the field of technology to be base for research and development, and what not; Although our cost will be higher than the vendor prices for some parts of goods, it might therefore be more beneficial to produce ourselves those parts as far as our long-term goals are concerned. The rest is the implementation of the model.

CONCLUSION

In this chapter we analyzed first, the factors of production availabilities as constraints to technology selection; then applied two deterministic models to find out the optimum technology with respect to total return or cost .

The final consideration was the make-or-buy decision on whether to buy-or-make certain parts of the product. Then we could determine the parts of the technology equipment accordingly.

In the next chapter we shall discuss how much the volume of the technology equipment would be in order to meet the total expected long-run demand in the market. This job is accomplished through size selection of the firm.

BIBLIOGRAPHY THESIS

ROBERT COLLEGE GRADUATE SCHOOL
BEBEK, İSTANBUL

PAGE

7. (See pp: 85)

8. (See pp: 85)

15. Jan Tinbergen, H.C. Bos
Mathematical Models of Economic Growth
McGraw - Hill Book C., Inc., 1962, London

16. James Brian Quin
Long-range Planning of Industrial Research
HBR- July-August 1961, V:39, N:4, USA

17. Ibrahim Özer Ertuna
Growth Implications of Sectoral Resource Allocation
University Microfilms Xerox C., Ann Arbor, Mich. 1969

18. Edward H. Bowman, Robert B. Fetter
Analysis For Production Management
Richard D. Irvin, Inc., 1957, Homewood Illinois

19. F. Bowman
Elementary Calculus
Longmans, G.B. , 1959

20. Management Review, American Management Association
Jan. 1967: Myran J. Hubler
Reviewing the Make-or-Buy Decision
Mar. 1967: Frank Lynn
Measuring Technological Change
Aug. 1967: Harris-Clichy Peterson
Finding Overseas Investment Opportunities
:OECD Observer
Technological Forecasting: What it is and What it does.

102. (See pp: 60)

CHAPTER V

SIZE SELECTION

INTRODUCTION

This chapter uses the decision tree approach through which an optimum size is selected.

Size is defined here as a function of capacity as well as the life of the investment. That is,

$$\text{Size} : \sum_{t:1}^{n} C_t$$

Where, t : period
n : total life of the investment
C_t : capacity of the investment at period t, measured in units of P/S

Thus the life concept introduced into the size selection problem involves two concideratlons:

1. Expected life of the investment
2. Depreciation method and rate of depreciation to be used as determinants of expected life.

SIZE SELECTION

For a decision on size selection a decsion tree (DT) approach will satisfy the decision maker. This approach follows the net present value analysis.

DT is a method of analyzing problems which involve a sequence of decisions. However, it is not an end in itself. It only helps management to consider things systematically, to analyze, interpret and decide upon them systematically. The problem involves risk, and DT does not eliminate it. The same probles worked out through DT approach may as well be worked out threugh other methods, but the essence in the tree fashion is that it is neat, brief to the point, analytical and precise. The degrees of risks change according to types of the variables. There may be some chance variables which are completely beyond our knowledge, and that we can only assign random variables for them and handle through Monte Carlo approach.

One of the characteristics of DT is the "rollback" principle applied to come to the final decision. That is , we start from the end variables and move back to the initial decision point.

If the problem involves a lot of variables, then, the tree will be large and computation will also be long. Nevertheless, computer will help. With the computer, it will even be possible to make sensitivity analyses on the variables of the investment. If some of the variables are very sensitive to changes of other variables, then, a further research or study may be necessary to narrow the limits of sensitivity or to widen the limits of certainty . For that study, a bayesian approach, with posterior probability calculation, may be utilized.

Let us go through an example which classifies in detail all the relevant aspects of the size selection problem faced in the enterprise selection decision. The approach in DT is the following:

1. Select the alternative sizes
2. Determine the capacities of production for each size
3. Specify most probable states of nature : chance events
4. Estimates their probabilities
5. Find the respective returns from each event
6. Find the projected amounts of expansion investments
7. Initiate the DT
8. Find the expected values per period
9. Find the present expected values using the rollback.
10. Select the optimum size
11. Determine the expected life of the selected plant
12. Determine the depreciation method to be applied

Let us work out these steps :

1. Management decides, as it is appropriate, to select three alternatives:

	Decision alternatives	TI. Initial investment
a1	B-BP : Build-big plant	3 000 000
a2	B-MP : Build-medium plant	2 000 000
a3	B-SP : Build-small plant	1 000 000

2. Capacity Determination is merely affected by the size of the selected technology. It is easy, therefore, to calculate the capacity in units of products per period.

Some terminology:

- Cc : 100% capacity if the process does not stop at all
- Cs : Standard capacity, normal for a given technology in a well organized and managed plant taking into consideration normal stops, representative of the technology as it is actually used.
- Es : Cs/Cc : Standard efficiency of production
- Pa : Actual production volume
- Ea : Pa /Cc : Actual efficiency

A logical criterion to find the standard production capacity, Cs, per period is the determination of an equality between expected average of long-term aggregate sales and the net finished goods inventory level for the same period (56).

By definition, in optimum case:

$$J(T) : \int_{0}^{T} (Cs - EX(t))dt : 0 \qquad , (0 \leq t \leq T)$$

$$J(T) \geq 0$$

Where,

- Cs is the standard capacity of production per period t
- J(T) is the expected finished goods inventory level at T
- EX(t) is the expected aggregate sales rates as a random process per period .

From the above formula we can find that when J(T) : 0,

$$Cs : 1/T \int_{t:0}^{T} EX(t)\, dt$$

By using this formula we can find the standard production capacities per year for each alternative size. The result in our example is as follows :

ai	Tl. Il	Cs/year in units of P/S
a1	3 000 000	4 000
a2	2 000 000	2 200
a3	1 000 000	1 000

3. Most probable states of nature

H-D : High Demand
M-D : Medium Demand
L-D : Low Demand
HH-D : Initially and subsequently high demand when two decisions are involved fo[illegible]ing each other
HL-D : Initially high , subsequently low demand
LL-D : Initially and subsequently low demand
LH-D : Initially low and subsequently high demand

4. Probabilities of those events

. The more comprehensive research carried out for the reliable estimation of probabilities the better it will be . If a research team is assigned for that study its cost also enters into the proble as cash outlay. The estimated probabilities for chance variables may be as follows:

Build-Big-Plant, B-BP : H-D : 50%
HL-D : 20%
M-D : 20%
L-D : 10%

1.0

Building-Medium-Plant , B-MP : H-D : 70 % (50%+20% total initially H-D)
M-D : 20 %
L-D : 10 %
Expand the plant if it is initially H-D, then:
H-D : 70% (50%/70% or H-D/Total initially H-D)
L-D : 30% (20%/70% or $\frac{70-50}{70}$)
Nonexpansion (NE)
H-D : 70%
L-D : 30% as above.

Build small plant, B-SP : M-D : 20%
L-D : 10%
H-D : 70% (H-D+ HL-D)
1.0
Expansion:
H-D : 70%
L-D : 30%

Noassumptions:
H-D : 70%
L-D : 30%

5. Return from each event

Notations:

ai : Initial investment
Cs: Production capacity /year in units
F.C./U: Fixed cost per unit at Cs
V.C./U: Variable cost per unit
T.C./U: Total cost per unit at Cs

Tableau:

CHART XXXV

ai (Tl.)	Cs (un.)	At standard capacity				
		F.C./U	V.C./U	T.C./U	Price/U	Profit/U
3 000 000	4 000	375	500	875	1 100	225
2 000 000	2 200	450	500	950	1 100	150
1 000 000	1 000	500	500	1 000	1 100	100

Calculations:

First column : We know from step 1
Second column: " " " " 3
Third column : For small-size plant, a 500 Tl. fixed cost per unit (overhead/unit) is assumed. Fixed costs for the other sizes have been calculated as follows:

$$450 \text{ Tl.} : 500 \times \frac{2\ 000\ 000 \times 1\ 000}{1\ 000\ 000 \times 2\ 200}$$

$$375 \text{ Tl.} : 500 \times \frac{3\ 000\ 000 \times 1000}{1\ 000\ 000 \times 4\ 000}$$

Fourth column : 500 Tl. variable cost per unit is assumed for all sizes. It is direct material cost plus direct labor cost estimated.
Fifth column: 3rd plus 4th columns
Sixth column: The price for the product is given as dominant in the market. It is further assumed that it will not change throughout the time.
Column seven: Column 6 minus column 5

After having found the unit profits for each size of plants the next thing to do is to calculate the total profits. The following chart (chart XXXVI) will do that. Where:
Column 1 is given from step 4
Column 2 :

a. 4000units /year x 225 Tl/unit : 900 000 Tl. /year profit
b. For the first two years the demand is estimated as high
c. 4 000 x 375 / 2 200 : 682 Tl fixed cost/U at M-D of 2 200 units. 682+500 : 1 182 is the total cost /U at M-D.
1 182 x 2 200 : Tl. 2 600 400 , total cost of 2 200 units.
1 100 x 2 200 : Tl. 2 420 000 , total sales of 2 200 units.
2 600 400 - 2 420 000 : Tl. 180 400 , total loss.
d. 4 000 x 375 / 1 000 + 500 : 2 000 Tl. , T.C./U
2 000 x 1 000 : 2 000 000 Tl., T.C. for 1 000 units
1 100 x 1 000 : 1 100 000 Tl., total revenue from sales of 1 000 units .
2 000 000 - 1 100 000 : 900 000 Tl., total loss from 1 000 sales .

