

Detailed specifications of electricals; machine foundations; broad specifications of building and requirements as per Factory Act.

It is advisable for self-made Science & Technology Entrepreneurs to prepare their Project Report on their own. This exercise will enable them to come in contacts with number of traders, associations, machinery suppliers and knowledgeable persons in the line which will be useful even after starting commercial production. It is also useful in pursuing the project with the financial institution.

Sometimes, it is necessary to procure consultancy on turn-key basis. In a broad-sense, the turn-key consultancy starts right from preparation of techno-economic feasibility-report to starting-up of commercial production. This includes market survey; technical and financial feasibility of the project; site selections; detailed engineering; equipment; specifications procurements; inspection; erection; installation and commissioning of trial and commercial production.

There are certain advantages and disadvantages of selecting a turn-key consultant. While selecting a turn-key supplier for plant and equipment, proper assessment of his capability to do the job should be done thoroughly. For this purpose a 'capability statement' from such consultant may be useful, in addition to the past references of work done for other clients. The experience in implementation of projects and bio-data of technical and commercial people, available with the turn-key project supplier, will greatly help in assessing its capacity to render a proper services. To cross-check the information provided by turn-key supplier, it is necessary to discuss in detail with the past clients served by him. The experience and also the working results of plants set-up will give a guideline for reliability of the consultant.

The advantages of assigning the work on turn-key basis are:

- Less time required at planning stage
- Entrepreneur will not have to run at many places for project co-ordination
- Speedy implementation of the project
- Better project management
- Sure of project quality
- Least teething troubles
- Less wastage and rare chances of failure of product in trial runs

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The disadvantages of appointing a turn-key supplier are:

- Project cost may increase by about 25% than the piece-meal buying of the plant and equipment.
- High risk if turn-key supplier is not having proper know-how.
- Risk of getting low quality equipments.



DETAILS OF THE CAPITAL COST OF THE PROJECT AND METHOD OF APPRAISAL

Items to be included	Documents/particulars to be scrutinised for appraisal
a. Land & Site Development	
<ol style="list-style-type: none"> 1. Cost of land 2. legal charges for registration 3. Cost of levelling 4. Cost of laying roads 5. Cost of fencing 6. Cost of gates 	<ol style="list-style-type: none"> 1. Ascertain from plant layout and proposed construction of building that land is sufficient for the project & possible future expansion. 2. Agreement for purchase of land 3. Rate of legal charges 4. Total area of roads and cost per sq.mtr. 5. Total area of fencing and the basis on which provision has been made.
b. Building	
<ol style="list-style-type: none"> 1. Main factory Bldg. 2. Ancillary factory building 3. Admn. bldg. 4. Godowns 5. Canteen, Guest house etc. 6. Quarters for essential staff. 7. Soils tanks, wells, etc. 8. Garages 9. Cost of sewers, drainages etc. 10. Architects' fees. 	<ol style="list-style-type: none"> 1. Design of building 2. Different type of construction and area under each type of construction. 3. Ascertain from plant layout whether proposed construction of buildings is sufficient and also no unnecessary construction is done. 4. Rate per sq.mtrs. of each construction. 5. Agreement with building contractor if any. 6. A note on past record of Building contractor and Architect.
c. Plant & Machinery	
a) IMPORTED PLANTS	
<ol style="list-style-type: none"> 1. FOB value of plant to be imported. 2. Shipping, freight & insurance. 3. Import duty 4. Clearing, loading, unloading and transportation charges. 	<ol style="list-style-type: none"> 1. Ensure that proposed import of plant is necessary. 2. Ensure that necessary stores and spares are also imported. 3. Quotations of plant to be imported. 4. Orders, if already placed of plant to be imported. 5. Import licence 6. Report of an independent engineer, if second hand plant is being imported.

b) INDIGENOUS PLANTS

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| 1. Main plant and other machineries | 1. List of main items of machinery to be purchase ensure that all items are included and they have proper balance of capacity. |
| 2. Machinery stores and spares | 2. Quotations received from various machinery supplier. |
| 3. Sales-tax | |
| 4. Transportation charges | |
| 5. Foundation and Installation charges | 3. Cross check with some reputable potential suppliers from whom the promoters could have asked, but have not asked to bid or quote. |
| | 4. Selection should be done from various quotations on the basis of technical sophistication, reputation of suppliers, delivery dates, credit terms etc. |
| | 5. Orders for machinery if placed. |
| | 6. Contract entered between the company and machinery supplier. |

d. Engineering & Consultancy fees.

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| 1. Expenses of foreign technicians | 1. Contract between the company and foreign collaborators. |
| 2. Expenses of training for India technicians | 2. Contract between the Company and consultants. |
| 3. Technical know-how fees | 3. A note on past record of consultants. |
| 4. Expenses on drawing | 4. Relationship, if any, between promoters of a project and consultants. |
| 5. Consultancy fees for preparing project report. | |

e. Misc. Fixed Assets

- | | |
|--|--|
| 1. Furniture | 1. Details of various items of furniture, office machinery, equipments etc. and cost thereof. |
| 2. Office machinery and equipments | 2. Ascertain whether it is necessary to invest in vehicles for the project-Estimate cost of maintaining vehicle(s) and compare with transportation charges to be paid if outside vehicles are hired. |
| 3. Vehicles, Car, trucks | 3. Contract regarding, electric installation, piping etc. |
| 4. Cost of electric installation | 4. Price list of laboratory equipments, workshop equipment etc. |
| 5. Equipment and pipes for distribution of water air and steam | |
| 6. Lab. equipments | |
| 7. Workshop equipments | |
| 8. Fire Fighting equip. | |
| 9. Effluent collection, treatment and disposal arrangements | |
| 10. Misc. fixed assets. | |

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f. Preliminary & pre-operative exps.

1. Brokerage & Commission on capital issue
2. Other capital issue exps.
3. Commitment charges
4. Int. on term loan during construction period
5. Mortgage exps.
6. Misc. exps. during construction period
7. Cash losses, if any.

1. Find the total amount of capital issue and calculate charges thereon.
2. Find the construction period for that period.
3. Calculate the amount of mortgage exps.
4. Calculate the other exps. during construction period.

g. Provision for contingencies

1. Probable increase in cost due to new additions.
2. Probable increase in cost due to rise in prices, sales-tax excise duty, transportation charges, fluctuation in foreign exchange rates etc.

1. Divide total cost estimates into two groups considered firm and non firm.
2. Make provision for contingencies on non-firm items of cost at the rate of 5% to 15% depending on inflationary trend and period of project implementation longer the implementation period, higher the contingencies required.

h. Margin for working capital

1. Indigenous raw-material
2. Imported raw material
3. Consumable stores
4. Stock of goods-in-process
5. Stock of finished goods.
6. Outstanding debtors.

1. Calculate total requirement of working capital on the basis of expected production in first year. However, if profitability estimates of first year indicate cash loss, take working capital requirement on the basis of the production for second or third year when the project is likely to generate profit.
2. The level of raw materials, consumable stores, goods-in-process, finished goods and debtors should be decided keeping in view of production requirement process time and practice prevailing in the industry.
3. 25% of total working capital requirement should be financed by long term resources and included in the capital cost of the project.

MEANING AND SCOPE OF ENVIRONMENT

THERE IS DEFINITION PARTICULARLY RELEVANT IN THE CONTEXT OF PROJECTS. HERE, THE TERM "ENVIRONMENT" IS DEFINED AS :

THE SURROUNDING ZONE (THE SPECIFIC ZONE TO BE AFFECTED BY THE PROJECT), ALL NATURAL RESOURCES (PHYSICAL AND BIOLOGICAL), AND THE HUMAN RESOURCES (PEOPLE, ECONOMIC DEVELOPMENT AND QUALITY OF LIFE VALUES).

TYPES AND DIMENSIONS OF A PROJECT

BROADLY, THERE ARE TWO TYPES OF PROJECTS.

THE FIRST ONE REFERS TO THOSE PROJECTS THAT PRODUCE PHYSICAL GOODS LIKE CEMENT, STEEL, PAPER, CHEMICALS, ETC. THESE PROJECTS, IN FACT, CONVERT THE NATURAL RESOURCE ENDOWMENTS INTO SALEABLE AND EXCHANGEABLE PRODUCTS. AS A MATTER OF FACT, THESE PROJECTS INFLECT A LARGE NUMBER OF PHYSICAL CHANGES AND DISRUPTIONS ON ENVIRONMENT AND, HENCE, DISTURB THE ENVIRONMENTAL AND ECOLOGICAL BALANCE. ENVIRONMENTALISTS ARE MOSTLY CONCERNED WITH SUCH TYPE OF PROJECTS.

THE SECOND TYPE REFERS TO THOSE THAT PRODUCE/RENDER VARIOUS KINDS OF SERVICES SUCH AS HEALTH, EDUCATION, TRANSPORT, ENERGY, DEFENCE, LAW AND ORDER, ETC. SUCH PROJECTS ALSO COVER ACTIONS LIKE LAND REFORMS, AGRICULTURAL EXTENSION SERVICES, SALES PROMOTION CAMPAIGNS, ETC. PROJECTS OF THIS TYPE ARE NON-PHYSICAL IN NATURE AND THEY DO NOT DIRECTLY CAUSE ANY PHYSICAL CHANGES IN THE ENVIRONMENT.

HOWEVER, THEY BRING ABOUT SIGNIFICANT CHANGES OF FAR-REACHING CONSEQUENCES ON VALUES, ATTITUDES, LIFE-STYLES, SOCIAL RELATIONS, AND SO ON. THE NET EFFECT OF SUCH PROJECTS IS THE CREATION OF NEW WANTS AND NEEDS IN SOCIETY. THEY ULTIMATELY PROMOTE CONSUMERISM IN THE SOCIETY AND THEREBY INCREASE THE NUMBER OF MANUFACTURING PROJECTS. THUS, BOTH ARE INTERRELATED.

EACH PROJECT HAS TWO DIMENSIONS : (a) THE INTENDED OBJECTIVES/ PURPOSES - THEY ARE ALSO CALLED STATED GOALS / BENEFITS; AND (b) THE UNINTENDED CONSEQUENCES. THEY ARE ALSO CALLED EXTERNALITIES OR SOCIAL COSTS WHICH ARE UNPLANNED, UNWANTED, AND UNANTICIPATED.

ENVIRONMENTAL MANAGEMENT OR PLANNING IS THE STUDY OF THE UNINTENDED CONSEQUENCES OF A PROJECT.

STRESSES ON ENVIRONMENT

ENVIRONMENTALISTS HAVE IDENTIFIED FOUR TYPES OF DIFFERENT STRESSES OR PRESSURES THAT ARE BEING CONTINUOUSLY INFLICTED ON ENVIRONMENT. THEY ARE :

(I) EUTROPHIC STRESS REFERS TO THE RELEASE OF VARIOUS KINDS OF WASTES INTO THE RIVER AND OTHER WATER BODIES AND THEIR CONSEQUENT DRYING.

(II) EXPLOITATIVE STRESS REFERS TO THE EXPLOITATION OF NATURAL RESOURCES ENDOWMENT FOR PRODUCTION AND CONSUMPTION PURPOSES THROUGH AGRICULTURE, INDUSTRY, EXTRACTION, FISHING ETC. IT IS IMPORTANT TO NOTE THAT THE RATE OF EXPLOITATION HAS A RELEVANCE TO THE NATURE'S CAPACITY TO REPRODUCE

CONTD

STRESSES ON ENVIRONMENT

- (III) DISRUPTIVE STRESS REFERS TO THE PHYSICAL ALTERATIONS IN NATURE RESULTING FROM SUCH ACTIVITIES LIKE FOREST CLEARANCE, HIGHWAYS, RAILWAYS, FACTORY BUILDINGS AND SO ON. THESE PHYSICAL CHANGES DISTURB THE ENVIRONMENTAL AND ECOLOGICAL BALANCE.

- IV) CHEMICAL AND INDUSTRIAL STRESS : THIS RESULTS MAINLY FROM THE DEVELOPMENTS IN "SCIENCE AND TECHNOLOGY" AND THEIR APPLIED FIELDS LIKE INDUSTRY, WARFARE AND AGRICULTURE. THIS COMPRISES MAINLY THE POLLUTANTS AND EFFLUENTS OF ALL TYPES, RADIATION ETC.

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APPROACH TO MITIGATE STRESSES ON ENVIRONMENT

STRATEGIES TO MEET THESE THREATS TO NATURAL ENVIRONMENT THROUGH POLLUTION, DESTRUCTION AND OVER-USE CAN BE :

- (A) PREVENTIVE OR
- (B) REGULATORY.

IT IS IN THIS CONTEXT THAT THE ENVIRONMENTAL APPRAISAL OF PROJECTS IS GAINING SIGNIFICANCE WITH A HOPE OF ACHIEVING **SUSTAINABLE DEVELOPMENT IN HARMONY WITH ENVIRONMENT.**

ENVIRONMENTAL RESOURCES / VALUES (ER/Vs)

- (A) LEVEL -1 : PHYSICAL RESOURCES, COVERING LAND, WATER AND AIR.
- (B) LEVEL -2 : ECOLOGICAL RESOURCES, CONSISTING OF AQUATIC, TERRESTRIAL AND ENDANGERED (RARE) SPECIES (OTHER THAN MAN).
- (C) LEVEL- 3: HUMAN USE VALUES, COVERING TRANSPORT, AGRICULTURE, WATER SUPPLY, RECREATION, MINING, INDUSTRY, FOOD CONTROL, ETC.
- (D) LEVEL-4 : QUALITY OF LIFE VALUES, COVERING SOCIO-ECONOMIC CULTURAL AND AESTHETIC ASPECTS.

ENVIRONMENTAL RESOURCES / VALUES (ER/Vs)

ALTERNATIVELY, SOME OTHER ENVIRONMENTALISTS IDENTIFY AND CLASSIFY THE VARIOUS ELEMENTS OF ENVIRONMENT BROADLY UNDER EIGHT TYPES WHICH ARE CALLED ENVIRONMENTAL ATTRIBUTES (EA) THEY ARE :

- (A) AIR
- (B) WATER
- (C) LAND,
- (D) ECOLOGY (E) SOUND, (F) HUMAN ASPECTS,
- (G) ECONOMICS, AND (H) RESOURCES.

EACH ONE CAN FURTHER BE SUBDIVIDED INTO DIFFERENT RELATED ELEMENTS.

IMPACT ON THE ENVIRONMENTAL RESOURCES / VALUES (ER/Vs)

THE NATURE AND EXTENT OF ENVIRONMENTAL IMPACTS INCLUDING MAGNITUDE, SEVERITY, URGENCY, RISK ETC., OF A PROJECT IN THE ULTIMATE ANALYSIS DEPENDS UPON :

- (a) NATURE, SIZE AND TYPE OF THE PROJECT: SUCH AS MANUFACTURING SERVICES, AGRICULTURE, MINING, LOGGING, POWER, HARBOUR, CHEMICALS, SUGAR, ETC.
- (b) TECHNOLOGY.
- (c) LOCATION/ECO-REGION : SUCH AS URBAN OR RURAL AREAS, COASTAL, RIVER VALLEY, FOREST/HILL AREAS OR ANY OF THE ECO-SYSTEMS AS DESCRIBED EARLIER.