Column 3 :
a. 2 200 units /year x 150 Tl./unit : 3 300 000 Tl./year profit.
b. Same 3 300 000, since the demand excedes the production volume.
c. Same 3 300 000
d. 2 200 x 450 : 990 000 Tl. total fixed cost/U for a2 at full Cs.
990 000 /1 000 : Tl. 990 , F.C./U at L-D
990 + 500 : Tl. 1 490 , T.C./U
1 490 x 1 000 : Tl. 1 490 000 , T.C. for 1 000 units.
1 100 x 1 000 : Tl. 1 100 000 , total earnings from 1 000 sales.
1 490 000 - 1 100 000 : Tl. 390 000 , total loss at L-D

Column 4:
a. 100 Tl./U x 1 000 U/year : 100 000 Tl. / year profit
b. Same
c. Same
d. Same, since the demand excedes all the production.

Column 5:
a. Same as column 2
b. During the next six years, L-D occurs. Therefore, Tl. 900 000 loss for 1000 units demand as in column 2.
c. Same as in column 2
d. Same as in column 2

Column 6:
a. Expansion takes place. It is assumed that some of the other firms also enter the field, thus, reducing the total profit to: 900 000 -100 000 : Tl. 800 000.

d. 100 000 more loss due to competition: Thus,
900 000 + 100 000 : 1 000 000 Tl.

CHART XXXVI

	Si	Cs(U)	3rd and 4th years annual profit(Tl.)			Annual profit next 6 years				13-NE
			a_1	a2	a3	a_1	a2-E	a2-NE	a3-E	
a	H-D	4000	900000	330000	100000	900000	800T.	300 T.	700T.	100 000
b	H/L-D	4000/ 1000	900000	330000	100000	-900T.	-	-	-	-
c	M-D	2200	-180400	330000	100000	-180400	-	-	-	-
d	L-D	1000	-900000	-390000	100000	-900000	-1 M	-400T	-1M.	100 000
Columns:	1		2	3	4	5	6	7	8	9

(E: Expansion
NE: Nonexpansion)

Column 7:

a. A slight decline from Tl. 330 000 profit due to entries.
d. Again a small change assumed. Expansion from M-P to B-P is taken as one year.

Column 8:

Expansion from SP to BP takes 1 year.
a. A 900 000 - 200 000 : Tl. 700 000 profit: A pessimistic behaviour.
d. Same as column 6

Column 9:

As column 4

6. Expansion Investments

For expansion from medium plant (MP) to big plant(BP):

0	Years	4
-3 000 000		
-(-2 000 000)		S

$$C : \frac{-1\ 000\ 000}{S_{\overline{4}|14\%}} : -1\ 000\ 000/.592$$

: ~~-1 700 000~~ T.

Tl. 1 700 000 are required in the fourth year to expand the business. For expansion from small plant (SP) to BP :

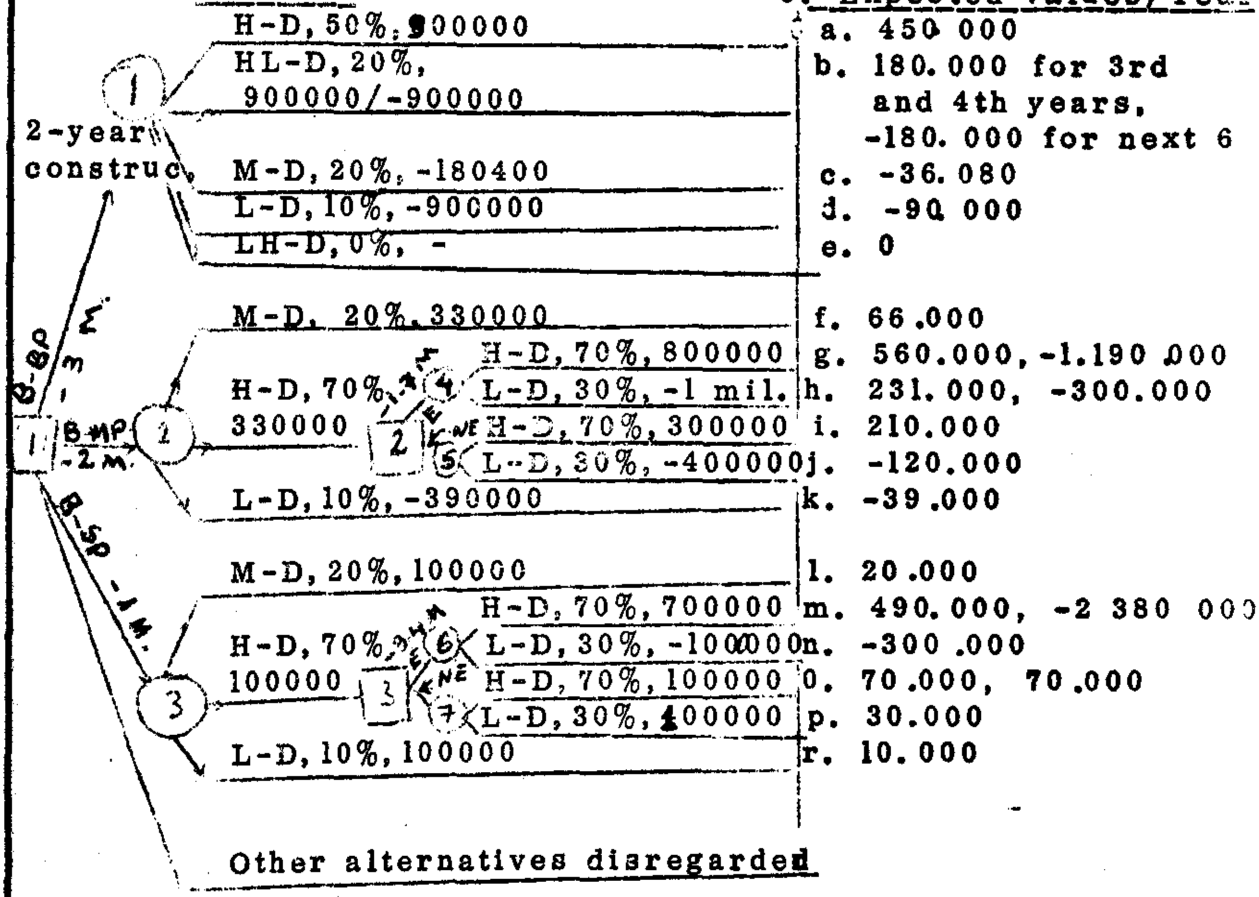
0 Years	4
-3 000 000	
-(-1 000 000)	

§ $§ : \frac{-2\ 000\ 000}{S_{\overline{4|}14\%}} : -2\ 000\ 000/.592 : \text{Tl. } 3\ 400\ 000$

Tl. 3 400 000 are required to expand the business in the fourth year. Here, we used 14% discount rate, assuming that the business is very risky.