MEANING AND SCOPE OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND ENVIRONMENTAL IMPACT STATEMENT (EIS)

THE BASIC PROMISE BEHIND THE EIS/EIA IS THAT NO ONE HAS ANY RIGHT TO USE THE PRECIOUS ENVIRONMENTAL RESOURCES RESULTING IN GREATER LOSS THAN GAIN TO SOCIETY. FROM THIS, IT FOLLOWS THAT THE AIM OF EIS IS TO SEEK WAYS BY WHICH THE PROJECT CAN PROCEED WITHOUT ANY IRREPAIRABLE LOSSES TO ENVIRONMENT AND MINIMUM LOSSES IF ANY, SO THAT THE NET EFFECT WILL BE A DESIRABLE GAIN.

MEANING AND SCOPE OF ENVIRONMENTAL IMPACT ASSESSEMENT (EIA) AND ENVIRONMENTAL IMPACT STATEMENT (EIS)

ENVIRONMENTAL IMPACT ASSESSEMENT (EIA) IS DEFINED AS : "AN ACTIVITY DESIGNED TO IDENTIFY, PREDICT, INTERPRET, AND COMMUNICATE INFORMATION ABOUT THE IMPACT OF AN ACTION ON MAN'S HEALTH AND WELL-BEING (INCLUDING THE WELL-BEING OF ECOSYSTEMS ON WHICH MAN'S SURVIVAL DEPENDS).

MEANING AND SCOPE OF ENVIRONMENTAL IMPACT ASSESSEMENT (EIA) AND ENVIRONMENTAL IMPACT STATEMENT (EIS)

ON THE OTHER HAND, ENVIRONMENTAL IMPACT STATEMENT (EIS) IS DEFINED IS :
A REPORT, BASED ON STUDIES, DISCLOSING THE LIKELY OR CERTAIN ENVIRONMENTAL CONSEQUENCES OF A PROPOSED ACTION, THUS ALERTING THE DECISION-MAKER, THE PUBLIC AND THE GOVERNMENT TO ENVIRONMENTAL RISKS INVOLVED; THE FINDINGS ENABLE BETTER INFORMED DECISIONS TO BE MADE, PERHAPS TO REJECT OR DEFER THE PROPOSED ACTION OR PERMIT IT SUBJECT TO COMPLIANCE WITH SPECIFIC CONDITIONS.

A CRITICAL OVERVIEW OF EIA METHODOLOGIES

METHODOLOGY	AREAS OF USEFULNESS	DRAWBACKS
AD HOC	<ul style="list-style-type: none"> • SIMPLE AND NO TRAINING/SKILLS NEEDS. • INDEPTH AND FOCUSED ANALYSIS ON FEW; WHEN NO EXPERTISE AND RESOURCES AVAILABLE, THIS IS THE BEST. • GIVES PRELIMINARY UNDERSTANDING. • PROJECT'S EFFECT ON ENVIRONMENT GIVEN WITHOUT ANY WEIGHTING AND CAUSE-EFFECT RELATIONS. 	<ul style="list-style-type: none"> • RESTRICTS TO BROAD AREAS ONLY • NOT ALL RELEVANT IMPACTS COVERED. • SELECTIVE AND BIASED. • LACKS CONSISTENCY DUE TO DIFFERENT CRITERIA TO EVALUATE DIFFERENT GROUPS OF FACTORS.
CHECKLISTS	<ul style="list-style-type: none"> • STRONG IN IMPACT IDENTIFICATION • EFFECTIVE IN EVOKING PUBLIC ATTENTION. • SIMPLE AND EASY TO UNDERSTAND; COMPREHENSIVE. • MOST USEFUL AT THE STAGE OF INITIAL ENVIRONMENTAL EXAMINATION (IEE) 	<ul style="list-style-type: none"> • SCALING AND WEIGHTING SUBJECTIVE. • LEAVES INTERPRETATION TO DECISION MAKERS. • MEASUREMENT DEFICIENT.

MATRICES	<ul style="list-style-type: none"> • PROVIDES CAUSE-EFFECT RELATIONS BETWEEN PROJECT ACTIVITIES AND IMPACTS ON VARIOUS ATTRIBUTES. • GRAPHICAL DISPLAY OF IMPACTS GIVEN BETTER UNDERSTANDING. • STRONG IN IMPACT IDENTIFICATION AND THEIR INTERACTION IS POSSIBLE. 	<ul style="list-style-type: none"> • INFORMATION IS LOST DUE TO QUANTIFICATION. • SCALING AND WEIGHTING BECOME SUBJECTIVE.
NETWORKS	<ul style="list-style-type: none"> • CAPABLE OF IDENTIFYING BOTH DIRECT AND INDIRECT EFFECTS AND THEIR INTERACTION. • CAPABLE OF INCORPORATING MITIGATION AND MANAGEMENT MEASURES AT THE PLANNING STAGE OF A PROJECT. 	<ul style="list-style-type: none"> • LESS USEFUL IN CONSIDERING SOCIO-ECONOMIC ENVIRONMENT. • DISPLAY BECOMES LARGE AND UNWIDELY WHEN LARGE INDUSTRIAL COMPLEXES OR REGIONAL PLANS ARE CONSIDERED.
OVERLAYS	<ul style="list-style-type: none"> • USEFUL IN SITE AND ROUTE SELECTION. • EFFECTIVE PRESENTATION AND DISPLAY • USEFUL IN TRANSPORT PROJECTS AND ROAD ROUTE ALTERNATIVES; LAND USE PLANNING 	<ul style="list-style-type: none"> • QUANTIFICATION AND MEASUREMENT WEAK. • NOT ALL IMPACTS COVERED. HIGHER ORDER IMPACTS CANNOT BE IDENTIFIED. • SOCIAL ENVIRONMENT NOT CONSIDERED. SUBJECTIVE • SELF LIMITING IN SCOPE.

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FINANCIAL APPRAISAL

1. Capital Cost of project
 - a) Land and site development
 - b) Buildings
 - c) Plant and machinery
 - d) Engineering and consultancy fees
 - e) Misc. fixed assets
 - f) P & P exps.
 - g) Provision for contingencies
 - h) Margin money for working capital
2. Sources of finance
3. Financial projection
 - a) Profitability estimates
 - b) Cash flow estimates
 - c) Projected balance sheet
4. Ratio analysis
 - a) Debt equity ratio
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 - c) Debt services coverage ratio
 - d) Margin on security
 - e) Other ratios
5. Break even point
6. Discounted cash flow techniques
 - a) net present value
 - b) Internal rate of return

The Cost of Capital

In the previous chapter we learnt that the cash flows of a capital investment may be viewed from various points of view (the equity point of view, the long-term funds point of view, the explicit cost funds point of view, and the total funds point of view) and the discount rate applied to the cash flows must be consistent with the point of view adopted. We also mentioned that the standard practice in capital budgeting is to look at the cash flows from the point of view of explicit cost funds (referred to also as investor claims) and apply the weighted average cost of capital of the firm as the discount rate.

Having learnt how to specify the project cash flows let us now turn our attention to the weighted average cost of capital, referred to also, for the sake of simplicity, as the cost of capital.

The cost of capital is a central concept in financial management. It is used for evaluating investment projects, for determining the capital structure, for assessing leasing proposals, for setting the rates that regulated organisations like electric utilities can charge to their customers, so on and so forth.

This chapter discusses how a company's cost of capital is calculated. It is divided into nine sections:

- Some preliminaries
- Cost of debt and preference
- Cost of equity
- Determining the proportions
- Weighted average cost of capital
- Weighted marginal cost of capital
- Floatation costs and the cost of capital
- Cost of capital in practice
- How financial institutions calculate cost of capital

10.1 SOME PRELIMINARIES

Concept of Average Cost of Capital

A firm's cost of capital is the weighted average cost of various sources of finance used by it, viz., equity, preference, long-term debt, and short-term debt. Note that many companies leave out the cost of short-term debt while calculating the weighted average cost of capital (WACC). In principle, this is not correct. Investors who provide short-term debt also have a claim on the operating earnings of the firm. If a company ignores this claim, it will mistake the rate of return required on capital investments.

Suppose that a firm uses equity costing 16 per cent and debt costing 9 percent. If the proportions in which equity and debt are used are 40 percent and 60 percent respectively, its WACC will be:

$$\begin{aligned} \text{WACC} &= \text{Proportion of equity} \times \text{cost of equity} + \text{Proportion of} \\ &\quad \text{debt} \times \text{cost of debt} \\ &= 0.40 \times 16\% + 0.6 \times 9\% \\ &= 6.4\% + 5.4\% \\ &= 11.8\% \end{aligned}$$

In general, if the firm uses n different sources of finance, its WACC:

$$\text{WACC} = \sum p_i r_i \quad (10.1)$$

where p_i is the proportion of the i th source of finance and r_i is the cost of the i th source of finance

Thus, the three basic steps involved in calculating a firm's WACC are:

- Determine the cost of different components of capital
- Establish a set of weights (or proportions)
- Calculate the weighted average cost of capital.

Rationale

The rationale for using the WACC as the hurdle rate in capital budgeting is fairly straightforward. If a firm's rate of return on its investments exceeds its cost of capital, the wealth of equity stockholders is enhanced. Why? When the firm's rate of return on its investments is greater than its cost of capital, the rate of return earned on equity capital (after meeting the costs of other forms of financing) will exceed the rate of return required by equity stockholders. Hence, the wealth of equity stockholders will increase. To illustrate this point, consider a firm whose cost of equity and debt are, respectively, 14 percent and 6 percent and which employs equity and debt in equal proportions. The cost of capital for the firm, which is the weighted average cost of capital, works out to 10 percent. If the firm invests Rs 100 million, say, on a project which earns 12 percent rate of return, the rate of return on equity funds will be:

$$\frac{\text{Total return on the project} - \text{Interest on debt}}{\text{Equity fund}} = \frac{100 (.12) - 50 (.06)}{50} = 18\%$$

Since 18 percent exceeds the rate of return required by equity stockholders (14 percent), the market value of equity capital, reflecting the wealth of equity stockholders, increases.

■ Conditions for Using the Cost of Capital

Two basic conditions should be satisfied for using WACC for evaluating new investments.

- The risk of new investments is the same as the average risk of existing investments. In other words, the adoption of new investments will not change the risk complexion of the firm.
- The capital structure of the firm will not be affected by the new investments. Put differently, the firm will continue to pursue the same financing policy.

Thus, strictly speaking WACC is the right discount rate for a project that is a carbon copy of the firm's existing business. However, in practice, WACC is used as a benchmark hurdle rate that is adjusted for variations in risk and financing patterns.

In this chapter we assume that the new investments being considered by the firm do not differ from existing investments in terms of risk or financing mix. Variations in risk and financing mix will be considered in the following chapters.

■ 10.2 COST OF DEBT AND PREFERENCE

Since debt and preference stock entail more or less fixed payments, estimating the cost of debt and preference is relatively easy.

■ Cost of Debt

A company raises debt finance through a variety of instruments like debentures, bank loans, and commercial paper. The cost of debt is the average rate of different kinds of debt employed by the firm. To illustrate the calculation of the average rate, let us look at the following data on the debt employed by Multiplex Limited.

Debt instrument	Maturity value or book value	Market value	Coupon or interest rate	YTM or current rate ¹
Debentures, Series A	Rs 200 million	Rs 185 million	11%	13%
Debentures, Series B	Rs 300 million	Rs 280 million	12%	14%

1: The yield to maturity (YTM) of a debt instrument is simply its internal rate of return. For example, if a Rs 100 par value debenture carrying 12% interest rate and maturing after 5 years sells for Rs 95, its YTM is the value of r in the following equation:

$$95 = \sum_{t=1}^5 \frac{12}{(1+r)^t} + \frac{95}{(1+r)^5}$$

Term Loan	Rs 300 million	n.a. ^a	14%	15% ^b
Commercial Paper	Rs 100 million	Rs 95 million	n.a. ^c	10.5%

- Term loans do not have a secondary market.
- This is the interest rate on a new term loan.
- Commercial paper does not carry an explicit coupon rate. Its yield is implicit in the discount of its market value over maturity value.

The average rate of debt is calculated using the market values² and yields to maturity of various debt instruments.

Total market value of debt = Rs 860 million³

$$\begin{aligned} \text{Average rate of debt} &= 13\% \left(\frac{185}{860} \right) + 14\% \left(\frac{280}{860} \right) + 15\% \left(\frac{300}{860} \right) + 10.5\% \left(\frac{95}{860} \right) \\ &= 13.75\% \end{aligned}$$

Note that we use the yields to maturity or the current rates as they reflect the rates at which the firm can raise *new* debt. Put differently, we are interested in calculating the marginal cost of debt. Hence, coupon rates that reflect the *historical* or *embedded* interest rates at the time the debt was originally raised are not relevant for our purposes.

What we have calculated so far is the average pre-tax cost of debt. Since interest on debt is a tax-deductible expense, the pre-tax cost of debt has to be adjusted for the tax factor to arrive at the post-tax cost of debt.

$$\text{After-tax cost of debt} = \text{Pre-tax cost of debt} (1 - \text{Tax rate})$$

The tax rate to be used in this calculation is the marginal tax rate applicable to the company. If we assume that the marginal tax rate for Multiplex Limited is 35 percent, the post-tax cost of debt for Multiplex Limited is:

$$\text{After-tax cost of debt} = 13.5 \text{ percent} (1 - 0.35) = 8.938 \text{ percent}$$

■ Cost of Preference

Preference capital carries a fixed rate of dividend and is redeemable in nature. Even though the obligation of a company towards its preference shareholders is not as firm as that towards its debenture holders, we will assume that preference dividend will be paid regularly and preference capital will be redeemed as per the original intent.

2. The rationale for using market values and not book values is explained in a subsequent section.
3. Since term loans do not have a secondary market, we have used the maturity value figure for them.

E = market value of equity
 V = market value of the firm
 r_E = cost of equity
 P = market value of preference
 r_P = cost of preference
 D = market value of debt
 r_D = cost of debt
 T_c = corporate tax rate

Illustration

The cost of specific sources of capital for Bharat Nigam Limited are:

$$r_E = 16.0 \text{ percent}$$

$$r_P = 14.0 \text{ percent}$$

$$r_D = 12.0 \text{ percent}$$

The market value proportions of equity, preference, and debt are:

$$E/V = 0.60$$

$$P/V = 0.05$$

$$D/V = 0.35$$

The corporate tax rate, T_c , is 30 percent.

The WACC for Bharat Nigam Limited is calculated in Exhibit 10.1.

Exhibit 10.1 Calculation of the WACC for Bharat Nigam Limited

Source of Capital	Proportion (1)	Cost (2)	Weighted Cost [(1) x (2)]
Debt	0.60	16.0%	9.60%
Preference	0.05	14.0%	0.70%
Equity	0.35	8.4%	2.94%
			WACC = 13.24 %

10.6 WEIGHTED MARGINAL COST OF CAPITAL SCHEDULE

At the outset we assumed, *inter alia*, that the adoption of new investment proposals will not change either the risk complexion or the capital structure of the firm. Does it mean that the weighted average cost of capital will remain the same irrespective of the magnitude of financing? Apparently not. Generally, the weighted average cost of capital tends to rise as the firm seeks more and more capital. This happens because the supply schedule of capital

is typically upward sloping—as suppliers provide more capital, the rate of return required by them tends to increase. A schedule or graph showing the relationship between additional financing and the weighted average cost of capital is called the weighted marginal cost of capital schedule.

▣ Determining the Weighted Marginal Cost of Capital Schedule

The procedure for determining the weighted marginal cost of capital involves the following steps:

1. Estimate the *cost of each source of financing for various levels of its use* through an analysis of current market conditions and an assessment of the expectations of investors and lenders.
2. Identify the levels of total new financing at which the cost of the new components would change, given the capital structure policy of the firm. These levels, called *breaking points*, can be established using the following relationship.

$$BP_j = \frac{TF_j}{W_j} \quad (10.7)$$

where

- BP_j = breaking point on account of financing source j
- TF_j = total new financing from source j at the breaking point
- W_j = proportion of financing source j in the capital structure

3. Calculate the WACC for various ranges of total financing between the breaking points.
4. Prepare the weighted marginal cost of capital schedule which reflects the WACC for each level of total new financing.

▣ Illustration

To illustrate the preparation of the weighted marginal cost of capital schedule, let us consider an example. Shiva Chemicals Limited wishes to use equity, preference, and debt capital in the following proportions:

Equity	: 0.45
Preference	: 0.05
Debt	: 0.50

Cost of Each Source of Finance for Various Levels of Its Use Based on the discussions with its merchant bankers and lenders, Shiva Chemicals Limited estimates that the cost of each of its three sources of financing for various levels of usage is as given in Exhibit 10.2.

Exhibit 10.2 *Data for Calculating the Weighted Marginal Cost of Capital (WMCC) Schedule for Shiva Chemicals*

Source of Capital	Target Proportion	Range of New Financing ^a (Rs in million)	Cost
Equity	45%	0-10	15.00
		10-30	16.50
		30 and above	18.00
Preference	5%	0-1	14.50
		1 and above	15.00
Debt	50%	0-15	7.50
		15-40	8.00
		40 and above	8.40

^a These ranges are for the respective sources of financing and not for total new financing.

Breaking Points Given the target capital structure proportions and the financing ranges for each source of finance, the breaking points for each source of finance and the corresponding ranges of total new financing are given in columns 3 and 4 of Exhibit 10.3.

WACC for Various Ranges of Total New Financing An examination of column 4 of Exhibit 10.3 shows that the firm's weighted average cost of capital will change at Rs 20.00, Rs 22.22, Rs 30.00, Rs 66.67, and Rs 80.00 million of total new financing. Exhibit 10.4 shows the calculation of the weighted average cost of capital over various ranges.

Weighted Marginal Cost of Capital Schedule The weighted marginal cost of capital schedule is shown in Exhibit 10.5. It is represented graphically in Exhibit 10.6.

Exhibit 10.3 *Determination of Brezking Points and the Resulting Ranges of Total New Financing for Shiva Chemicals Limited*

Source of Capital	Cost (%) (1)	Range of New Financing (Rs in million) (2)	Breaking Point (Rs in million) (3)	Range of Total New Financing (Rs in million) (4)
Equity	15.00	0-10	$10 / 0.45 = 22.22$	0-22.22
	16.50	10-30	$30 / 0.45 = 66.67$	22.22-66.67
	18.00	30 and above	-	66.67 and above
Preference	14.50	0-1	$1 / 0.05 = 20.00$	0-20.00
		1 and above	-	20.00 and above
Debt	7.50	0-15	$15 / 0.50 = 30.00$	0-30.00
	8.00	15-40	$40 / 0.50 = 80.00$	30.00-80.00
	8.40	40 and above	-	80.00 and above

Exhibit 10.4 WACC for Various Ranges of Total New Financing for Shiva Chemicals Limited

Range of Total New Financing (Rs in million)	Source of Capital (1)	Proportion (2)	Cost (%) (3)	Weighted Cost (%) [(2) x (3)] (4)
0-20.00	Equity	0.45	15.00	6.750
	Preference	0.05	14.50	0.725
	Debt	0.50	7.50	3.750
	Weighted average cost of capital			11.225
20.00-22.22	Equity	0.45	15.00	6.750
	Preference	0.05	15.00	0.750
	Debt	0.50	7.50	3.750
	Weighted average cost of capital			11.250
22.22-30.00	Equity	0.45	16.50	7.425
	Preference	0.05	15.00	0.750
	Debt	0.50	7.50	3.750
	Weighted average cost of capital			11.925
30.00-66.67	Equity	0.45	16.50	7.425
	Preference	0.05	15.00	0.750
	Debt	0.50	8.00	4.000
	Weighted average cost of capital			12.175
66.67-80.00	Equity	0.45	18.00	8.100
	Preference	0.05	15.00	0.750
	Debt	0.50	8.00	4.000
	Weighted average cost of capital			12.850
20.00-22.22	Equity	0.45	18.00	8.100
	Preference	0.05	15.00	0.750
	Debt	0.50	8.40	4.200
	Weighted average cost of capital			13.050

Exhibit 10.5 Weighted Marginal Cost of Capital Schedule

Range of Total Financing (Rs in million)	Weighted Marginal Cost of Capital (%)
0-20.00	11.225
22.00-22.22	11.250
22.22-30.00	11.925
30.00-66.67	12.175
66.67-80.00	12.850
80.00 and above	13.050

2. The immediate sources of funds used for a project do not necessarily determine the hurdle rate. What matters is the contribution made by the project to the firm's overall borrowing power and not which sources of funds happen to be tapped when the project is being undertaken.
3. Even if the firm is inclined and capable of going for 90 percent debt financing, on an overall basis, the component costs of equity and debt are highly unlikely to remain what they are, when the firm has 50 percent debt financing.

10.9 HOW FINANCIAL INSTITUTIONS CALCULATE COST OF CAPITAL

Financial institutions calculate cost of capital as post-tax weighted average cost of the mix of funds employed for the project.

The cost for different sources of funds are taken as follows:

- Equity share capital : 15%
- Cash accruals/Retained earnings : 15%
- Preference share capital : Preference dividend rate
- Subsidy/Incentive loans : Zero cost
- Debt : Post-tax rate of interest
(Long-term loans, non-convertible debentures, deferred credits, bank borrowings for working capital, unsecured loans from public)
- Convertible debenture : Convertible portion at 15%
Non-convertible portion at post-tax interest rate

For calculating the post-tax rate of interest, the interest rate is multiplied by $(1 - \text{tax rate})$. The tax rate for this purpose is the average applicable tax rate and not the notional tax rate. The average applicable tax rate is calculated as follows:

$$\frac{\text{Total tax liability during the life of the project}}{\text{Total operating profit over the life of the project}}$$

The average applicable tax rate is generally lower than the prevailing notional tax rate because of various tax benefits available on account of incentives and losses.

Illustration

The means of financing for a project are given below:

- Equity and cash accruals : Rs 900 million
- Preference share capital (@ 10%) : Rs 100 million
- Rupee term loans from institutions (@14%) : Rs 800 million

- Non convertible debentures (@12%) : Rs 400 million
- Convertible portion of convertible debentures : Rs 100 million
- Non-convertible portion of convertible debentures : Rs 100 million
- Bank borrowing for working capital (@15%) : Rs 200 million

The average applicable tax rate for the project is estimated at 25 percent.

The cost of capital is calculated in Exhibit 10.7.

Exhibit 10.7 Cost of Capital Calculation

Rs in million

Means of Financing (A)	Amount (Rs in million) (B)	Cost of Funds (C)	Total Cost (post-tax) (D) = C × B
1. Equity and cash accruals	900	15%	135
2. Preference share capital	100	10%	10
3. Rupee term loans (@14%)	800	10.5%	84
4. Non-convertible debentures (@12%)	400	9%	36
5. Convertible portion of convertible debentures	100	15%	15
6. Non-convertible portion of convertible debentures (@10%)	100	7.5%	7.5
7. Bank borrowing for working capital (@15%)	200	11.25%	22.5
	<u>2600</u>		<u>310</u>

The average cost of capital (post-tax) is: $310 / 2600 = 11.92\%$

SUMMARY

- Capital, like any other factor of production, has a cost. A company's cost of capital is the weighted average cost of the various sources of finance used by it, viz., equity, preference, long-term debt, and short-term debt.
- Note that many companies leave out the cost of short-term debt while calculating the weighted average cost of capital (WACC). In principle, this is not correct. Investors who provide short-term debt also have a claim on the operating earnings of the firm. So, if a company ignores this claim, it will mis-state the rate of return required by its investors.
- WACC is a central concept in financial management. It is used for evaluating investment projects, for determining the capital structure, for setting the rates that regulated organisations like electric utilities can charge to their customers, so on and so forth.
- In general, if a firm uses n different sources of capital its WACC is:

$$\sum p_i r_i$$

- Two basic conditions should be satisfied for using the company's WACC for evaluating new

investments: (a) The risk of new investments is the same as the average risk of existing investments. (b) The capital structure of the firm will not be affected by the new investments. Thus, strictly speaking, WACC is the right discount rate for a project that is a carbon copy of the firm's existing business. However, in practice, WACC is used as a benchmark hurdle rate that is adjusted for variations in risk and financing patterns.

- Since debt and preference stock entail more or less fixed payments, estimating the cost of debt and preference is relatively easy.
- A company raises debt finance through a variety of instruments like debentures, bank loans, and commercial paper. The cost of debt is the weighted average rate of different kinds of debt employed by it.
- The weighted average rate of debt is calculated using the market values and yields to maturity of various debt instruments. Note that we use the yields to maturity or the current rates as they reflect the rates at which the firm can raise new debt.
- Since interest on debt is a tax-deductible expense, the pre-tax cost of debt has to be adjusted for the tax factor to arrive at the post-tax cost of debt.
- Preference capital carries a fixed rate of dividend and is redeemable in nature. Given the fixed nature of preference dividend and principal repayment commitment and the absence of tax deductibility, the cost of preference is simply equal to its yield.
- Equity earnings may be obtained in two ways: (i) retention of earnings, and (ii) issue of additional equity. The cost of equity or the return required by equity shareholders is the same in both the cases. Remember that when a firm decides to retain earnings, an opportunity cost is involved.
- A popular approach to estimating the cost of equity is the security market line (SML) relationship. According to the SML, the required return on a company's equity is:
 - Analysts who do not have faith in the SML approach often resort to a subjective procedure to estimate the cost of equity. They add a judgmental risk premium to the observed yield on the long-term bonds of the firm to get the cost of equity.
 - According to the dividend growth model approach, the cost of equity is equal to:
$$\text{Dividend yield} + \text{Expected growth rate in dividends}$$
 - For calculating the WACC we multiply the cost of each source of capital by the proportion applicable to it. These proportions may be based on book values or target capital structure or market values. Market value proportions are generally recommended unless market values are not available or are highly unreliable or distorted.
 - WACC tends to rise as the firm seeks more and more capital. This happens because the supply schedule of the capital is typically upward sloping—as suppliers provide more capital, the rate of return required by them tends to increase.
 - A schedule or graph showing the relationship between additional financing and WACC is called the weighted marginal cost of capital schedule.
 - When a firm raises finance by issuing equity and debt, it almost invariably incurs floatation or issue costs, comprising items like underwriting costs, brokerage expenses, fees of

merchant bankers, under-pricing costs, so on and so forth.

- There are two ways of handling floatation costs. One approach is to adjust the WACC to reflect the floatation costs. A better approach is to leave the WACC unchanged but to consider floatation costs as part of the project cost.
- Despite the importance of cost of capital in financial management, we find that several misconceptions characterise its application in practice. The more serious ones are:
(i) The cost of capital is too academic or impractical. (ii) The cost of equity is equal to the dividend rate or return on equity. (iii) Retained earnings are either cost free or cost significantly less than external equity. (iv) Depreciation has no cost. (v) The cost of capital can be defined in terms of an accounting-based measure. (vi) If a project is financed heavily by debt, its WACC is low.

18.1 CAPITAL STRUCTURE

The two broad sources of finance available to a firm are: shareholders' funds and loan funds. Shareholders' funds come mainly in the form of equity capital and retained earnings and secondarily in the form of preference capital. Loan funds come in a variety of ways like debenture capital, term loans, deferred credit, fixed deposit, and working capital advance.

Ignoring preference capital (which is of minor significance) the basic differences between shareholders' funds (referred to as equity) and loan funds (referred to as debt) are as follows:

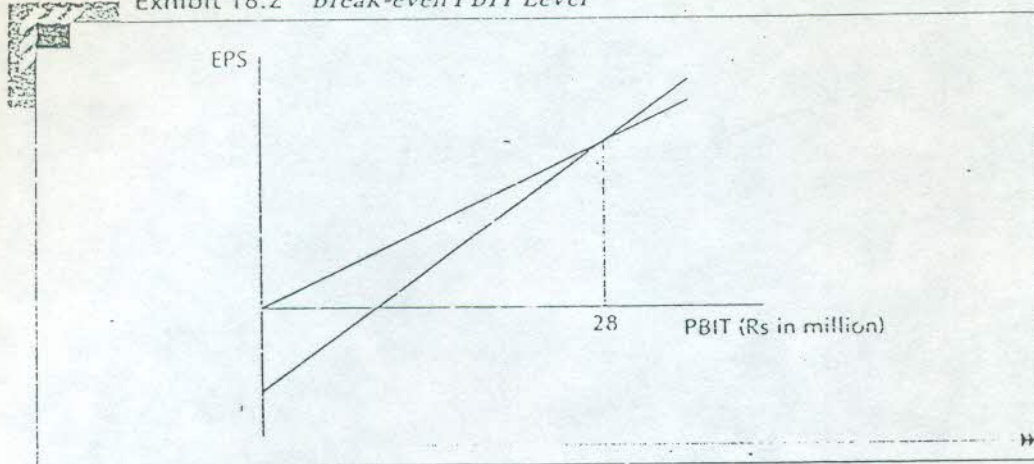
- | <i>Equity</i> | <i>Debt</i> |
|--|---|
| <ul style="list-style-type: none">• Equity shareholders have a <u>residual claim on the income and the wealth of the firm.</u>• Dividend paid to equity shareholders is not a tax deductible payment.• Equity ordinarily has an <u>indefinite life.</u>• Equity investors enjoy the prerogative to control the affairs of the firm. | <ul style="list-style-type: none">• Creditors (suppliers of debt) have a fixed claim in the form of interest and principal payment.• Interest paid to creditors is a <u>tax deductible payment.</u>• Debt has a <u>fixed maturity.</u>• Debt investors play a passive role—of course, they impose certain restrictions on the way the firm is run to protect their interest. |

What are the key considerations in determining the debt equity ratio (the capital structure) of a firm? The important considerations in planning the capital structure are:

- Earnings per share
- Risk
- Control
- Flexibility
- Nature of assets

Earnings per Share

Earnings per share, which is simply equity earnings divided by the number of outstanding equity shares, is regarded as an important financial number that firms would like to im-

Exhibit 18.2 *Break-even PBIT Level*

Risk

The two principal sources of risk in a firm are: business risk and financial risk.

Business Risk It refers to the variability of profit before interest and taxes. It is influenced, *inter alia*, by the following factors.

- **Demand Variability** Other things being equal the higher the variability of demand for the products manufactured by the firm, the higher is its business risk.
- **Price Variability** A firm which is exposed to a higher degree of volatility for the prices of its products is, in general, characterised by a higher degree of business risk in comparison with similar firms which are exposed to a lesser degree of volatility for the prices of their products.
- **Variability of Input Prices** When input prices are highly variable, business risk tends to be high.
- **Proportion of Fixed Costs** If fixed costs represent a substantial proportion of total costs, other things being equal, business risk is likely to be high. This is because when fixed costs are high, PBIT is more sensitive to variations in demand.