7. DT

8. Expected values/Year



DECISION TREE

CHART XXXVII

9. Calculation of expected present values of alternative decisions:
(Tj: period, figures are in Thousands of Tl.)

B P :(Build Big Plant)

BP

1	Tj:0	1	2	3	4	5	6	7	8	9	10	...
a	-3000	0	0	450	450	450	450	450	450	450	450	
b	-3000	0	0	180	180	-180	-180	-180	-180	-180	-180	
c	-3000	0	0	-36	-36	-36	-36	-36	-36	-36	-36	
d	-3000	0	0	-90	-90	-90	-90	-90	-90	-90	-90	
T:	-12000	0	0	504	504	144	144	144	144	144	144	

Total expected present value -big plant (TEPV-BP) :
-12000+(504 x 1.647 x 0.769) + (144 x 3.889 x 0.456) :
-11,105

MP - E

2	Tj:0	1	2	3	4	5	6	7	8	9	10	...
f.	-2000	0	0	66	66	66	66	66	66	66	66	
g	-2000	0	0	231	231 -1190	560 0	560	560	560	560	560	
h	-2000	0	0				-300	-300	-300	-300	-300	
k	-2000	0	0	-39	-39	-39	-39	-39	-39	-39	-39	
T:	-8000	0	0	258	-932	258	287	287	287	287	287	

TEPV-MP with expansion : -8000+258 x 0.675 - 932 x0. 592
+ 258 x 0.519+ 287 x 3.433 x 0.519
: - 7,733

MP-NE

3	Tj:0	1	2	3	4	5	6	7	8	9	10	..
f	-2000	0	0	66	66	66	66	66	66	66	66	
i	-2000	0	0	231	231	231	210	210	210	210	210	
g	-2000	0	0				-120	-120	-120	-120	-120	
k	-2000	0	0	-39	-39	-39	-39	-39	-39	-39	-39	
T	-8000	0	0	258	258	258	117	117	117	117	117	

TEPV-MP/NE : -8000+258 x 2.332 x 0.769+117 x 3.433 x 0.519
: - 7,329

SP-E.: Small Plant with expansion

T	: 0	1	2	3	4	5	6	7	8	9	10
l	-1000	0	0,	20	20	20	20	20	20	20	20
m	-1000	0	0	70	70	70					
					-2380	0	490	490	490	490	490
n	-1000	0	0				-300	-300	-300	-300	-300
r	-1000	0	0	10	10	10	10	10	10	10	10
T	- 4000	0	0	100	-2280	100	220	220	220	220	220

TEPV-SP-E :.-4000+100 x 0.675 -2280 x 0.592 +100 0 0.519
+220 x 3.433 x 0.519

: - 4,833

SP-NE

T	: 0	1	2	3	4	5	6	7	8	9	10
l	-1000	0	0	20	20	20	20	20	20	20	20
o	- 1000	0	0	70	70	70	70	70	70	70	70
p	- 1000	0	0				30	30	30	30	30
r	-1000	0	0	10	10	10	10	10	10	10	10
T:	- 4000	0	0	100	100	100	130	130	130	130	130

TEPV-SP-NE : -4000+100 x 2.322 x 0.769+130 x 3.433 x 0.519

: - 3,589

Recapitulation:

Alternative decisions	TEPV
1 . BP	Tl-11,105,000
2 . MP-E	Tl-7,733,000
3 . MP- NE	-7,329,000
4 . SP- E	- 4,838,000
5 . SP- NE	- 3,589,000

OPTIMUM SIZE SELECTION DECISION

The result of the DT analysis reveals that the optimum size si small plant with no expansion in later years. The comparison of alternative decisions shows also that the most disadvantageous alternative is build big plant, with corresponding figure (-11,105,00), although it has indicated highest profit per unit as we remember.

The resulting expected present value figures are all minus, not to imply that all the alternatives result with losses. Those TEPV figures should be considered only for comparative purposes The reason for this is that we did not take the whole lives of the investments into account, but we wanted only to be content with a length of period so as to enable us to have a fair comparison between the decision alternatives. The length of life for the alternative sizes that we used here was 10 years. Nonetheless, the benefits in the given example are very low. See that, return of investments vary from 1% in B-BP to about 4% in B/SP-NE. On the other hand, the assumed rate of interest, 14%, is a high percentage which indicates that the business is very risky.

As far as the undertaken period of 10 years is concerned, we did not go beyond that, because:

1. Choosing 10 years was sufficient to compare the alternatives
2. Or, we might have no idea or estimate upon the events that would be expected to occur after 10 years
3. Also, we might have forecast that no change would occur after 10 years.

EXPECTED LIFE

Expected life of the plant however is not 10 years, but more, In our earlier discussions we have assumed perpetual life for some investment alternatives for the reason of simplicity and as requirement of perpetual business goal. Here we shall discuss how to find what the exact life of the plant with all its components could be until it is scrapped.

The composite life of a plant is defined as the time in which the total annual depreciation charges for the plant would amount to the total depreciation value, when accumulated at an assumed rate of interest. The depreciable value is the wearing value which is equal to purchase value minus scrap value. The problem is to determine the composite life of the plant composed of several parts having different probable lives. These parts are the installation facilities, the building itself, machinery and equipment, etc. We know their probable lives and depreciation rates individually. For official depreciation purposes there are official rates , and for business purposes we may set up different rates which fit better to our policies. The problem is how to find the composite life of the entire plant. Let us develop the model(34):

According to the definition :

$$W : S_{\overline{n}|} D \qquad (17)$$

Where, W denotes the total wearing value

$S_{\overline{n}|} : \dfrac{(1+i)^n - 1}{i}$, denotes the coefficient which

brings the annual depreciation charges to the present value.
D denotes the total annual depreciation charge
i is the assumed rate of interest for discounting.

If we put the value of $S_{\overline{n}|}$ into (17) :

$$W : \frac{(1+i)^n - 1}{i} \times D$$

Or,

$$(1+i)^n : 1 + \frac{Wxi}{D}$$

Solving for the exponent , n,

$$n : \frac{\log\left(1 + \frac{W}{D} i\right)}{\log(1+i)}$$

Putting D/W : d , rate of depreciation, the formula then becomes:

$$n : \frac{\log\left(1 + \frac{i}{d}\right)}{\log(1+i)}$$

Where, n is the expected life of the entire plant.

Let us apply the formula to our DT model. There we had i : 14%. Assuming also that D/W : d , say, is 7%, then, substituting,

$$n : \frac{\log\left(1 + \frac{.14}{.07}\right)}{\log\left(1 + .14\right)}$$

$$: \frac{\log 3}{\log 1.14}$$

$$: \frac{0.47712}{0.05690}$$

$$: 8.5 \text{ years}$$

If we had taken d: 2% , n would be 117 years. The rate of depreciation affects the life considerably.

DEPRECIATION METHODS

They are several, o which,

a . Straight line depreciation
b . Double declining balance depreciation
c . At one time, passing from b to a

may be applied in Turkey . By passing over from b to a at a suitable time, we want to get use of more depreciation charging to previous years so as to increase cost and reduce tax charges in earlier years.

CONCLUSION

P/S vs. technology vs. portfolio of investments vs size are the prerequisite variable components of an optimum enterprise mixture. Probabilities assigned to the variables of each componen should coincide. Some will be independet, sone dependent, and still some, mutually exclusive. However, the solution of one variable should not contradict the solution outcomes of the others. If so, then, there will be either of the following:

a. Error in our assumptions
b. Mistake in probabilities
c. Inconsistency in the applied method or model
d. Errors in the information obtained.

BIBLIOGRAPHY

8. (See pp : 83)

22. William A. Spurr, Charles P. Bonini, "Statistical Analysis for Business Decisions," Richard D. Irwin, Inc., Illinois. 67

34. Ernest Brown Skinner, "The Mathematical Theory of Investment", Ginn and C., Boston, 1913

51. John F. Magee
Operation Research in making Marketing Decisions
Journal of Marketing, October 1960, USA

52. James S. Cross
Operation Research in Solving a Marketing Problem
Journal of Marketing , January 1961, USA

53. Charles C. Slater
The most Profitable market share Objectives
Journal of Marketing, 1961 April, USA

54. Alâeddin Güneysu
Small Scale Industries and Industrial Growth
METU-1964, Bulletin of Faculty of Administrative Sciences

55. John F. Magee
Decision Tree for Decision Making
HBR, July-August 1964, V: 42, NO : 4

. How to use Decision Trees in Capital Investments
HBR, September-October, 1964, V :42, No: 5

56. David A. Wismer
On the Use of Industrial Dynamic Models
OR- v:15, 1967

57. C. M. Cannon
The Limited Application of Minimum Profitability Requirements to Capital Expenditure Proposals

. H. Martin Weingartner
Criteria For Programming Investment Projects Selection

The Journal of Industrial Economics, V:XV, 1966

58. Joel Dean , "Measuring the Productivity of Investment in Pursuation"

. Morris Silver, " Managerial Discretion and Profit ~~Maximization Behaviour: Some Further Comments~~
~~The Journal of Industrial Economics, V: XV, No:2/3, 1967~~

CHAPTER VI

LOCATION SELECTION

INTRODUCTION

EVOLUTION OF PLANT LOCATION THEORY

OPTIMALITY MODEL
COST MODEL

PRACTICAL APPROACH

NON-COST FACTORS
COST FACTORS
PURELY PERSONAL PREFERENCES

CONCLUSION

BIBLIOGRAPHY

INTRODUCTION

Plant location (PL) problem is a dynamic process, which, after being solved will have a static effect -depending on the degree of optimality of selection- on the benefits of the business, continuing until the end of the operations at the location. It is not a general but a specific problem to be solved as to the type and size of the business involved. It is not merely a cost problem, but also a problem having intangible considerations related to the community and personal preferences of the owners themselves.