Financial Risk It represents the risk emanating from financial leverage. When a firm employs a high proportion of debt in its capital structure, i.e. when it has a high degree of financial leverage, it carries a high burden of fixed financial commitment. Equity shareholders, who have a residual interest in the income and wealth of the firm, are naturally exposed to the risk arising from such fixed commitments. Equity shareholders face this risk, also referred to as financial risk, in addition to business risk.

Generally, the affairs of the firm are, or should be, managed in such a way that the total risk borne by equity shareholders, which consists of business risk plus financial risk, is not unduly high. This implies that if the firm is exposed to a high degree of business risk, its financial risk should be kept low. On the other hand, if the firm has a low business risk profile, it can assume more financial risk.

Control

Consider the case of a firm which presently has an equity capital of 1000 owned entirely by the original promoters. If the firm wants to raise some additional capital, say another 1000, it may go for debt finance, or a rights issue of equity capital, or a public issue of equity capital, or a combination of two or more of these. The pros and cons of the three basic ways of raising additional finance are shown below:

	Pros	Cons
• <i>Rights issue of equity capital</i>	No dilution of control	Severe limits on the financing
• <i>Debt capital</i>	No financial risk Relatively limited dilution of control Lower cost	Higher cost Financial risk
• <i>Public issue of equity capital</i>	No financial risk	Dilution of control Higher cost More onerous regulation

Since the rights issue option severely limits the financing ability of the firm—the present owners may lack resources or inclination or both—the options which may merit serious considerations are debt capital and public issue of equity capital. In evaluating these options, among other things, the issue of control is important.

Flexibility

Flexibility refers to the ability of a firm to raise capital from any source it wishes to tap. It provides manoeuvrability to the firm. Generally, if the return earned on equity is satisfactory, the firm can raise further equity capital as there is no restriction on the amount of equity capital a firm can raise. However, as the debt equity ratio is normally not permitted to exceed a certain level (which may be specified by some regulatory authority, or determined by financial institutions, or indicated by the capital market), the firm cannot presume that it can always raise further capital by issuing debt securities. Hence, flexibility for practical purposes may mean that the firm does not fully exhaust its debt capacity. Put differently, it implies that the firm maintains reserve borrowing power to enable it to raise debt capital to fund unforeseen needs.

■ Nature of Assets

The nature of a firm's assets has an important bearing on its capital structure. If the assets are primarily tangible (plant and machinery and buildings) and have a liquid resale/secondary market, debt finance is used more. For example, electric utility companies use more debt because their assets are mainly tangible, physical in nature. On the other hand, if the assets are primarily intangible (brands and technical know-how), debt finance is used less. For example, software companies use very little debt, as their assets are mainly intangible.

What explains the link between the nature of assets and the use of debt finance? The major explanation is that lenders are more willing to lend against tangible assets and less inclined to lend against intangible assets.

■ A Checklist

When should a firm use more equity and when should a firm use more debt. Here is a checklist:

Use more equity when

- The corporate tax rate applicable to the firm is negligible.
- Business risk exposure is high.
- Dilution of control is not an important issue.
- The assets of the firm are mostly intangible.
- The firm has many valuable growth options.

Use more debt when

- The corporate tax rate applicable to the firm is high.
- Business risk exposure is low.))
- Dilution of control is an issue.
- The assets of the firm are mostly tangible.))
- The firm has few growth options.))

■ 18.2 MENU OF FINANCING

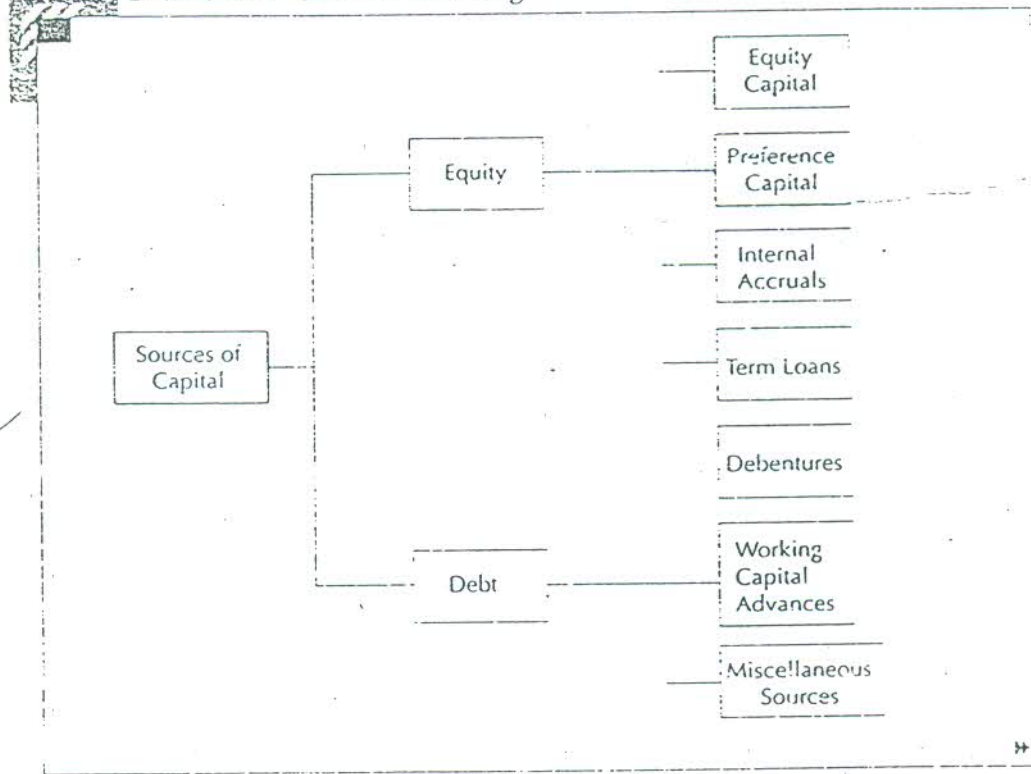
Equity and debt come in a variety of forms and are raised in different ways. The important forms are shown in Exhibit 18.3 which shows the menu of financing available to a firm. The various forms of financing are discussed in detail in the following sections.

■ Public and Private Sources of Capital

A firm can raise equity and debt capital from both public and private sources. Capital raised from public sources is in the form of securities offered to the public through an offer document filed with the Securities Exchange Board of India.¹ These securities can be traded on public secondary markets like the National Stock Exchange or the Bombay Stock Exchange, which are recognised stock exchanges that facilitate the trading of public securities.

1. This, however, does not apply when a firm raises fixed deposits or issues commercial paper.

Exhibit 18.3 *Menu of Financing*



Private capital comes either in the form of loans given by banks and financial institutions or in the form of securities like equity shares, preference shares, and debentures which are privately placed with a small group of sophisticated investors like venture capital firms, financial institutions, insurance companies, mutual funds, and wealthy individuals.

■ The Typical Pattern of Financing

When a company is formed, it first issues equity shares to the promoters (founders) and also, in most cases, raises loans from banks, financial institutions, and other sources. As the need for financing increases, the company may issue shares and debentures privately to promoters' relatives, friends, business partners, employees, financial institutions, banks, mutual funds, venture capital funds, and others—venture capital funds are likely to be an important source of finance for a nascent venture. Such investors are specific and small in number.

Basic Financial Variables

An Introduction to Concepts of NPV and IRR

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When a financial decision is made, four basic variables are taken in to consideration. These variables are:

- Present value of money (PV)
(Evaluating money by its purchasing power)
- Future value of money (FV)
(Value of money at certain point of time)
- Rate of interest per period (R)
- Number of periods (n)

Money has a cost. The cost of money affects its future value. We know this cost of money as "Interest Rate". Demand and supply of money determine the interest rate in the market.

If a commercial bank offers interest rate of 10% per annum, the deposit of Rs. 1000/- after a period of one year will grow to Rs. 1100/-, after two years to Rs. 1210/- and after three years to Rs.1331/-.

AFTER FIRST YEAR

$$\text{Rs. } 1000 + 10\% \text{ of Rs. } 1000 = \text{Rs. } 1100$$

Or

$$\text{Rs. } 1000 (1 + 10\%) = \text{Rs. } 1100 \dots\dots\dots(1)$$

AFTER SECOND YEAR

$$\text{Rs. } 1100 + 10\% \text{ of Rs. } 1100 = \text{Rs. } 1210$$

Or

$$\text{Rs. } 1100 (1 + 10\%) = \text{Rs. } 1210$$

Putting the value of Rs. 1100 from equation (1), we get

$$\text{Rs. } 1000 (1 + 10\%) (1 + 10\%) = \text{Rs. } 1210$$

Or

$$\text{Rs. } 1000 (1 + 10\%)^2 = \text{Rs. } 1210 \dots\dots\dots(2)$$

AFTER THIRD YEAR

$$\text{Rs. } 1210 + 10\% \text{ of } 1210 = \text{Rs. } 1331$$

Or

$$\text{Rs. } 1210 (1 + 10\%) = \text{Rs. } 1331$$

Putting the value of Rs. 1210 from equation (2), we get

$$\text{Rs. } 1000 (1 + 10\%)^2 (1 + 10\%) = \text{Rs. } 1330$$

Or

$$\text{Rs. } 1000 (1 + 10\%)^3 = \text{Rs. } 1330 \dots\dots\dots(3)$$

An amount of Rs. 1000 (PV) deposited in the bank for period of three years (n) at the interest rate of 10% (R) grows to Rs. 1331 (FV). We can express the relationship between these variables by the formula:

$$\text{FV} = \text{PV} (1 + R)^n \dots\dots\dots(a)$$

$$\text{Or } \text{PV} = \text{FV} \cdot 1 / (1 + R)^n \dots\dots\dots(b)$$

The above formula is very important and is frequently used in making financial decisions. Also, from the above-cited example it is very clear that the money has time value. "Rupee" to be received tomorrow is not equivalent to Rupee in hand today. If cost of money (Interest rate) is 10% per annum, then Rs. 1100 to be received after one year, or Rs. 1210 after two years or Rs. 1331 after three years are equivalent to Rs. 1000 in hand today. Since money always earns positive return; and different alternatives to which can be put to use, may provide different returns, an intelligent financial decision requires the comparison of available alternatives. Suppose, for buying a branded Computer specific configuration, three options are available to us:

- (A) Pay cash Rs. 30,000/-
- (B) Pay in instalments - 12 quarterly instalments Rs. 4,200/- each
- (C) Pay Rs. 50,000/- after 3 years

NOTE:- Interest Rate in the market is 15% per annum

We have to choose the most attractive offer and our choice should be based on a prudent financial decision.

First option can be exercised either through own funds or borrowed funds (we can lend or borrow money at 15%

selection amongst two or more alternative investment proposals is to be made, the project for which IRR is highest is selected.

Though it is easy to calculate IRR, its significance as an important parameter for assessing the worthiness of investment may not be instantly realized. What we exactly mean by 15% IRR? Why it is a precondition for accepting a project that IRR should be greater than COC? To answer these questions we take an example of a two-year investment proposal.

	YEAR		
	0	1	2
CASH FLOW	-162.58	+100	+100

Here IRR is 15%. If the funds required to finance the project are available at less than 15%, a profit will be made. The project will just break even, if the availability of funds is exactly at 15%. To check the above meaning of IRR, let us assume that a firm borrows Rs. 162.58 for implementation of the project and that the bank charges 15% interest, which is also IRR of the project. In such a situation the firm will earn no profit. This is illustrated in the table below:

	First Year	Second Year
Cash Inflow	+100	+100
Payment of Interest	-24.38	-13.04
Payment of Principal	-75.62	-86.96
Loan Outstanding at the beginning of the Year	162.58	86.96
Loan Outstanding at the end of the Year	86.96	NIL

At the end of the first year, out of the cash inflows of Rs. 100, the firm pays Rs. 24.38 as interest @15% and Rs. 75.62 towards repayment principal to the bank on its loan of Rs.162.58. At the end of the second year, interest payment comes to Rs. 13.04 {15% of (162.58-75.62)}. After paying Rs. 13.04 towards interest, the firm is left with Rs. 86.96 {Rs. 100-Rs. 13.04}, which is just sufficient to repay the outstanding loan amount. It is evident that the firm neither earns profit nor incurs loss from the project.



Net Present Value (NPV)

NPV of a project is the difference between the present value of future benefits (cash inflows) and the present value of investment outlay (cash outflows). We arrive at the present value of future benefits by discounting the future benefits at a rate, which reflects the value of alternate use of funds.

in the case of project A, the PV of Rs 1200/- at a discount rate of 10% comes to Rs. 1090/-, the initial investment outlay being Rs.1000/-, NPV is Rs. 90/- (PV of Future Benefits-PV of Investment Outlay), which is positive. Similarly, NPV of project E is also positive, but NPVs of projects B & D are negative. There is relationship between discount rate and NPV. If we discount the future benefits by 12% (Bank offers higher interest rate of 12% instead of 10%), the NPVs of the projects will get reduced. In case bank offers interest rate higher than 12%, then bank as an investment alternative becomes attractive as compared to investment in projects A, B, C, D & E.

Let us take another example:

PERIOD	0	1	2	3	4	5
CASH FLOW (Rs. in Lac)	-600	150	250	300	300	200

$$\begin{aligned} \text{NPV (AT 15\%)} &= -600/(1+15\%)^0 + 150/(1+15\%)^1 + 250/(1+15\%)^2 + 300/(1+15\%)^3 + 300/(1+15\%)^4 + 200/(1+15\%)^5 \\ &= \text{Rs. 187.69 lakh} \end{aligned}$$

NOTE: - Here we have assumed that the Opportunity Cost of the funds of Rs. 600 lakh is 15%. In a competitive environment this Opportunity Cost is equal to the cost of raising the capital.

Similarly, NPV at different Cost of Capital can be calculated.