In this chapter, the problem of location selection is started with an overview of its theory. Then two models are defined : optimality model, and cost model. The first one explaines the conditions for optimality in location selection. The second one constructs the cost structure of the optimum location.
However, these models are prescriptive. Therefore, to give a descriptive feature to the location selection problem, a practical approach is applied to a particular case. This approach involves non-cost, cost, and purely personal factors affecting the decision on location selection.

EVOLUTION OF PLANT LOCATION THEORY

The origin is Germany. The forrunners Launhardt, von Thünen, Sombant and especially Weber, assumed pure economy in their theories, where there was a big market and all the sellers were scattered around. Prices and qualities of goods were the same. Rules of pure competition took place. The seller who was the nearest to the market would have the least cost of freight and therefore the least total cost, which in turn would result in the highest return. Such sellers were considered to have the best plant location (PL) in the market.

They considered the PL problem as cost problem only, Because, demand was assumed to be infinite.

Weber went further, and established his imperfect competition model. There, he classified cost factors into three groupings (60, 62) :

1. Transportation cost
2. Labor cost
3. Agglomeration effect (proximity to auxiliary industries)

Bering in mind these three costs, the proposed business has to be located near at least one of the followind sources:

a. Raw material and energy source
b. Labor supply source
c. Consumer supply source

The first source gains more importance when the raw material used loses much from its weight when it becomes finished good. For example, iron and steel and cement factories are located very close to the raw material supply source. It is known that to produce 1 ton of steel , 2 tons of iron ore and 2 tons of coal are required (62). When the business is labor intensive and requires skill, then a crowded and trained community is needed. If the good is a final good, the factory should be as near to the population center as possible.

Later on came two approaches which may be considered as one theory since they assume the same things. They were "market area" and "locational interdependence" approaches. Among forrunners, Hoover, Hanger, Hammer, Christiansen, Solomon and August Lösch can be mentioned.

They assumed seperate market gatherings. Each of the markets was penetrated by a seller who loaded its monopoly over that area. Costs and prices would change according to demand and economies of scale. Demand was limited. So, it became a demand factor that had a great effect on PL.

They analyzed the problem using the following three criteria:

1. Elasticity of demand
2. Slope of the marginal cost curve
3. Amount of the freight cost.

The demand for the output of the supplier was accepted as a variable factor governed by location of competitor. Supplier tried to maintain its control on its buyers.

We must admit that Weber has also assumed implicitly the existence of demand factor, but the assumption of its infinity has not created any restriction to the problem (62).

Still, we can introduce a third approach by including both demand and cost factors into the analysis and presenting them as coordinates on the cost vs. demand graph (chart X XXVIII). There, P' represents the delivered cost function of the firm which is disadvantageously located. P is the function of effectively located firm. The left-hand side of the functions imply that unfavorably situated firm will probably have more advantage of its location at low sales than the other firm. The right-hand side (to the right of the intersection) however, will favor the firm at the optimum location. This favorability may be due to :

1. Different modes of transport
2. Freight rate system.
3. Number of buyers, as well as,
4. Amount of sales.

OPTIMALITY MODEL(60)

Notations:

L : Location
R : Total revenue
C : Total cost
Ca: Average cost
S : Sales volume
P : Unit price
t : Period
n : Total period of operation of business in given L

Formulas:

$$L : f(R-C)$$

Subject to:

$$C : \phi(S \times Ca)$$

$$R : \phi(S \times P)$$

When dR : dC , there is locational equilibrium, that is, optimality in location selection is secured. Generalizing this logic, it should be that :

$$\sum_{t:1}^{n} P_t S_t - \sum_{t:1}^{n} Ca_t S_t : 0$$

to obtain the optimality.

COST MODEL[x]

x This model heavily depends on the algorithm developed by Kurt Spielberg in his article (65).

Notations:

m : Number of plants which produce the same P/S
n : Number of consumers that the P/S is distributed to
ni: Number of customers whose demands are supplied by plant i
i : The particular plant
j : The given customer
dj: Demand of the customer j (sink j)
Zi: Cost associated with the plant i (source i)
Ai: Total amount shipped from source i
Aij: Amount shipped from source i to sink j
Yi: State whether the plant is built or not
Sij: Unit shipping cost from source i to sink j
fi: Total cost of source i (construction cost plus production cost)
Ui: Production capacity of source i

Conditions:

There is one P/S

$1 \leq i \leq m$

$1 \leq j \leq n$

Zi : 0 when source i is not built

$$Ai : \sum_{j:1}^{n} Aij$$

Yi : 1 when plant is built
Yi : 0 when plant is not built.
Yi : 0, 1
fi : 0 when plant is not built
Zi : fi when Yi : 1
Zi : 0 when Yi: 0

$0 \leq Zi \leq fi$

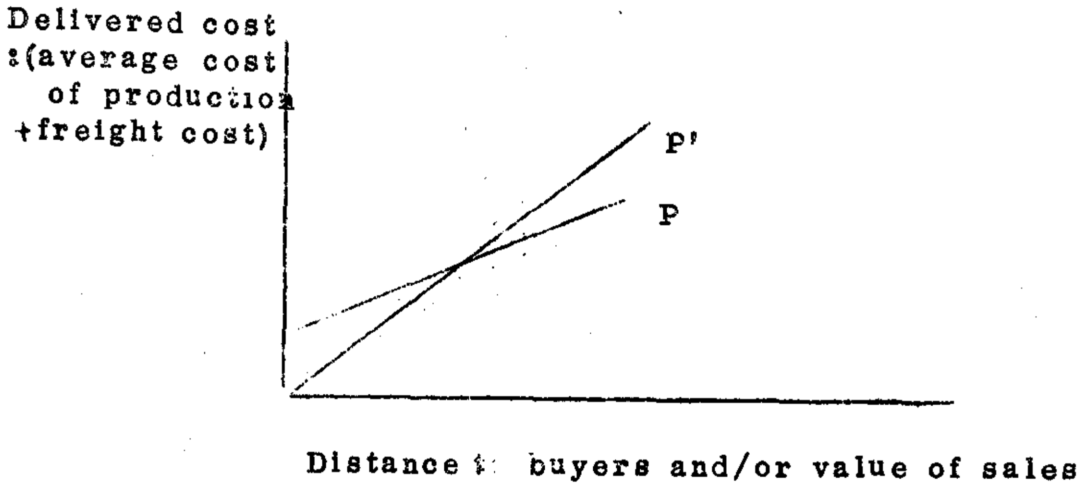
Formulation:

Objective function:

$$\text{Minimize } Z : \underbrace{\sum_{i,j}^{m,n} Sij\ Aij}_{\text{Total cost of shipment}} + \underbrace{\sum_{i:1}^{m} fi\ Yi}_{\text{Total FOB cost}}$$

Subject to :

CHART XXXVIII



$$\sum_{i=1}^{m} Aij = dj$$

$$\sum_{j=1}^{n} Aij \leq Yi\ Ui$$

$$Aij \geq 0$$

And above mentioned conditions.

Revision:

Put $Xij = Aij / dj$, meaning that the shipment from source i to sink j is a fraction of the total demand of j. Assuming that, i either supplies all what j needs or it does not supply j at all, thus,

$$Xij = 0,1 \text{ only. Then,}$$

$$\sum_{j=1}^{n} Xij \leq Yini$$

Put also Cij : Sij.dj, meaning that , that is the total shipment cost for the total demand of sink j if it were supplied by ... source i only. Then the whole model will take up the following linear programming form:

$$\text{Min. } Z : \sum_{i,j}^{m,n} Cij.\ Xij + \sum_{i:1}^{m} fi.\ Yi$$

Subject to:

$$\sum_{i:1}^{m} Xij \ : 1 \qquad (j : 1, 2, \ldots, n)$$

$$\sum_{J:1}^{n} Xij \leqslant ni.\ Yi \qquad (i : 1, 2, \ldots m)$$

$$Yi : 0,1$$
$$Xij \geqslant 0$$

As a consequence, optimal solutions may in general associate more than one supply plants with a given customer j. Evidently, for fixed Y, the linear programming problem is a transportation problem . As some of the routes may be prohibited (when Cij : L, where, L is assigned a prohibitively large cost), however, the transportation problem may or may not give a feasible solution.

We have included into the analysis only the cost and demand factors which could rationally be measured. What if irrational factors had to enter the analysis? In this case , the above model will have a partial fulfillment in the selection decision. There is a practical and widely used approach , which does not even need computer's help, taking into consideration all tangible and intangible features of the PL problem.