Cost Of Capital (in Percentage)	Net Present Value (Rs. in Lakh)
15%	187.69
20%	97.27
25%	22.02
30%	-41.23
35%	-94.86
40%	-140.70

It may be seen from above that as we increase discount rate (based on the Cost of Funds), the NPV decreases and turns into negative. At a discount rate of 25% NPV is positive and at 30% it is negative. At a certain Cost of Capital, the NPV of the project is calculated. The project is taken for consideration if the NPV is positive and is rejected if NPV is negative. When selection is to be made between two or more alternative projects, the project with highest NPV is selected

Internal Rate Of Return (IRR)

IRR is another measure of investment worth. It is defined as that discount rate, which makes NPV equal to zero. It makes the present value of cash outflows of a project equal to the present value of future cash inflows. For calculating IRR, "trial and error" method is used. For a given future cash flows and capital outlay, two consecutive discount rates - one at which NPV is positive and other at which NPV is negative - are searched. In the above example, at the discount rate of 25%, the NPV is positive (Rs. 22.02 lakh) and at 30% it is negative (-Rs.41.23 lakh), which means that at the discount rate which lies in-between 25% & 30%, the NPV of the project becomes zero. And this discount rate at which NPV becomes zero, is IRR and is calculated by Interpolation formula:

$$\text{IRR} = \frac{\text{Lower Discount Rate} + \text{Difference between Discount Rates} \times \text{NPV at Lower Discount Rate}}{\text{Absolute Difference between NPVs}}$$

$$\begin{aligned} \text{IRR} &= 25 + \{ 5 \times 22.02/63.25 \} \\ &= 26.74\% \end{aligned}$$

For the purpose of arriving at an investment decision, the IRR of the project under consideration is compared with COC (Cost of Capital). The project is accepted when $\text{IRR} > \text{COC}$ and rejected when $\text{IRR} < \text{COC}$. When the

annum). We may calculate the value of Rs. 30,000/-, (to be paid in cash, at the time of purchase of Computer) after a period of 3 years (12 Quarters) @ 15% P.A

$$FV = PV (1 + R/4)^n \text{ (here n being number of quarters)}$$

Putting the values, we get,

$$FV = Rs 30000 (1 + 0.15/4)^{12}$$

Rs. 46664/-

For analyzing offer B, we have to arrive at the Present Value of the total payoff of 12 quarterly instalments, each of Rs. 4200/-, applying interest rate of 15% P.A. (quarterly rest)

Quarter	1	2	3	12
Instalments	4200	4200	4200	4200

$$\text{Present Value} = \frac{4200}{(1+3.75)} + \frac{4200}{(1+3.75)^2} + \frac{4200}{(1+3.75)^3} + \dots + \frac{4200}{(1+3.75)^{12}}$$

Adding the PVs of all instalments, we get:

$$4200 \left[\frac{1}{(1+3.75)} + \frac{1}{(1+3.75)^2} + \frac{1}{(1+3.75)^3} + \dots + \frac{1}{(1+3.75)^{12}} \right]$$

OR Rs. 39,995/-

Similarly, Future Value (FV) of the above payoff can also be calculated, which comes to Rs. 62211/-

Under offer C, Present Value (PV) of Rs. 50000/- (the amount which is to be paid after three years) is calculated

$$PV = \frac{FV}{(1 + R)^n}$$

Putting the values, we get

$$PV = \frac{50000}{(1 + 3.75\%)^{12}}$$

Rs. 32145/-

The results so obtained, are arranged in a tabular form

OFFERS	PRESENT VALUE	FUTURE VALUE
A	Rs. 30000/-	Rs. 46665/-
B	Rs. 39995/-	Rs. 62211/-
C	Rs. 32145/-	Rs. 50000/-

In the above table we have brought all the three Offers to the same point of time. Now it has become easy for us to compare these Offers. Offer A is the most attractive where the Present Value or the Future Value is the least. The technique of comparing the alternatives by using four basic variables and making financial decision is applied in Capital Budgeting Process. The capital investment decision involves comparison of present outlay (cash outflow) with future benefits (cash inflows).

Supposing that an investment outlay of Rs. 1000/- from different projects A, B, C, D and E gives the future benefits as under:

Project/Period	Year 0	Year 1	Future Value Bank As Alternative	Present Value Of Future Benefits
	Outlay	Future Benefit	(10%)	(10%)
A	-1000	1200	1100	1090
B	-1000	1050	1100	954
C	-1000	1100	1100	1000
D	-1000	1000	1100	909
E	-1000	1150	1100	1045

NOTE: - BANK OFFERS 10% P.A. ANNUAL COMPOUNDING ASSUMED

If the amount of Rs. 1000/- is deposited in bank, it will grow to Rs. 1100/- after a period of one year. Thus, the future value of Rs. 1000/-, as far as the bank as an alternative is concerned, is Rs. 1100/- Further, the Present Values of future benefits from the projects A, B, C, D and E (at the rate of 10%) are Rs. 1090/-, Rs. 954/-, Rs. 1000/-, Rs. 909/- and Rs. 1045/- respectively. It will be seen that, in case of projects A and B, the future benefits of Rs. 1200 and Rs. 1150 respectively, are more than the benefits of Rs. 1100/- from bank., and also that there are two ways to make Rs. 1200/-:

Choose project A and invest Rs. 1000/-

OR

Choose bank and deposit Rs. 1090/-

Obviously it would be prudent financial decision to invest in project A rather than depositing the amount in bank.

5.1 Discounted Cash Flow Method :

5.1.1 Most of the capital investment decisions relate to expenditure for long lived items like machinery etc. A characteristic of this type of investments is the commitment of future costs and the depreciations of the first cost over the life of the equipment. The investment decisions are made with regard to the lowest acceptable rate of return on the investment. The decision will always be between two or more alternatives. At the very minimum, the alternative will be the existing procedure versus the proposed one.

For any investment decision, the lowest acceptable rate of return must be at least cost of capital. It is obvious that an investment should not be made if it does not return at least the cost of capital. Investments are generally ranked according to the return they yield in excess of their cost of capital. Discounted Cash Flow Method (DCF) is one of the methods for evaluating investment proposals using rate of return. We first give a brief background on other simpler approaches and then present the DCF method which uses the rate of return approach.

5.1.2 Interest considerations :

a. Compound Value :

The compound value of a sum say Rs. 100 is the value of the sum after it earns an annual rate of interest for a specific time duration.

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V/QNT

The interest is compounded ; i.e. during each period, interest is earned on the initial sum plus the interest earned upto the preceeding period. Suppose the annual interest is $i\%$. Then value of the sum after one year is given by

Value after one year

$$= \text{Initial Value} + \text{interest during the year}$$

$$= \text{Initial Value} + \text{Initial Value} \times \frac{i}{100}$$

$$= \text{Initial Value} \left(1 + \frac{i}{100} \right)$$

Similarly, value after second year

$$= \text{Value after first year} + \text{Interest during second year}$$

$$= \text{Value after first year} + \text{value after first year} \times \frac{i}{100}$$

$$= \text{Value after first year} \left(1 + \frac{i}{100} \right)$$

$$= \text{Initial value} \left(1 + \frac{i}{100} \right)^2$$

Thus if we define

$$P = \text{Initial value of sum}$$

$$S_j = \text{Value at the end of } j\text{th year}$$

and $i = \text{Interest rate (on unit capital)}$

$$\text{Then } S_n = P(1+i)^n \quad (5.1)$$

For example if the initial sum is Rs. 100 and interest rate is 10, then compound values are as given below :

Year	Value at the beginning of the year	$(1+i)$	Value at the end of the year
1	Rs. 100.00	1.1	Rs. 110.00
2	Rs. 110.00	1.1	Rs. 121.00
3	Rs. 121.00	1.1	Rs. 133.10
4..	Rs. 133.10	1.1	Rs. 146.41

(205)

Y/QNT

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$$S = P(1+i)^n$$

$$S = \frac{R(1+i)^n - 1}{i}$$

$$P = \frac{R(1+i)^n - 1}{i}$$

Similarly compound value of an annuity can be computed. An annuity is the receipt of an equal value of funds at the end of every year for a specified number of years. Since, the receipt is at the end of the year, it does not earn interest for that year. Suppose, we get Rs. 100 at the end of each year for four years. Then compound value at the end of fourth year can be computed as shown below, assuming an interest rate of 10%.

Year	Sum received at the end of the year	No. of years till the end of the period i.e. 4th year	Compound value of the sum
1	Rs. 100	3	$100(1+.10)^3 = \text{Rs. } 133.10$
2	Rs. 100	2	$100(1+.10)^2 = \text{Rs. } 121.00$
3	Rs. 100	1	$100(1+.10)^1 = \text{Rs. } 110.00$
4	Rs. 100	0	100 = Rs. 100.00
			Total compound value = Rs. 464.10

Let R_j = Receipt at the end of j th year

i = interest rate

S_n = Compound value of annuity

Then $S_n = R_1(1+i)^{n-1} + R_2(1+i)^{n-2} + \dots + R_{n-1}(1+i)^1 + R_n$

$$= R[(1+i)^{n-1} + (1+i)^{n-2} + \dots + (1+i)^1 + 1]$$

(Since $R_1 = R_2 \dots = R_n = R$)

$$= R \frac{(1+i)^n - 1}{(1+i) - 1}$$

$$= R \frac{(1+i)^n - 1}{i}$$

(5.2)

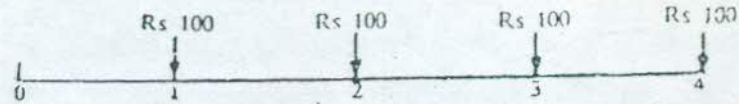
The flow of cash in an investment proposal is generally represented using a time-scale. On this scale the units of time are interest periods. Thus when the interest period is yearly, as used before, the units of time used on the time scale will be years. The rupee amounts are written above the line. Unless otherwise stated, the sums on the time scale will be taken as disbursements *not*

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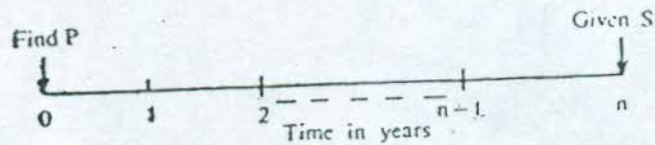
income. Thus the annual disbursements of Rs. 100 for four years can be represented as



b. Present Value

Present value is used to determine the current value of a sum stream of receipts expected to be received in the future.

Case 1. Given a future sum S , x periods later, find its value today, using the interest rate i . Using time scale :

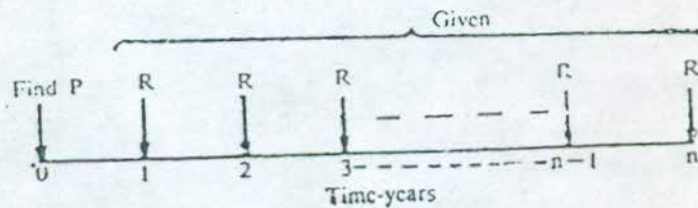


This is just inverse of finding the compound value. Given P today, the compound value S after n years is given by :

$$S = P(1+i)^n$$

Hence $P = \frac{S}{(1+i)^n}$ (5.3)

Case 2. Given, future series of end of the period payments, find the value of the present sum P using compound interest " i ". Using time scale diagram :



$$P = \frac{R}{(1+i)} + \frac{R}{(1+i)^2} + \dots + \frac{R}{(1+i)^{n-1}} + \frac{R}{(1+i)^n}$$

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$$= R \left[\frac{1}{1+i} + \frac{1}{(1+i)^2} + \dots + \frac{1}{(1+i)^{n-1}} + \frac{1}{(1+i)^n} \right]$$

$$= R \left\{ \frac{\frac{1}{1+i} \left(1 - \frac{1}{(1+i)^n} \right)}{\left(1 - \frac{1}{1+i} \right)} \right\} \quad \text{using sum of a geometric series}$$

$$= R \left\{ \frac{(1+i)^n - 1}{i(1+i)^n} \right\} \quad (5.4)$$

All the formulas derived above need not be used to compute the present or compound values. In practice, tables are available giving these computations for different values of i and n .

5.1.3 Evaluation of Investment Proposals :

The most common methods of evaluating alternative investments may be divided into the following categories

- a. An annual cost comparison
- b. A present worth comparison
- c. A rate of return comparison

We will briefly discuss each of the approaches here.

5.1.3.1 Annual Cost Comparisons :

In this method, the costs for each alternative proposal are converted into an equivalent annual series. The annual cost method is frequently used because the concept of annual cost is much more common than present worth or compound value. Here, the alternative with the lowest series will be the preferred alternative. Let us consider the following example :

A company plans to purchase a new machine. They can purchase a new special purpose machine for Rs. 70,000. The annual cost including operating costs, labour, maintenance etc. is Rs. 20,000. As an alternative, a new general purpose machine can be purchased for Rs. 50,000 with operating cost of Rs. 30,000 per year. Both machines are expected to be operated for 5 years, at which time their salvage values are expected to be Rs. 10,000 and Rs. 5,000 respectively. The company's minimum required rate of return is 12%. Which machine should be purchased ?

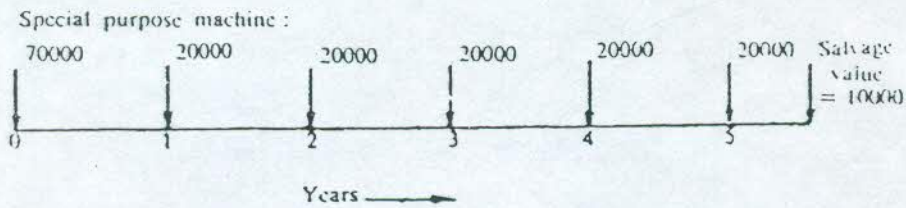
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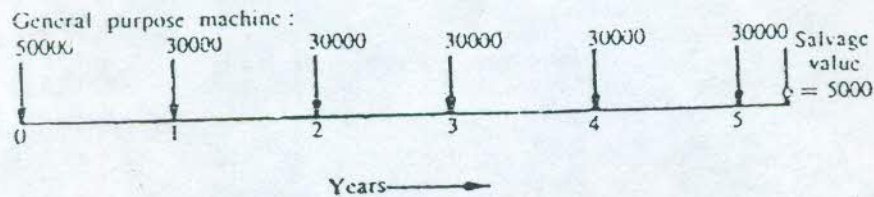
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Using time scales the cash flows for the two alternatives can be represented as follows :

Special purpose machine :



General purpose machine :



In the annual cost comparison, for each machine, we determine the equivalent annual value

Special purpose machine :

Equivalent Annual cost for Rs. 70000 at time 0 can be obtained by applying the formula in equation (5.4)

$$P = R \left\{ \frac{(1+i)^n - 1}{i(1+i)^n} \right\}$$

$$\text{or } R = P \left\{ \frac{i(1+i)^n}{(1+i)^n - 1} \right\}$$

$$\text{or } R = 70000 \left\{ \frac{.12(1.12)^5}{(1.12)^5 - 1} \right\}$$

$$= 70000/3.605$$

$$= \text{Rs. } 19417.$$

Equivalent annual cost for Rs. 10000 at time 5 can be computed using formula in equation (5.2)

$$S_n = R \left(\frac{(1+i)^n - 1}{i} \right)$$

$$\text{or } R = S_n \left(\frac{i}{(1+i)^n - 1} \right)$$

$$= 10000 \left(\frac{.12}{(1.12)^5 - 1} \right)$$

$$= \frac{10000}{6.353}$$

$$= \text{Rs. } 1573$$

Similarly for General Purpose Machine :

equivalent annual cost for Rs. 50000 at time 0

$$= \frac{50000}{3,605}$$

$$= \text{Rs. } 13869.30$$

and equivalent annual cost for is 5000 at time 5

$$= \frac{5000}{6.353}$$

$$= \text{Rs. } 786.50$$

Thus the two alternatives can be compared as follows :

	<i>Equivalent Annual Costs</i>	
	Special purpose	General purpose
Initial Investment	Rs. 19,417.00	Rs. 13,869.30
Operating Costs	20,000.00	30,000.00
Total Costs	Rs. <u>39,417.00</u>	Rs. <u>43,869.30</u>

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Equivalent Annual Costs

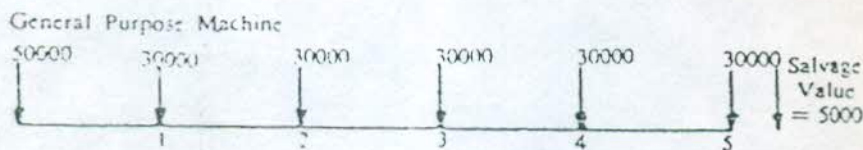
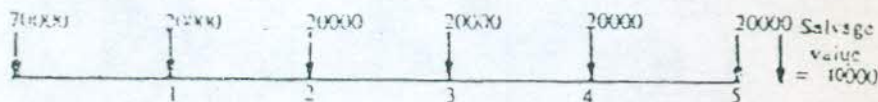
	Special purpose	General purpose
Less :		
Salvage value	Rs. 1,573.00	Rs. 786.50
Total Annual Cost	Rs. 37,844.00	Rs. 43,082.50

Thus special purpose machine with a lower equivalent annual cost should be purchased. As mentioned before, interest tables are readily available for the computation shown above and there is no need in practice to compute using actual formulas as we have done here.

5.1.3.2 Present Worth Analysis :

Present worth method consists of reducing all future cash flows to a single equivalent present sum for each alternative. In this method, one should be careful to ensure that the present worth for different alternatives for equal time periods is computed.

We illustrate this method using the same example considered before. The time scale diagrams are Special Purpose Machine :



Special Purpose Machine :

Present worth of the annuity (Rs. 20000) can be computed using formula (5.4)

$$P = R \left\{ \frac{(1+i)^n - 1}{i(1+i)^n} \right\}$$

$$= 20000 \left\{ \frac{(1.12)^5 - 1}{.12(1.12)^5} \right\}$$

$$= 20000 \times 3.605$$

$$= \text{Rs. } 72,100$$

Present worth of salvage value of Rs. 1000 at time 5 can be computed using formula (5.3)

$$P = \frac{S_n}{(1+i)^n} = \frac{10000}{(1.12)^5} = 10000 \times .567 = \text{Rs. } 5670.00$$

Similarly for general purpose machine

Present worth of annuity of Rs. 30000 is given by

$$P = 30,000 \times 3.605$$

$$= \text{Rs. } 108,150.00$$

Present worth of Rs. 5000 at time 5 is given by

$$P = 5000 \times .567$$

$$= \text{Rs. } 2835.00$$

Thus present worth comparison for two alternatives can be done as follows :

	Present worth	
	Special purpose machine	General purpose machine
1. Initial Investment	Rs. 70000.00	Rs. 50000.00
2. Operating costs	72100.00	108150.00
	Rs. 142100.00	Rs. 158150.00
Less :		
Salvage value	Rs. 5670.00	Rs. 2835.00
Net present worth	Rs. 136430.00	Rs. 155315.00

Here, again the special purpose machine with the lower present worth will be selected. It can be seen that the equivalent annual cost for the total present worth is the same as computed as total annual cost in previous section.

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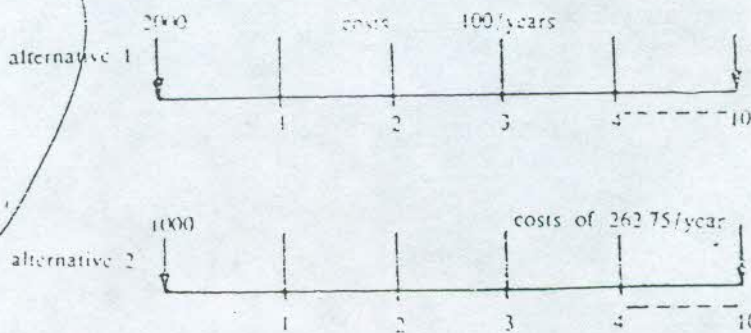
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5.1.3.3 Discounted Cash Flow Method (Rate of Return Comparison):

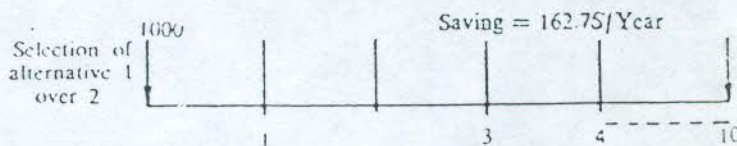
The internal rate of return for an organisation may be defined as the interest rate which equates the present value of an income stream with the cost of an investment. Let us consider the following example to illustrate this method. The two alternatives are:

to see
basic
D C F



NPV
IRR

The problem of selecting alternative 1 over alternative 2 can be expressed on the time scale as follows:



Here converting all the costs and savings to equivalent annuities, and equating annual equivalent cost (AC) to annual equivalent savings (AS) the rate of return can be determined.

This can be solved by trial and error method as given below.

First trial $i=0$:

For $i=0$, the costs and savings can be summed up without any interest calculations.

Thus

$$AC = \frac{1000}{10} = 100$$

$$AS = 162.75$$

Thus

$$AC < AS \quad \text{by } 162.75 - 100 \\ \text{or Rs. } 62.75$$

(KCPGZ/10)

This can be interpreted that the investment is recovered with zero rate of return plus Rs. 62.75 per year.

$$\text{Hence approximate rate of return } "i" = \frac{62.75}{1000}$$

$$= .06275$$

or approximately 6%

The true rate of return is always higher than the approximate rate of return.

Thus for second trial we assume $i > 6\%$

or $i = 12\%$ (say)

Second trial $i = 12\%$:

Then AC = Equivalent annual cost of Rs. 1000 at time 0 spread over 10 years.

$$= 1000 \left(\frac{i(1+i)^n}{(1+i)^n - 1} \right)$$

$$= \frac{1000}{5.650} \text{ Rs. } 176.90$$

$$AS = 162.75$$

Here $AC > AS$ by $176.90 - 162.75$

$$= \text{Rs. } 14.15$$

This shows that at 12% interest costs exceeds incomes or the investment fails to be recovered with 12% return by Rs. 14.15 per year. Thus the true i will be less than 12%. In the next trial we try $i = 10\%$.

Third trial $i = 10\%$:

$$\text{Here } AC = 1000 \left(\frac{i(1+i)^{10}}{(1+i)^{10} - 1} \right)$$

$$= \frac{1000}{6.145} = \text{Rs. } 162.75$$

$$AS = 162.75$$

(2145)

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20.4

Thus $AC=AS$

This shows that investment is recovered at 10% interest.

Hence the rate of return = 10%

From here we conclude that if minimum rate of return is 10% or less then alternative 1 should be selected over alternative 2. However, if the minimum required rate of return is greater than 10%, we should select alternative 2 over 1. By selecting alternative 2, we make an immediate savings of Rs. 1000. Later annual payments of Rs. 162.75 over the next 10 years have to be made.

In general, the precise value of i cannot be computed by this method. By successive trials, we can find the range in which the true rate of return lies. From this by interpolation, we can approximate the rate of return. For example, suppose for a given problem for $i=6%$, $AC < AS$ by Rs. 50.

Then let us say for $i=7%$ $AC > AS$ by Rs. 100. This implies that true value of i is between 6% and 7%. Thus by interpolation

$$i = 6\% + \left(\frac{50}{50+100} \right) (7\% - 6\%)$$

$$= 6\% + \frac{1}{3} 1\%$$

$$= 6.34\%$$

Risk Analysis of Single Investments

Risk is inherent in almost every business decision. More so in capital budgeting decisions as they involve costs and benefits extending over a long period of time during which many things can change in unanticipated ways.

For the sake of expository convenience, we have assumed so far that all the investments being considered for inclusion in the capital budget had the same risk as those of the existing investments of the firm. Hence the average cost of capital was used for evaluating every project. Investment proposals, however, differ in risk. A research and development project may be more risky than an expansion project and the latter tends to be more risky than a replacement project. In view of such differences, variations in risk need to be evaluated explicitly in capital investment appraisal.

Risk analysis is one of the most complex and slippery aspects of capital budgeting. Many different techniques have been suggested and no single technique can be deemed as best in all situations. The variety of techniques suggested to handle risk in capital budgeting fall into two broad categories: (i) Techniques that consider the stand-alone risk of a project. (ii) Techniques that consider the risk of a project in the context of the firm or in the context of the market.

This chapter discusses different techniques that consider the stand-alone risk of a project, examines ways of managing risk, explores various approaches to project selection under risk, and describes risk analysis in practice. It is divided into eleven sections as follows:

- Sources, measures, and perspectives on risk
- Sensitivity analysis
- Scenario analysis
- Break-even analysis
- Hillier model
- Simulation analysis
- Decision tree analysis
- Managing risk

11.1 SOURCES, MEASURES, AND PERSPECTIVES ON RISK

Sources of Risk

There are several sources of risk in a project. The important ones are project-specific risk, competitive risk, industry-specific risk, market risk, and international risk.

Project-specific risk The earnings and cash flows of the project may be lower than expected because of an estimation error or due to some other factors specific to the project like the quality of management.

Competitive risk The earnings and cash flows of the project may be affected by the unanticipated actions of the competitors.

Industry-specific risk Unexpected technological developments and regulatory changes, that are specific to the industry to which the project belongs, will have an impact on the earnings and cash flows of the project as well.

Market risk Unanticipated changes in macroeconomic factors like the GDP growth rate, interest rate, and inflation have an impact on all projects, albeit in varying degrees.

International risk In the case of a foreign project, the earnings and cash flows may be different than expected due to the exchange rate risk or political risk.

Measures of Risk

Risk refers to variability. It is a complex and multi-faceted phenomenon. A variety of measures have been used to capture different facets of risk. The more important ones are: range, standard deviation, coefficient of variation, and semi-variance.

To illustrate the calculation of these measures, consider a capital investment whose net present value has the following distribution.

NPV	Probability
200	0.3
600	0.5
900	0.2

The expected NPV works out to:

$$E(NPV) = \sum_{i=1}^3 p_i NPV_i$$

$$= 0.3 \times 200 + 0.5 \times 600 + 0.2 \times 900 = 540$$

Now let us look at the various measures of risk.

Range Obviously the simplest measure of risk, the range of a distribution is the difference between the highest value and the lowest value. The range of the above distribution is: $900 - 200 = 700$.

Standard Deviation The standard deviation of a distribution is:

$$\sigma = [\sum p_i (X_i - \bar{X})^2]^{1/2} \quad (11.1)$$

where

σ = standard deviation

p_i = probability associated with the i th value

X_i = i th value

\bar{X} = expected value

The standard deviation of the NPV distribution presented above is:

$$\begin{aligned} \sigma &= [0.3 (200 - 540)^2 + 0.5 (600 - 540)^2 + 0.2 (900 - 540)^2]^{1/2} \\ &= [62,500]^{1/2} = 250 \end{aligned}$$

The square of standard deviation is called variance

$$\text{Variance} = \sigma^2$$

The variance of the above distribution is 62,500.

Coefficient of Variation One problem with standard deviation (or variance) is that it is not adjusted for scale. If you go only by standard deviation, an investment with an expected net present value of Rs 10 million and a standard deviation of Rs 100,000 would be considered more risky than an investment with an expected net present value of Rs 1 million and a standard deviation of Rs 90,000.

The coefficient of variation (CV) adjusts standard deviation for scale. It is defined as:

$$CV = \frac{\text{Standard deviation}}{\text{Expected value}}$$

The coefficient of variation for the investment in our illustration is:

$$CV = \frac{250}{540} = 0.46$$

Semi-Variance There is yet another problem with standard deviation (or variance). It considers all deviations, positive as well as negative, from the expected value in the same way. Since investors are concerned about only negative deviations, semi-variance seems to be a more suitable measure of risk.

The semi-variance is computed the way the variance is computed, except that only outcomes below the expected value are taken into account. It is defined as:

$$SV = \sum p_i d_i'^2 \quad (11.2)$$

where d_i' is equal to d_i if $d_i < 0$ and is equal to 0 if $d_i \geq 0$

The semi-variance for the investment in our illustration is:

$$SV = 0.3 (200 - 540)^2 = 34,680$$

The semi-standard deviation is the square root of semi-variance. The semi-standard deviation for the investment in our illustration is:

$$\begin{aligned} \text{Semi-standard deviation} &= (\text{Semi-variance})^{1/2} \\ &= (34680)^{1/2} = 186.2 \end{aligned}$$

The Principal Measure Despite the limitations pointed out, standard deviation is the most commonly used measure of risk in finance. The main reasons for using standard deviation are as follows: (i) If a variable is normally distributed, its mean and standard deviation contain all the information about its probability distribution. (ii) If the utility of money is represented by a quadratic function (a function commonly suggested to represent diminishing marginal utility of wealth), then the expected utility is a function of the mean and standard deviation. (iii) Standard deviation is analytically easily tractable.

Use of Subjective Probabilities For measuring the expected value and dispersion of a variable, its probability distribution is required. In some cases the probability distribution can be defined with a fairly high degree of objectivity on the basis of past evidence. A wildcatter, for example, may be able to define with a high degree of objectivity the probabilities associated with certain states of nature if sufficient records for similar ventures are available. Since such a probability distribution is substantially based on objective facts, it may be referred to as 'objective' probability distribution.

However, in most real-life situations, such objective evidence may not be available for defining probability distributions. In such cases, knowledgeable persons may pool their experience and judgment to define the probability distribution. Since there is likely to be a high element of subjectivity in these distributions, such distributions are generally referred to as 'subjective' probability distributions.

Perspectives on Risk

Regardless of the risk measure employed, there are different perspectives on risk. You can view a project from at least three different perspectives. These are:

Stand-alone risk This represents the risk of a project when it is viewed in isolation.

Firm risk Also called *corporate risk*, this reflects the contribution of a project to the risk of the firm.

Systematic risk This represents the risk of a project from the point of view of a diversified investor. It is also called *market risk*.

This chapter focuses on stand-alone risk and the following chapter examines firm risk and market risk. There are several reasons for starting with single investment risk analysis, which are:

- The proponent of a capital investment in a large organisation often does not have information about all the projects of the firm to measure the contribution of his proposed investment to the riskiness of the firm as a whole.
- The proponent of a capital investment is likely to be judged on the performance of that investment. Hence he will naturally be concerned about its stand-alone risk and not about its contribution to the risk of the firm or the risk of a diversified investor.
- Analysis of the stand-alone risk of an investment is often a prerequisite for evaluating the contribution of an investment to the risk of the firm and the risk of a diversified investor.
- In most firms, the capital budgeting committee considers investment proposals one at a time. The committee often does not have the time or information or expertise to fully consider the interactions of the investments with the other investments of the firm or its shareholders.

11.2 SENSITIVITY ANALYSIS

Since the future is uncertain, you may like to know what will happen to the viability of the project when some variable like sales or investment deviates from its expected value. In other words, you may want to do a "what if" analysis or sensitivity analysis.

To understand the nature of a sensitivity analysis, let us consider an example. Suppose you are the financial manager of Naveen Flour Mills. Naveen is considering setting up a new flour mill near Bangalore. Based on Naveen's previous experience, the project staff of Naveen has developed the figures shown in Exhibit 11.1. (Note that the salvage value has been assumed to be nil.)

Exhibit 11.1 *Cash Flow Forecast for Naveen's Flour Mill Project*

	(Rs in '000)	
	Year 0	Years 1-10
1. Investment	(20,000)	
2. Sales		18,000
3. Variable costs (66 $\frac{2}{3}$ % of sales)		12,000
4. Fixed costs		1,000
5. Depreciation		2,000
6. Pre-tax profit		3,000
7. Taxes		1,000
8. Profit after taxes		2,000
9. Cash flow from operation		4,000
10. Net cash flow	(20,000)	4,000

Since the cash flow from operations is an annuity, the *NPV* of the flour mill project is:

$$\begin{aligned}
 & -20,000,000 + 4,000,000 \times PVIFA (r = 12\%, n = 10) \\
 & -20,000,000 + 4,000,000 (5.650) \\
 & = 2,600,000
 \end{aligned}$$

The *NPV* based on the expected values of the underlying variables looks positive. You are, however, aware that the underlying variables can vary widely and hence you would like to explore the effect of such variations on the *NPV*. So you define the optimistic and pessimistic estimates for the underlying variables. These are shown in the left hand columns of Exhibit 11.2. With this information, you can calculate the *NPV* for the optimistic and pessimistic values of each of the underlying variables.