PRACTICAL APPROACH

Steps to follow :

I- Establish the committee which will deal with this problem. The responsibility of the committee rests upon the strategies involved. Either one of the following strategies could be utilized:

1. Location selection (LS) for entirely new plant
2. LS for expansion of the business
3. New location selection for an old business.

Difficulty of optimal solution goes down as we go from (1) to (3). However, the committee will go in the same analytical procedure to get the result, in all cases.

II- Establish the selection criteria (requirements for the new plant).

The location of any firm depends upon several factors which can be classified in various ways. One way can be :

1. Primary factors
2. Secondary factors

Primary factors are the factors without due consideration on them, locating the plant somewhere does not give optimum solution. Secondary factors are of lesser importance. An other way of classification is:

1. General factors (which relate to regional forces)
2. Specific factors (which relate to the location itself).

Another way :

1. Non-cost factors
2. Cost factors
3. Purely personal considerations of the owners.

We shall utilize more of those factors a few steps below. To find out these factors, some sources of information for PL analysis may be listed as follows:

- Newspapers
- Architects and engineers
- Departments of electricity, gas, water
- PTT
- Civic officials
- Municipality
- Chamber of commerce, industry
- Consultant bureaus
- Firms
- Real estate brokers
- Tax department
- Trahsportation agencies
- Gowernment
- Statistical publications , reports

III- Select the general area (region) for the new plant.

The region is where most of the requirements , especially primary requirements, for the new PL are satisfied.

IV- Screen the communities within that area.
Select, if applicable, the community whereby there is a heavy consentration of the primary PL factors.

V- Compare the alternative communities and select one.
The one which offers the optimum combination of favorable factors, is selected.

VI- Select a site within the chosen community.
The site which gives the maximum profit, minimum cost, optimum personal and costomer satisfaction, is where the plant should be constructed.

VII - Construct the plant
This is the subject of a next chapter.

On chart XXXIX we put all possible but general factors under the analysis and tried to come to a synthesis which will enable us to decide on the optimum PL alternative.

Plant can be built either within or outside the country. In both cases, application of the procedure does not change, however, as to foreign country-alternatives, certainty of data must be higher.

Chart XXXIX presents non-cost factors, their relative weights to the proposed company, and their ratings among the alternative communities. The last three columns show the weighted ratings of non-cost factors. The total of those columns indicate that, town B has the most advantageous position for the PL as far as non-cost factors are concerned.

CHART XXXIX

NON-COST FACTORS

Weight :
1 : Less important
2: Moderately important
3: Highly important
4: Extremely important

Rating:
0 : No value
1 : Poor
2: Good
3: Best

W.	Non-cost factors	Town A	Town B	Town C	Weighted Rating A	Weighted Rating B	Weighted Rating C

(Continues)

(Continued)

W_2	Non-cost factors	A	B	C	A	B	C
4	Characteristics of the surrounding territory - Terrain - Elevation -Flood hazards -Volcanos - Availability to the industry	1	2	3	4	8	12
3	Climate - Temperature - Minimum - Maximum - Length of seasons - Winter - Summer Precipitation - Humudity - Wind and direction - Smog	1	1	2	3	3	6
3	Availability of transport media - Railways - Highways - Waterways - Airports	1	3	2	3	9	6
2	Existing transport facilities - Trucks - Busses - Train - Ship - Cargo	2	2	2	4	4	4
2	Civic administration - Police - Fire - Municipality services - Sewerage Garbage disposal - Hospitals - Judiciary	3	2	2	6	4	4

(Continues)

(Continued)

W.	Non-cost factors	A	B	C	A	B	C
4	Company image	3	2	2	12	8	8
1	Standard cost of living	2	1	3	2	1	3
3	Housing availabilities - For sale - For rent - Comfort	1	1	2	3	3	6
4	Energy availability						
	- Power - Strength - Service of supply - Reliability of " - Adequacy of " - Kind of service - Seasonal restrictions	2	3	1	8	12	4
0	- Coal	-	-	-	-	-	-
2	- Gas - Natural/Artificial - Quality - Quantity of supply - Service of " - Reliability of " - Adequacy of "	2	2	1	4	4	2
3	Water - From city mains - From rivers - From wells 1. Volume 2. Quality 3. Chemistry 4. Service facilities 5. Reliability of service 6. Accuracy of service	3	2	3	9	6	9

(Continues)

(Continued)

.W	Non-cost factors	A	B	C	A	B	C
2	Competitors - Number - Size - Efficiency - Average number of employees - Average wage rate - TYpe fo manufacture - Competition - When have they come to the town? - When/why they moved from the town?	1	2	2	2	4	4
1	Banks and loan institutions - Number - Interest rates Capacity	1	1	1	1	1	1
1	Schools - Common - Technical - Commercial - Administrative	2	3	2	2	3	2
2	Recreational facilities - Sports - Parks - Cinemas, theaters - Swimming pools	1	1	1	2	2	2
2	Social facilities - Mosques - Libraries - Newspapers - Restaurants - PTT - Hotels	2	1	2	4	2	4
1	Population growth	2	2	2	2	2	2

(Continues)

(Continued)

4	Labor availabilities - Total employment - Total unemployment - % unionized - 1. Skilled male 2. Skilled female 3. Unskilled male 4. Unskilled female - Past history of disputes - Turnover - Educational level - Efficiency /productivity	3	3	1	12	12	4
4	Staff availability - Engineers - Administrators - Managers - Officials 1. Number 2. Turnover	2	3	2	8	12	8
2	Construction material - Resources - Volume - Construction labor availabilities - Proximity of resources	2	2	3	4	4	6
3	Social factor - Political - Cultural - Religious	0	3	0	0	9	0
	TOTAL RATING	37	41	39	95	113	97

Chart XL shows the analysis of cost factors. 1 year is taken as base period. The "requirement " column figures have been calculated considering prospective sales volume and size of the company. Prices should be comparative. The last three columns cover the total costs for each cost factor. The totals of those columns give us the amounts of annual costs of the alternatives. Since town C has the least total annual cost, it has the most advantageous position. But, according to the first chart (XXXIX) we have found that town B has been the best. So what to do? In those cases, the third criterion other than non-cost and cost criterion, "personal preferences" takes over an important function. It is the utility that non-cost and cost factors will give to the decision committee. If the committee is money-conscious then it selects the town C. If it were not Tl. 1,621,000 and 2,193,000, but instead, only Tl. 162,100 and 219,300 respectively, then, utility of plant B might have been more to the committee, since the difference would have meant nothing considerable.

We can propose another way to find a solution: From chart XXXIX we see that the higher the total non-cost rating of an alternative, the better it is. From chart XL, the smaller the total cost, the better. So, if we divide the total cost column by the corresponding total non-cost rating columns, we get ratios. The smaller the ratio, the better it is. The row "cost factor / rating non-cost factor" points to this fact and reveals that plant C is still the optimum location to be chosen. But it is true also that it does not give always correct result. One should be careful.

After having determined

a. Non-cost factors
b. Cost factors
c. Personal preferences and found the optimum

community, the next step and the final one is to select the site where the plant will actually be erected. The same but a smaller analysis than that of community selection is required. Some of the factorial considerations may read as follows:

1. Acreage
2. Proximity to main roads
3. Elevation
4. Foundation
5. Accessability to
    - power lines
    - Gas lines
    - Water mains
    - Resources
6. Sewerage
7. Wind direction

8. Sunny side
9. Nearness to transportation facilities
10. Locatio n in the town
11. Fire protection facilities
12. History of flood
13. Beauty of scene, etc.

CHART XL

COST FACTORS

Cost factors	Price (Tl. /U) A	B	C	Requirements per year	Total cost (Tl. '000) A	B	C
Tax rate (% gross profit per year)	40%	40%	35%	500.000 Tl.	200	200	175
Average wage rate(Tl. /Hr.)	3.0	3.20	2.80	200 000 Hr.	600	640	560
Energy cost							
-Power(Tl. /Kw	.20	.25	.30	1 000 000 Kw.	200	250	300
-Gas (Tl. /Lt	.50	.50	.60	100 000 Lt.	50	50	60
Water (Tl. /Ton)	.90	1.0	1.0	1 500 Tons	1	1	2
Average salaries	2000	18.00	2500	30 staff	60	54	75
Land rent (Tl. /a)	[illegible]	3000	1500	200 acres	400	600	300
Raw material co							
- X	18.	20.	20.	400 Kg.	72	80	80
-Y	2.	2.	2.20	3 200 Kg.	6	6	7
- Z	.40	.50	.60	5 400 Kg.	2	3	3
- Q	.50	.50	.40	1 300 Meters	1	1	1
Average rent for housing(TL/Y)	6 000	6500	4750	4 families	24	26	19
Construction material							
- Stone	150	170	100	[illegible]0 trucks	15	17	10
-Cement	10	10	10	[illegible] sacks	2	2	2
-Sand	100	80	50	220 trucks	22	18	11
- Iron	2.25	2.35	2.55	10 000 Kg.	23	24	26

(Continues)

(Continued)

Cost factors	Million Km.			Price/Km.-U.	Total cost (Tl.'000)		
	A	B	C		A	B	C
Transportation cost	5.0	4.4	6.0	.05 Tl./Km-U	250	220	300
Special cost (Bridge fare)				10 000 Tl/Year	10	0	0
TOTAL ANNUL COST					1938	2193	1621
Total cost factor/Rating non-cost factors :					21	19	17

DECISION : Choose Town C since 17 < 19 < 21

CONCLUSION

PL selectionconcludes the initial research and study phases of enterprise selection. Then come the real activity stages

- Capitalization selection and reporting to financial sources to obtain funds is the first one considered in the next chapter.

BIBLIOGRAPHY

14. (See pp : 86)
23. Investment Guide To Turkey, Union of Chambers of Commerce Industry and Commodity Exchanges of Turkey, Ankara, 1964
59. M, Y, Yoshino
International Operations, What is the best Strategy
Management Review, V: 56, Jan. 1967, USA

60. Melvin L. Greenhut
Plant Location in Theory and in Practice
The University of North Carolina Press, 1956, USA

61. D.C. Hague, P. K. Newman
Costs in Alternative Locations: The Clothing Industry
Cambridge University Press, 1952, GB

62. Ahmet Ali Özeken
Sanayi Tesis Yerleri Problemi ve Türkiye'nin Sınai Kalkınmasında Tesis Yeri Davası
İstanbul Üniversitesi İktisat Fakültesi Mecmuası, C:3, S:3, 4, Temmuz 1942
63. Conference Board Report
Techniques of Plant Location
National Industrial Conference Board, Inc., Studies in Busin. Policy, N:61, Second printing, 1956, N. Y.
64. A. E. Grunewald
Capital Budgeting Strategy
Management International Review, V:7, No:2-3 , 1967, W. Ger.

65. Kurt Spielberg
Algorithms for the Simple Plant Location Problem with some Side Conditions
OR, Jan.-Feb., 1967, V: 17, No: 1 , ORSA, USA
66. Business Management, April 1968, USA
The Right Way to pich a New Location

67. Mehmet Gürpınar
Endüstri Planlamasında Fabrika Yeri Seçiminin Önemi
Sevk ve İdare Dergisi, Eylül 1967, No: 7, TSİD, İstanbul,

68. R. L. Ackoff, M. W. Sasieni
Fundamentals of Operation Research
John Wiley and Sons Inc., N. Y., 1968
69. Ronald L. Gue, Micheal E. Thomas, "Mathematical Methods in Operation Research", The Macmillan C. , Londor, 1969
107. Hasan Akbelen, "Analysis of Point-to-point Closed Circuit Transportation Network", Thesis, School of Bus. Adm., R. C., 1969

CHAPTER VII

CAPITALIZATION SELECTION

INTRODUCTION

Capitalization selection is defined in this chapter as the accomplishment of the following activities:

1. Prediction of long-and-short-term cash outflows necessary to establish and operate the new business.
2. Determination of the sources of finance to meet the requirements of predicted cash outflows.
3. determination of the optimum compotition of financial behaviours (investment, borrowing, and lending).
4. Preperation of a financial feasibility report to be submitted to lending bodies (external sources of finance) to pursue them in financing the new business.
5. Preparation of the financial statements based on the final status of the internal and acquired funds, and thereupon, construction of the capital structure.

In the following pages these activities are discussed separately.

PREDICTION OF CASH OUTFLOWS

Master budget model that was discussed in portfolio selection reveals cash outflows necessary to establish and operate the new business. Those expenses relate to acquisition of assets depicted by enterprise selection activities. Master budget model will also reveal when and in what amounts should those expenses be made. Their sums for each period indicate the total capital requirements pertaining to those periods. However, priority is given to those expenses which need immediate considerations so that their financing makes it possible for the new firm to be established.

DETERMINATION OF SOURCES OF FINANCE

Next consideration is the sources through which those cash outflows can be financed. There are external and internal sources of finance which are illustrated on chart XLI. Since internal sources of finance are already at the hands of the owners they are known beforehand. So, the difference between the total cash outflow requirements and the total amount of internal sources of finance will give the theoretical amount of capital necessary to be acquired through external sources. It is the theoretical amount because in practice all of the external needs may not be acquired due to prevailing restrictions in the present financial market of the country. Those restrictions are mainly, lack of external capital, high cost associated with it, imperfect information pertaining to the capital market, risk involved in debt financing, government regulations, and variation in profitabilities of different levels of debt financing (chart XLII).

CHART XLI
Financial flow chart according to sources

External sources
- Loans
  - Banks
  - Government
  - Persons
  - Other loan instutions
- Aids
- Inheritence
- Gift

Internal sources
- Current income
- Accumulated cash savings
- Fixed assets

Consumption Saving Investment Lending Aid Gift Other

Investment optimization decisions

DETERMINATION OF OPTIMUM COMPOSITION OF FINANCIAL BEHAVIOURS

Despite all those restrictions in the financial market there is a theory developed by Irwin Fisher and expanded by J. Hirchleifer (46) to find out the relationship between external and internal financing behaviours and determine the optimum composition among them. In the following analysis (chart XLIII) lending is also introduced as an outflow of cash varying with borrowing (inflow of cash) in an opposite direction. They are both considered as external financing behaviours.

Assumptions of this theory are as follows:

1. Utility is a function of consumption, only. That is:

$U = f(C)$

Where, U is utility of the particular financial behaviour
C is consumption

2. There is perfect capital market (perfect information).

The business establisher will look for the opportunities on both borrowing and lending in the capital market. As far as the investment behaviour (other than borrowing and lending which may also be considered as investments) is concerned, the establisher knows already the field in which he will invest for the new business. Then he will try to achieve two things :

1. Maximize wealth (by obtaining tangency between market lines and production opportunity locus).
2. Maximize the utility of lending or borrowing (by obtaining a tangency between market line and indifference curve).

Yo and Co represent the initial income and consumption. Y_1 and C_1, the next period's income and consumption. OC_5 is the income Yo. Of that, the business establisher should invest the amount C_3C_5 in order to increase his wealth. Of that, he can borrow the amount C_3C_4 to increase the utility of investment. If he chooses lending also as an alternative in decision making, then, he may act as follows:

- Invest C_2C_5 to increase wealth
- Lend C_1C2 to increase utility. So, of the income OC_5 (Yo) :

- OC_1 remains as the consumption Co, of the initial year,
- C_1C_2 remains for lending.
- C_2C_3 remains for investment.
- C_3C_4 remains for borrowing
- C_4C_5 remains for investment any how.
- The corresponding flows in the next year are seen on the coordinate scale.

We recognize that the market borrowing line has bigger slope than that of marketlending line. That is because of the fact that, usually, borrowing interest rate is larger than lending interest rate for the firm, and the slope is defined as $-(1+r)$, where r is the interest rate in the market.