Exhibit 11.2 Sensitivity of *NPV* to Variations in the Value of Key Variables

Key Variable	Rs in million					
	Range			NPV		
	Pessimistic	Expected	Optimistic	Pessimistic	Expected	Optimistic
Investment (Rs in million)	24	20	18	-0.65	2.60	4.22
Sales (Rs in million)	15	18	21	-1.17	2.60	6.40
Variable costs as a percent of sales	70	66.66	65	0.34	2.60	3.73
Fixed costs	1.3	1.0	0.8	1.47	2.60	3.33

To do this, vary one variable at a time. For example, to study the effect of an adverse variation in sales (from the expected Rs 18 million to the pessimistic Rs 15 million), you maintain the values of the other underlying variables at their expected levels. (This means that the investment is held at Rs 20 million, variable costs as a proportion of sales are held at $66\frac{2}{3}$ percent, fixed costs are held at Rs 1 million, so on and so forth.)

The *NPV* when the sales are at their pessimistic level and other variables at their expected level is shown on the right side of Exhibit 11.2. Likewise you can calculate the effect of variations in the values of the other underlying variables. The *NPVs* for the pessimistic, expected, and optimistic forecasts are shown on the right side of Exhibit 11.2.

Evaluation

A very popular method for assessing risk, sensitivity analysis has certain *merits*:

- It shows how robust or vulnerable a project is to changes in values of the underlying variables.
- It indicates where further work may be done. If the net present value is highly sensitive to changes in some factor, it may be worthwhile to explore how the variability of that critical factor may be contained.

- It is intuitively a very appealing as it articulates the concerns that project evaluators normally have.

Notwithstanding its appeal and popularity, sensitivity analysis suffers from several *shortcomings*:

- It merely shows what happens to *NPV* when there is a change in some variable, without providing any idea of how likely that change will be.
- Typically, in sensitivity analysis only one variable is changed at a time. In the real world, however, variables tend to move together.
- It is inherently a very subjective analysis. The same sensitivity analysis may lead one decision maker to accept the project while another may reject it.

11.3 SCENARIO ANALYSIS

In sensitivity analysis, typically one variable is varied at a time. If variables are inter-related, as they are most likely to be, it will be helpful to look at some plausible scenarios, each scenario representing a consistent combination of variables.

Procedure

The steps involved in scenario analysis are as follows:

1. Select the factor around which scenarios will be built. The factor chosen must be the largest source of uncertainty for the success of the project. It may be the state of the economy or interest rate or technological development or response of the market.
2. Estimate the values of each of the variables in investment analysis (investment outlay, revenues, costs, project life, and so on) for each scenario.
3. Calculate the net present value and/or internal rate of return under each scenario.

Illustration

Zen Enterprises is evaluating a project for introducing a new product. Depending on the response of the market—the factor which is the largest source of uncertainty for the success of the project—the management of the firm has identified three scenarios:

- Scenario 1*: The product will have a moderate appeal to customers across the board at a modest price.
- Scenario 2*: The product will have a strong appeal to a large segment of the market which is highly price-sensitive.
- Scenario 3*: The product will appeal to a small segment of the market which will be willing to pay a high price.

Exhibit 11.3 shows the net present value calculation for the project.

Exhibit 11.3 *Net Present Value Calculation for Three Scenarios*

	(Rs in million)		
	Scenario 1	Scenario 2	Scenario 3
Initial investment	200	200	200
Unit selling price (in rupees)	25	15	40
Demand (in units)	20	40	10
Revenues	500	600	400
Variable costs	240	480	120
Fixed costs	50	50	50
Depreciation	20	20	20
Pre-tax profit	190	50	210
Tax @ 50%	95	25	105
Profit after tax	95	25	105
Annual cash flow	115	45	125
Project life	10 years	10 years	10 years
Salvage value	0	0	0
Net present value (at a discount rate of 15 percent)	377.2	25.9	427.4

Best and Worst Case Analysis

In the above illustration, an attempt was made to develop scenarios in which the values of the variables were internally consistent. For example, high selling price and low demand typically go hand in hand. Firms often do another kind of scenario analysis called the best case and worst case analysis. In this kind of analysis the following scenarios are considered:

- Best Scenario* High demand, high selling price, low variable cost, and so on.
- Normal Scenario* Average demand, average selling price, average variable cost, and so on.
- Worst Scenario* Low demand, low selling price, high variable cost, and so on.

The objective of such a scenario analysis is to get a feel of what happens under the most favourable or the most adverse configuration of key variables, without bothering much about the internal consistency of such configurations.

Evaluation

Scenario analysis may be regarded as an improvement over sensitivity analysis because it considers variations in several variables together.

However, scenario analysis has its own *limitations*:

- It is based on the assumption that there are few well-delineated scenarios. This may not be true in many cases. For example, the economy does not necessarily lie in three discrete states, viz., recession, stability, and boom. It can, in fact, be anywhere on the continuum between the extremes. When a continuum is converted into three discrete states some information is lost.

- Scenario analysis expands the concept of estimating the expected values. Thus in a case where there are 10 inputs, the analyst has to estimate 30 expected values (3×10) to do the scenario analysis.

11.4 BREAK-EVEN ANALYSIS

In sensitivity analysis we ask what will happen to the project if sales decline or costs increase or something else happens. As a financial manager, you will also be interested in knowing how much should be produced and sold at a minimum to ensure that the project does not 'lose money'. Such an exercise is called *break-even analysis* and the minimum quantity at which loss is avoided is called the break-even point. The break-even point may be defined in accounting terms or financial terms.

Accounting Break-even Analysis

Suppose you are the financial manager of Naveen Flour Mills. Naveen is considering setting up a new flour mill near Bangalore. Based on Naveen's previous experience, the project staff of Naveen has developed the figures shown in Exhibit 11.4.

Note that the ratio of variable costs to sales is 0.667 (12/18). This means that every rupee of sales makes a contribution of Rs 0.333. Put differently, the contribution margin ratio is 0.333. Hence the break-even level of sales will be:

$$\frac{\text{Fixed costs} + \text{Depreciation}}{\text{Contribution margin ratio}} = \frac{1 + 2}{0.333} = \text{Rs 9 million}$$

Exhibit 11.4 Cash Flow Forecast for Naveen's Flour Mill Project

	(Rs in '000)	
	Year 0	Years 1-10
1. Investment	(20,000)	
2. Sales		18,000
3. Variable costs (66 ² / ₃ % of sales)		12,000
4. Fixed costs		1,000
5. Depreciation		2,000
6. Pre-tax profit		3,000
7. Taxes		1,000
8. Profit after taxes		2,000
9. Cash flow from operation		4,000
10. Net cash flow	(20,000)	4,000

By way of confirmation, you can verify that the break-even level of sales is indeed Rs 9 million.

	<i>Rs in million</i>
Sales	9
Variable costs	6
Fixed costs	1
Depreciation	2
Profit before tax	0
Tax	0
Profit after tax	0

A project that breaks even in accounting terms is like a stock that gives you a return of zero per cent. In both the cases you get back your original investment but you are not compensated for the time value of money or the risk that you bear. Put differently, you forego the opportunity cost of your capital. Hence a project that merely breaks even in accounting terms will have a negative *NPV*.

▣ Financial Break-even Analysis

The focus of financial break-even analysis is on *NPV* and not accounting profit. At what level of sales will the project have a zero *NPV*?

To illustrate how the financial break-even level of sales is calculated, let us go back to the flour mill project. The annual cash flow of the project depends on sales as follows:

1. Variable costs : 66.67 percent of sales
2. Contribution : 33.33 percent of sales
3. Fixed costs : Rs 1 million
4. Depreciation : Rs 2 million
5. Pre-tax profit : $(.333 \times \text{Sales}) - \text{Rs } 3 \text{ million}$
6. Tax (at 33.3%) : $.333(.333 \text{ Sales} - \text{Rs } 3 \text{ million})$
7. Profit after tax : $.667 (.333 \times \text{Sales} - \text{Rs } 3 \text{ million})$
8. Cash flow (4 + 7) : $\text{Rs } 2 \text{ million} + .667 (.333 \times \text{Sales} - \text{Rs } 3 \text{ million})$
= 0.222 Sales

Since the cash flow lasts for 10 years, its present value at a discount rate of 12 percent is:

$$\begin{aligned} PV (\text{cash flows}) &= 0.222 \text{ Sales} \times PVIFA (10 \text{ years}, 12\%) \\ &= 0.222 \text{ Sales} \times 5.650 \\ &= 1.255 \text{ Sales} \end{aligned}$$

The project breaks even in *NPV* terms when the present value of these cash flows equals the initial investment of Rs 20 million. Hence, the financial break-even occurs when

$$\begin{aligned} PV (\text{cash flows}) &= \text{Investment} \\ 1.255 \text{ Sales} &= \text{Rs } 20 \text{ million} \\ \text{Sales} &= \text{Rs } 15.94 \text{ million} \end{aligned}$$

Thus, the sales for the flour mill must be Rs 15.94 million per year for the investment to have a zero NPV. Note that this is significantly higher than Rs 9 million which represents the accounting break-even sales.

11.5 HILLIER MODEL

Under certain circumstances, the expected net present value and the standard deviation of the net present value may be obtained through analytical derivation. Two cases of such analysis are discussed here: (i) no correlation among cash flows, and (ii) perfect correlation among cash flows.

Uncorrelated Cash Flows

When the cash flows of different years are uncorrelated, the cash flow for year t is independent of the cash flow for the year $t-r$. Put differently, there is no relationship between cash flows from one period to another. In this case the expected net present value and the standard deviation of the net present value are defined as follows:

$$\overline{NPV} = \sum_{t=1}^n \frac{\bar{A}_t}{(1+i)^t} - I \quad (11.3)$$

$$\sigma(NPV) = \sum_{t=1}^n \left[\frac{\sigma_t^2}{(1+i)^{2t}} \right]^{1/2} \quad (11.4)^1$$

where \overline{NPV} = expected net present value

\bar{A}_t = expected cash flow for year t

i = risk-free interest rate

I = initial outlay

$\sigma(NPV)$ = standard deviation of the net present value

σ_t = standard deviation of the cash flow for year t

Note that in the above formulae the discount rate is the risk-free interest rate because we try to separate the time value of money and the risk factor. The risk of the project, reflected in $\sigma(NPV)$, is considered in conjunction with \overline{NPV} computed with the risk-free discount rate. If \overline{NPV} is computed using a risk-adjusted discount rate and then if this is viewed along with $\sigma(NPV)$, the risk factor would be counted twice.

1. In Eqs (11.3) and (11.4) we have assumed that the initial investment is known with certainty. The formula can, however, be easily modified to consider the variability of I .

Example A project involving an outlay of Rs 10,000 has the following benefits associated with it:

Year 1		Year 2		Year 3	
Net cash flow	Probability	Net cash flow	Probability	Net cash flow	Probability
Rs 3,000	0.3	Rs 2,000	0.2	Rs 3,000	0.3
5,000	0.4	4,000	0.6	5,000	0.4
7,000	0.3	6,000	0.2	7,000	0.3

The cash flows of different years are uncorrelated. Calculate \overline{NPV} and $\sigma(NPV)$, assuming that $i = 6$ percent

$$\begin{aligned}\overline{NPV} &= \sum_{t=1}^3 \frac{\bar{A}_t}{(1+i)^t} - I \\ &= \frac{5,000}{(1.06)} + \frac{4,000}{(1.06)^2} + \frac{5,000}{(1.06)^3} - 10,000\end{aligned}$$

$$\begin{aligned}\sigma(NPV) &= \left[\sum_{t=1}^3 \frac{\sigma_t^2}{(1+i)^{2t}} \right]^{1/2} \\ &= \left[\frac{2,400,000}{(1.06)^2} + \frac{1,600,000}{(1.06)^4} + \frac{2,400,000}{(1.06)^6} \right]^{1/2} = \text{Rs } 2,258\end{aligned}$$

Perfectly Correlated Cash Flows

If cash flows are perfectly correlated, the behaviour of cash flows in all periods is alike. This means that if the actual cash flow in one year is α standard deviations to the left of its expected value, cash flows in other years will also be α standard deviations to the left of their respective expected values. Put in other words, cash flows of all years are linearly related to one another. The expected value and the standard deviation of the net present value, when cash flows are perfectly correlated, are as follows:

$$\overline{NPV} = \sum_{t=1}^n \frac{\bar{A}_t}{(1+i)^t} - I \quad (11.5)$$

$$\sigma(NPV) = \sum_{t=1}^n \frac{\sigma_t}{(1+i)^t} \quad (11.6)$$

Example An investment project involves a current outlay of Rs 10,000. The mean and standard deviation of the cash flows, which are perfectly correlated, are as follows

Year	\bar{A}_t	σ_t
1	Rs 5,000	1,500
2	3,000	1,000
3	4,000	2,000
4	3,000	1,200

Calculate \overline{NPV} and $\sigma(NPV)$, assuming a risk-free interest rate of 6 percent.

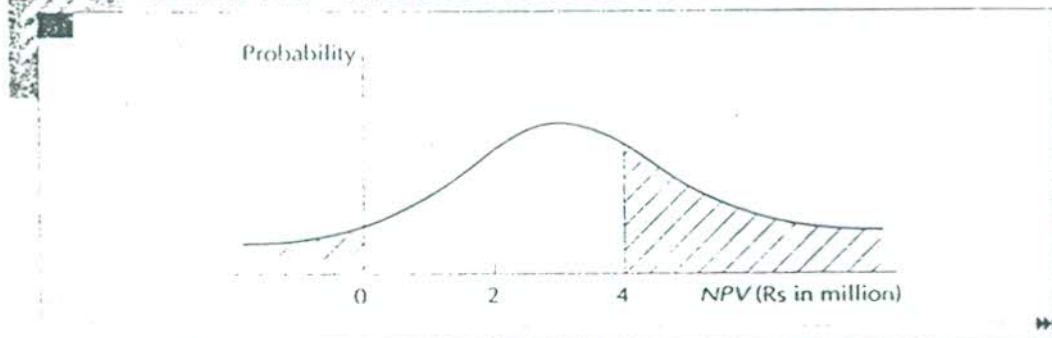
$$\begin{aligned}\overline{NPV} &= \sum_{t=1}^4 \frac{\bar{A}_t}{(1+i)^t} - I \\ &= \frac{5,000}{(1.06)} + \frac{4,000}{(1.06)^2} + \frac{5,000}{(1.06)^3} + \frac{3,000}{(1.06)^4} - 10,000 \\ &= \text{Rs } 3,121\end{aligned}$$

$$\begin{aligned}\sigma(NPV) &= \sum_{t=1}^4 \frac{\sigma}{(1+i)^t} \\ &= \frac{1,500}{(1.06)} + \frac{1,000}{(1.06)^2} + \frac{2,000}{(1.06)^3} + \frac{1,200}{(1.06)^4} = \text{Rs } 4,935\end{aligned}$$

▣ Standardising the Distribution

Knowledge of \overline{NPV} and $\sigma(NPV)$ is very useful for evaluating the risk characteristics of a project. If the NPV of a project is approximately normally distributed, we can calculate the probability of NPV being less than or more than a certain specified value. This probability is obtained by finding the area under the probability distribution curve to the left or right of the specified value. Suppose the probability distribution of NPV is as shown in Exhibit 11.5. If we want to calculate the probability distribution curve to the left of 0, this is indicated by the shaded region on the left. If we are interested in finding the probability that NPV exceeds a certain value, say Rs 4 million, we calculate the area under the probability distribution curve to the right of Rs 4 million—this area is shown as the shaded region on the right.