CHART XLII

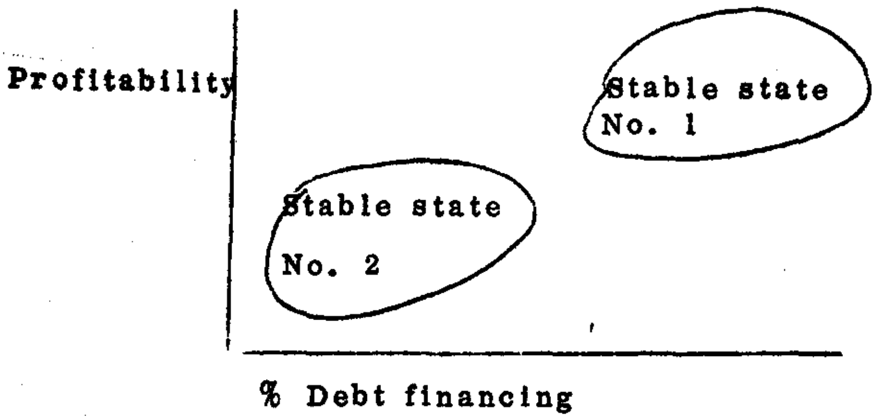
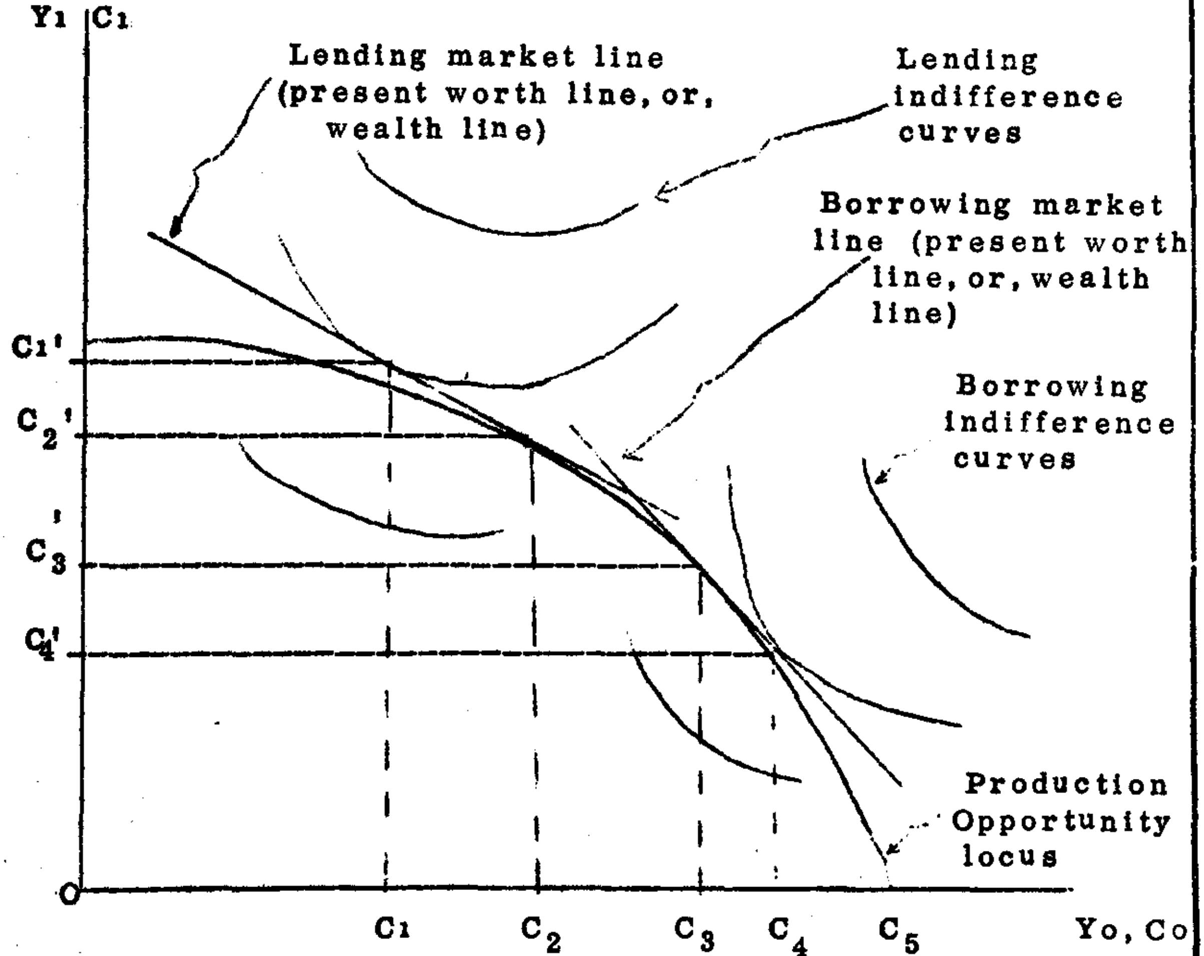


CHART XLIII



We can show borrowing and lending behaviours of the investor through formulas(26):

Suppose, additional capital

$$E : (e_1, e_2, e_3, \ldots\ldots, e_t)$$

can be obtained by borrowing. The net cost of the loan e_t is:

$$C(e_t) : \sum_{p:t+1}^{w} - \frac{q_p}{(1+r)^p} + \frac{e_t}{(1+r)^t}$$

Where, $C(e_t)$: Net cost of the borrowing

e_t : Additional capital borrowed at time t

p : The borrowing period $(t+1 \leq p \leq w)$

q_p : The principal interest paid to the lender in period p

r : The interest rate for the firm.

It is assumed that $C(e_t)$ is non-negative and monotone non-decreasing and that $C^{\prime t}(0) > 0$.

Lending the unallocated capital can also be included in this model by redefining $C(e_t)$:

$$C(e'_t) : \left(\sum_{p:t+1}^{w} \frac{q'_p}{(1\ r)^p} - \frac{e'_t}{(1\ r)^t} \right)$$

Where, $C(e'_t)$: Net cost of the lending

e'_t : Lending amount at time t

q'_p : Receipt in period p $(q'_{t\,1} < q'_p < q'_w)$

In the below chart we see the cash flows of external financing.

0	1	2 ...	t	t 1 ...	w	T	Periods
e_0-q_0	e_1-q_1	e_2-q_2	e_t-q_t	$e_{t+1}-q_{t+1}$	e_w-q_w	e_T-q_T	Borrowing
$-e'_0+q'_0$	...		$-e'_t+q'_t$		$e'_w+q'_w$	$e'_T+q'_T$	Lending

PREPERATION OF FINANCIAL FEASIBILITY REPORT

When it is time to appeal to lenders, the new business establisher will see that what Fisher's theory suggests is not always true. He will be able to acquire some of the external financial requirements, but for some of them he will not be able to get funds due to prestated financial market limitations. However in practice, the new business founder has to appeal to the creditors (external sources of finance) with a well prepared financial feasibility report at hand. This report can be considered as a statement of the findings out of enterprise selection activities which have so far been carried out in this thesis. It covers the following considerations:

1. Branch and name of the new business
2. Location of " " "
3. Purpose and policies of the new business
4. Its effects on the economic welfare of the country
5. Legal status proposal
6. Names and shares of the owners
7. P/S to be supplied
8. Size and market coverage
9. Raw material to be used
10. Export ant import conditions
11. Technology to be used
12. Employment
13. Time to initiate the business
14. Long-term sales and profitability of the business
15. Financial powers of the owners
16. Financial analyses of the new business
17. Financial reqùirements of the new business
18. External financial needs of the new business
19. Other material required by the creditor

FIRM EVALUATION

Upon this repoet, the creditors will evaluate the new business and decide on how much they can lend. Creditors may evaluate the new business according to its expected present values. The value of the new firm project can be represented by the following formula:

$$EPV : \sum_{i:1}^{n} q_i . Y_i$$

Where, EPV is expected present value of the new firm project
i is a particular period
n is life of the firm

q_i is EPV factor for period i

Y_i is cash flow in period i

As a result of firm evaluation, some creditors will accept lending and some will reject. Those who accept lending may or may not satisfy entire external financing requirements. If some part of the external financial requirements is not covered through credit financing, then the owners may follow one of the following strategies:

1. Issue stock or bonds.
   This strategy may also be a primary consideration in external financing.
2. Reduce the size of the business.
3. Plan the implementation of some projects to a later period.
4. Reduce the size of the project.
5. Find other creditors even at higher interest than normal. This will raise the cost of capital.
6. Give up the project of the new firm.

After a decision is taken, then, its implementation takes place. When the required funds are acquired, the next step in capitalization selection activity will be the construction of financial capital structure through preparation of pertaining financial statements of the new business.

CAPITAL STRUCTURE

Capital structure reflects the financial position of the firm. Financial position, on the other hand, reflects the efficiency, productivity, profitability, liquidity, and solvency of the firm's overall operations. Generally, capital structure, and particularly, financial ratios which are the interpretations of the numerical data in financial statements, should be in accordance with the nature and size of the enterprise.

FINANCIAL STATEMENTS

In view of the capitalization principles a sound capital structure can be established through the use of financial statements(chart XLV). Chart XLV shows the activities and related financial statements necessary in the preperation of capital structure. The most important of those are income statement and position statement, which are respectively the dynamic and static conclusions of enterprise activities.

COST OF CAPITAL

The final consideration in capital structure analysis is the calculation of cost of capital which is illustrated on chart XLVI.

CHART XLV
Overall view of the total budgeting process and financial St.

Business goals and objectives

Business long-range plan

Business long-range sales forecast

P/S mix strategy

Short-term sales forecast

Operating statements

Manufacturing policy	Marketing policy	R-D policy	Fin. Pol.
Production budget	Ad Budget	Research B.	P/S B.
Materials "	Sales "	Develop. B.	Branch B.
Personnel "	Turnover		Region B.
Capital expenditures			
Break-even chart			

Budgeted financial statements
- Capital budget(long-term cash flows)
- Cash " (short-term " ")
- Income statement (Profit and loss statement)
- Position statement(Balance-Sheet)

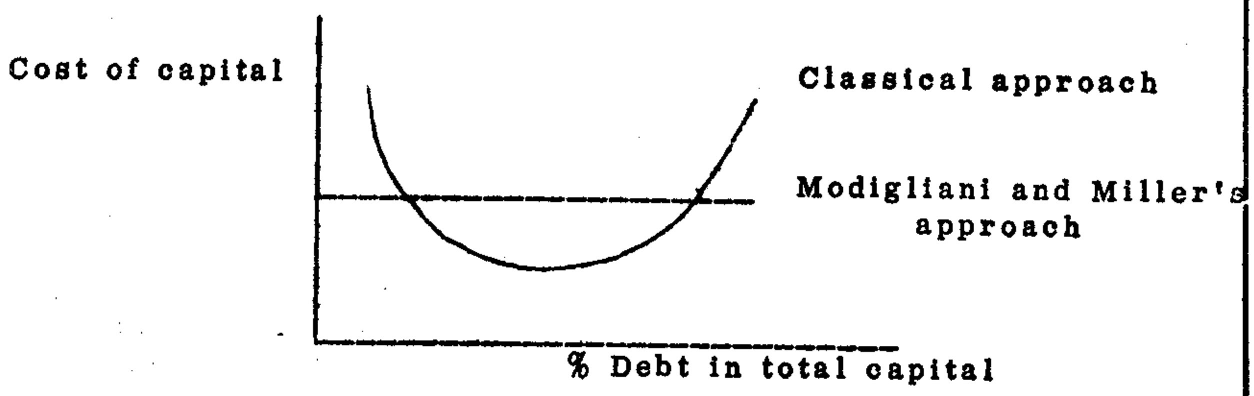
CHART XLVI
Cost of capital

Classes of Funds	Marketing value (Tl)	%Weihgt a	%Cost b	Weighted % cost a x b
Short -term	140 000	.10	10.4	1.04
-				
-				
-				
Long-term	420 000	.30	7.8	2.34
-				
-				
Stocks				
- Preferred	70 000	.05	14.0	.70
-Common	770000	.55	24.0	12.00
Total	1.400.000	1.0		16.18 :

Total cost : 226.520 Tl.

There are two theories of cost of capital: According to classical approach , the cost of capital does change as composition of capital changes. According to Modigliani and Miller approach , cost of capital does not change as composition of capital changes. Chart XLVII illustrates the two theories.

CHART XLVII



CONCLUSION

In this discussion we analysed and gave a solution to the financial problems of the new venture. The basic considerations were in the following manner:

1. Determination of cash outflows
2. Determination of cash inflows(sources of finance)
3. Determination of optimum combination of external and internal financing
4. Financial report to creditors to acquire external funds to finance some of the new firm requirements.
5. Preperation of financial statements for the construction of capital structure .
6. Calculation of cost of capital.

By now, the finance and accounting departments(x) of the new business should be established , and financial transactions that will take place should be recorded .

If the owners have decided to appeal to public by issuing stocks or bonds, they should follow up the acquisitions . They should also appeal to public authorities when a required amount of capital is accumulated , to label a legal and commercial standing to the new business. These and related activities are discussed in organization selection.

---

x Those departments are also the last ones to expire in case of bankruptcy.

BIBLIOGRAPHY

24. J. Fred Weston, Eugene F. Brigham, "Managerial Finance"
Halt, Rinehart and Winston, N.Y., 3rd edition, 1969

70. William H. Husband, James C. Dockeray
Modern Corporation Finance
Richard D. Irwin inc., Homewood, Illinois, 1962, USA

71. Glenn A. Welsch
Budgeting, Profit Planning and Control
Englewood Cliffs, N.J., Prentice-Hall, Inc., Aug. 1961

72. Charles W. Gerstenberg
Financial Organization and Management of Business
Prentice-Hall, Inc., Englewood Cliffs, N.J., Mar. 1960

73. I. Wayne Keller
Management Accounting for Profit Control
McGraw-Hill Book C. , Inc., N.Y., 1957, USA

74. Walter Rautenstrauch, Raymond Villers
The Economics of Industrial Management.
Funk and Wagnalls C., N.Y., 1957, USA

78. Frederick Hartman, Sidney Moglewer
Allocation of Resources to Research Proposals
Management Science, V:14, No:1 , September 1967,

SUMMARY AND CONCLUSION

Enterprise is assumed to be a perpetual entity. Therefore, its problems are also supposed to be continuous.

An enterprise model consists of the following stages:

1. Enterprise selection
2. Enterprise operations
3. Enterprise expansion

Enterprise operations are the activities carried out continuously as long as the firm stays in the market. Those operations which are mainly administration, finance, production and marketing, constitude the routine functions of an enterprise. Their aim is to accomplish the current (short-term) objectives of the firm.

Enterprise expansion activities aim at accomplishing the future (long-term) objectives of the enterprise. Those activities, in addition to the expansion problems of enterprise operations, are mainly research and development, new P/S (product/service) planning, acquisition, merger, consolidation and diversification. They help providing a better future outlook and better accomplishment of growth to the enterprise.

Enterprise selection activity, on the other hand, is the beginning of the cycle of enterprise model. It is a cycle which starts with an enterprise selection, goes on with enterprise operations, grows with enterprise expansion, and links back to the activity of enterprise selection for further diversification into new firms, branches or P/S's. And the cycle goes on this way.

The aim of enterprise selection activity is to build an enterprise with an optimum selection and combination of pertaining activities so that the new firm can operate effectively and grow properly under the business conditions that are expected to occur.

This thesis covers in its scope only the enterprise selection activities. Their identification, analyses, relationships, interpretations, alternative approaches and optimum solutions are treated in the thesis. This thesis deals with these problems in general terms by sometimes giving specific models and simulations to clear up the procedures. Emphasis is on mathematical models and their applications.

Entreprise selection activity covers the following chapters in the thesis:

Chapter I , Business Selection, discusses how a new business field is found under the considerations of business factors- namely, goal and objectives, states of environment, available resources,and business opportunities.

Chapter II, Feasibility Analysisi, covers the analysis , interpretation and evaluation functions of the new business.

Those two chapters include all of the problems which must be solved in order to come up with an optimum enterprize model. However, of those problems, the following are discussed in seperate chapters in order ot clear them up in all their dimensions:
In chapter III, Product /Service Selection discusses the alternatives of a known P/S and a new P/S. A sample strategy is formulated to solve the problem.

Chapter IV deals with the problem of Technology Selection in order to produce the P/S in the best way so far as the satisfaction of business objectives are concerned. Two deterministic models are applied in the chapter to help the reader.

Chapter V- Size Selection:
After technology is selected, the next decision is on the size of the business. According to environmental conditions of the present and future, an optimum size sel ection decision is taken. The approach followed in the chapter is the decision tree method associated with expected present value of outcomes.

Chapter VI- Location Selection:
Then the question "where the plant should be?" arises. For that, a location analysis is necessary. Chapter on location selection gives the theory, models for optimality and cost, and closes with a practical application of the location selection problem to find the best place of the firm.

Chapter VII- Capitalization Selection:
The beforementioned activities need some working capital and fixed capital. Therefore, it is the right time for the new businessman to capitalize upon those expenditures and investments. There are two major ways for capitalization:

Internal acquisition of funds, and external acquisition of funds. For external acquisition of funds, a [illegible] feasibility report has to be prepared and submitted to the creditors. Their firm evaluation leads to a decision on whether to lend or not to the new businessman to finance his external needs. It depends on how efficiently he has selected the beforementioned activities.

This thesis has been prepared through utilization of the following external sources:

a) Advisors who are eligible both in theory and practice of business strategies.
b) Libraries, which contain the related documents in the management science literature.
c) Some actual reports prepared for the purpose of new enterprise building.

Through the study of this thesis it has been found out that the current practice of enterprise selection has been lacking many important considerations as has been pointed out in chapter I. Also in business practice, the problems of enterprise selection are usually solved without giving due regard to uncertainty and probability of future events. Likewise, some recently developed models are not being utilized even though they may provide better solutions to present enterprise selection problems. The author tries to tackle those considerations through the pages of the thesis.

The final important conclusion of the author through his studies is that the scientific literature in enterprise selection is far below the necessity. Since enterprise selection problems include many facts and fields of management, their optimum integration is hardly attainable. However, it is desirable to develop a computer model applicable to any kind of or at least to certain fields of enterprise selection problem. It is hoped that this necessity is going to be achieved in a great extent in the near future.

It is also hoped that this thesis will fill some of the gaps arising out of those problems.

The end