Exhibit 11.5 Area under a Normal Distribution Curve



How can we calculate the area to the left or right of a specified point? To calculate the area to the left or right of a specified point, we use the following procedure:

Step 1 Standardise the difference between the specified point and \overline{NPV} . To do this the difference between the specified point and \overline{NPV} is divided by $\sigma(NPV)$. The standardised difference may be referred to as Z . The purpose of standardisation is to transform the actual distribution of NPV into a standard normal distribution. The standard normal distribution has a mean of 0 and standard deviation of 1. Exhibit 11.6 shows the standard normal distribution and Exhibit 11.7 gives cumulative probability.

Exhibit 11.6 *Standard Normal Distribution*

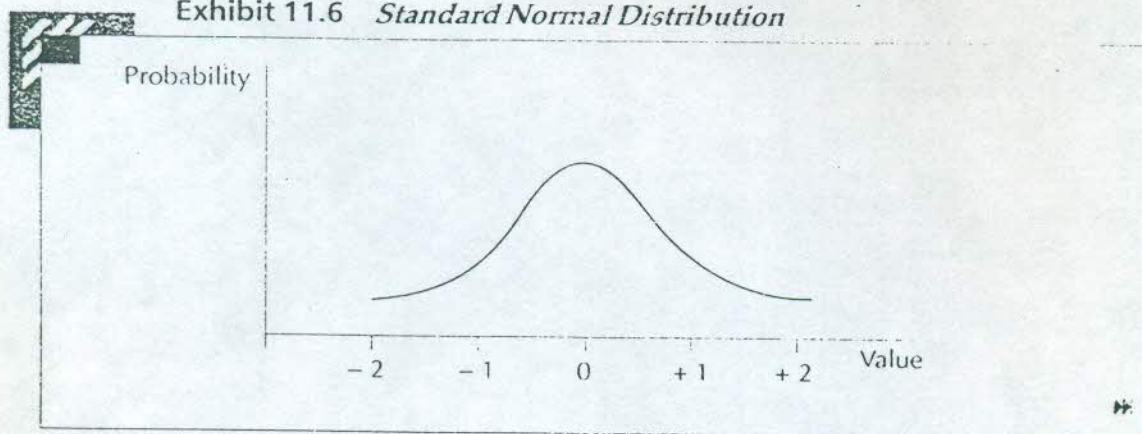


Exhibit 11.7 *Cumulative Probability up to Z for Standard Normal Distribution*

Z	Cumulative Probability	Z	Cumulative Probability
-3.0	0.001	0.2	0.579
-2.8	0.003	0.4	0.655
-2.6	0.005	0.6	0.726
-2.4	0.008	0.8	0.788
-2.2	0.014	1.0	0.841
-2.0	0.023	1.2	0.865
-1.8	0.036	1.4	0.919
-1.6	0.055	1.6	0.945
-1.4	0.081	1.8	0.964
-1.2	0.115	2.0	0.977
-1.0	0.159	2.2	0.986
-0.8	0.212	2.4	0.992
-0.6	0.274	2.6	0.995
-0.4	0.345	2.8	0.997
-0.2	0.421	3.0	0.999
-0.0	0.500		

Step 2 Refer to the standard normal distribution table and find the probability to the left (or right depending on our interest) of the Z value obtained in Step 1.

To illustrate the above procedure suppose that a project's \overline{NPV} and $\sigma(NPV)$ are Rs 96,000 and Rs 60,000 respectively and we want to find the probability that NPV will be less than 0. This may be done as follows.

Step 1 The standardised difference between the specified point ($NPV = 0$) and $\overline{NPV} = 96,000$ is

$$= \frac{0 - 96,000}{60,000} = -1.6$$

Step 2 The cumulative probability up to $Z = -1.6$ as seen from the standard normal distribution is 0.55. This means that there is a 5.5 percent chance that NPV will be equal to or less than 0.

11.6 SIMULATION ANALYSIS

Sensitivity analysis indicates the sensitivity of the criterion of merit (NPV , IRR , or any other) to variations in basic factors and provides information of the following type: If the quantity produced and sold decreases by 1 percent, other things being equal, the NPV falls by 6 percent. Such information, though useful, may not be adequate for decision making. The decision maker would also like to know the likelihood of such occurrences. This information can be generated by simulation analysis which may be used for developing the probability profile of a criterion of merit by randomly combining values of variables which have a bearing on the chosen criterion.

Procedure

The steps involved in simulation analysis are as follows:

1. Model the project. The model of the project shows how the net present value is related to the parameters and the exogenous variables. (Parameters are input variables specified by the decision maker and held constant over all simulation runs. Exogenous variables are input variables which are stochastic in nature and outside the control of the decision maker.)
2. Specify the values of the parameters and the probability distributions of the exogenous variables.
3. Select a value, at random, from the probability distributions of each of the exogenous variables.
4. Determine the net present value corresponding to the randomly generated values of the exogenous variables and the pre-specified parameter values.
5. Repeat steps (3) and (4) a number of times to get a large number of simulated net present values.
6. Plot the frequency distribution of the net present value.

Illustration

In real life situations, simulation is done only on the computer because of the computational tedium involved. However, to give you an idea of what goes on in simulation, we will work with a simple example where simulation has been done manually.

Zenith Chemicals is evaluating an investment project whose net present value has been modelled as follows:

$$NPV = \sum_{t=1}^n \frac{\text{Annual Cash Flow}}{(1 + \text{Risk-Free Rate})^t} - \text{Initial Investment} \quad (11.7)$$

In the NPV model embodied in Eq.(11.7), the risk-free rate and the initial investment are parameters with the following values: risk-free rate = 10 percent and initial investment = Rs 13,000. The annual cash flow and the project life (n) are stochastic exogenous variables with the following distributions:

<i>Annual Cash Flow</i>		<i>Project Life</i>	
Value	Probability	Value	Probability
Rs 1,000	0.02	3 years	0.05
1,500	0.03	4	0.10
2,000	0.15	5	0.30
2,500	0.15	6	0.25
3,000	0.30	7	0.15
3,500	0.20	8	0.10
4,000	0.15	9	0.03
		10	0.02

The firm wants to perform 10 manual simulation runs for this project. To perform the simulation runs, we have to generate values, at random, for the two exogenous variables: annual cash flow and project life. For this purpose, we have to (i) set up the correspondence between the values of the exogenous variables and the random numbers, and (ii) choose some random number generating device. Exhibit 11.8 shows the correspondence between the various variables and two-digit random numbers. Exhibit 11.9 presents a table of random digits that will be used for obtaining two-digit random numbers.²

Now we are ready for simulation. In order to obtain random numbers from Exhibit 11.9 we may begin anywhere at random in the table and read any pair of adjacent columns (since we are interested in a two-digit random number) and read column-wise or row-wise.

For our example, let us use the first two columns of Exhibit 11.9. Starting from the top, we will read down the column. For the first simulation run we need two two-digit random numbers, one for the annual cash flow and the other for the project life. These numbers are 53 and 97 and the corresponding values for the annual cash flow and project life are Rs 3,000 and 9 years respectively. We go further in this manner. Exhibit 11.10 shows the random numbers so obtained and the result of simulation.

2. Extracted from Rand Corporation, *A Million Random Digits with 100,000 Normal Deviates*, Glencoe, Illinois: The Free Press.

Exhibit 11.8 Correspondence between Values of Exogenous Variables and Two Digit Random Numbers

Annual Cash Flow				Project Life			
Value	Probability	Cumulative probability	Two digit random numbers	Value	Probability	Cumulative probability	Two-digit random numbers
Rs				Years			
1,000	.02	.02	00 to 01	3	.05	.05	00 to 04
1,500	.03	.05	02 to 04	4	.10	.15	05 to 14
2,000	.15	.20	05 to 19	5	.30	.45	15 to 44
2,500	.15	.35	20 to 34	6	.25	.70	45 to 69
3,000	.30	.65	35 to 64	7	.15	.85	70 to 84
3,500	.20	.85	65 to 84	8	.10	.95	85 to 94
4,000	.15	1.00	86 to 99	9	.03	.98	95 to 97
				10	.02	1.00	98 to 99

Exhibit 11.9 Random Numbers

53479	81115	98036	12217	59526
97344	70328	58116	91964	26240
66023	33277	74523	71118	84892
99776	75723	03172	43112	83086
30176	48979	92153	38416	42436
81874	83339	14988	99937	13213
19839	90630	71863	95053	55532
09337	33435	53869	52769	18801
31151	58925	40823	41330	21093
67619	52515	03037	81699	17106

Exhibit 11.10 Simulation Results

Run	Annual Cash Flow		Project Life		Net present value
	Random number	Corresponding value of annual flow	Random number	Corresponding value of project life	
1	53	3,000	97	9	4277
2	66	3,500	99	10	8506
3	30	2,500	81	7	(829)
4	19	2,000	09	4	(7660)
5	31	2,500	67	6	(2112)
6	81	3,500	70	7	4039
7	38	3,000	75	7	1605
8	48	3,000	83	7	1605
9	90	4,000	33	5	2163
10	58	3,000	52	6	66

11.11 HOW FINANCIAL INSTITUTIONS ANALYSE RISK

To evaluate the risk dimensions of a project, financial institutions calculate several indicators, the most important ones being the break-even point, the debt service coverage ratio, and the fixed assets coverage ratio. In addition, they carry out sensitivity analysis.

Break-Even Point

The break-even point for a project is calculated with reference to the year when the project is expected to reach its target (or expected) level of capacity utilisation, which is usually the third or the fourth operating year. Further, it is calculated in terms of capacity utilisation. So it is called break-even point capacity utilisation (*BEPCU*).

To illustrate the calculation of *BEPCU*, consider the following data for the third year of a project, when it is expected to reach the target capacity utilisation of 70 percent. (The installed capacity of this project is 2880 tonnes per annum and 70 percent of this is 2016 tonnes per annum.)

A. Variable Costs	(Rs in million)
• Raw materials and consumables	137.2
• Power, fuel, and water	24.7
• Variable selling expenses and royalty payments linked to sales	19.2
• Interest on working capital loans	10.8
• Other variable expenses	5.0
	<hr/>
	196.9
B. Fixed and Semi-fixed Costs	
• Salaries and wages	22.0
• Repairs and maintenance	2.0
• Administrative and miscellaneous expenses	2.5
• Fixed selling expenses	6.3
• Fixed royalty and know-how payments	3.0
• Interest on term debt	12.0
• Depreciation and amortisations	7.5
	<hr/>
	55.3

C. Sales Realisation	265.6
D. Contribution	68.7

$$BEPCU (\%) = \frac{\text{Fixed costs and semi - fixed costs} \times \text{Percentage capacity utilisation}}{\text{Contribution}}$$

$$= \frac{55.3}{68.7} \times 70\% = 56.3\%$$

The cash BEPCU, is calculated using the above formula without including depreciation and amortisation as part of the fixed costs.

$$\text{Cash BEPCU} (\%) = \frac{47.8}{68.7} \times 70\% = 48.7\%$$

Debt Service Coverage Ratio

The debt service coverage ratio (DSCR) is defined as:

$$DSCR = \frac{\text{Profit after tax} + \text{Depreciation and} + \text{Interest on term debt} + \text{Lease rentals}}{\text{Amortisation}}$$

$$\text{Repayment of term debt} + \text{Interest on term debt} + \text{Lease rentals}$$

The average DSCR is computed by taking the total of all values of the numerator and denominator for the entire period of the proposed term loans, commencing from the year in which commercial production starts and not by taking the DSCRs for each year.

The calculation of DSCR is illustrated by an example given in Exhibit 11.20.

Exhibit 11.20 Debt Service Coverage Ratio

Year	1	2	3	4	5	6	7	8	9	10
A. Total Cash Accrual										
1. Profit after tax	0.27	0.81	1.35	1.13	0.99	0.99	0.99	1.01	1.02	1.04
2. Depreciation	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3. Interest on term loan	1.18	1.18	1.07	0.93	0.78	0.64	0.48	0.33	0.19	0.04
Total (Rs in million)	2.15	2.69	3.12	2.76	2.47	2.33	2.17	2.04	1.91	1.78
B. Debt Service										
1. Interest on term loan	1.18	1.18	1.07	0.93	0.78	0.63	0.48	0.33	0.19	0.04
2. Repayment of term loan	-	0.4	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.4
Total (Rs in million)	1.18	1.58	1.87	1.73	1.58	1.43	1.28	1.13	0.99	0.44

$$\text{Average DSCR} = \frac{\text{Total cash accrual over the 10 year period}}{\text{Total debt service burden over the 10 year period}} = \frac{23.42}{13.21} = 1.77$$

▣ Sensitivity Analysis

Financial institutions carry out sensitivity analysis to assess the impact of adverse changes in the operating conditions of the project on its viability. The standard sensitivity analysis involves assessing the impact of 10 per cent adverse variation in selling price, quantity, and operating costs on the internal rate of return (*IRR*), debt service coverage ratio (*DSCR*), and break-even point (*BEPCU* %).

Example Here is the sensitivity analysis done for a port project.

Case 1 : Fall in cargo handling and storage charges by 10%. (This is akin to a fall in selling price.)

Case 2 : Fall in cargo by 10%. (This is akin to a fall in quantity.)

Case 3 : Increase in operating costs by 10%.

Case 4 : Combined effect of all the three factors.

The table showing the sensitivity of *IRR*, *DSCR*, and *BEP* % to the above cases is shown below:

	Revenue (3rd year)	Op. Profit (3rd year)	IRR%	DSCR	BEPCU%	
	(Rs in mln.)	(Rs in mln)	After Tax	Avg.	Gross	Cash
Base Case	1215.0	566.8	39.89	4.00	39.00	21.13
Case 1	1086.9	438.8	35.24	3.46	44.57	24.15
Case 2	1150.1	519.6	38.02	3.76	40.91	22.17
Case 3	1215.0	538.7	38.82	3.88	40.31	22.11
Case 4	1028.5	371.5	32.50	3.13	48.37	26.53

Exhibit 8.11 *Assessment of Basic Evaluation Methods*

	Net Present Value	Benefit Cost Ratio	Internal Rate of Return	Payback Period	Accounting Rate of Return
<i>Theoretical considerations</i>					
1. Does the method consider all cash flows?	Yes	Yes	Yes	No	?
2. Does the method discount cash flows at the opportunity cost of funds?	Yes	Yes	No	No	No
3. Does the method satisfy the principle of value additivity?	Yes	No	No	?	?
4. From a set of mutually exclusive projects, does the method choose the project which maximises shareholder wealth?	Yes	No	No	?	?
<i>Practical considerations</i>					
1. Is the method simple?	Yes	Yes	Yes	Yes	Yes
2. Can the method be used with limited information?	No	No	No	Perhaps	Yes
3. Does the method give a relative measure?	No	Yes	Yes	No	Yes

8.8 INVESTMENT APPRAISAL: INDIAN PRACTICE

Let us look at investment appraisal in practice in India. Certain questions may be raised in this context:

- How much importance is assigned to economic analysis of capital expenditures in practice?
- What methods are used for analysing capital expenditures in practice and what is the rationale underlying these methods?
- In what ways can economic analysis of capital expenditures be improved in practice?

A survey was conducted by the author. Twenty firms, varying on several dimensions like industry category, size, financial performance, and capital intensity, were included in this survey. In these firms, executives responsible for capital investment evaluation and capital budget preparation were interviewed. The interviews, semi-structured in nature, were conducted to obtain answers to the questions posed above.

Importance of Economic Analysis

The nature of economic analysis of capital expenditures varies from project to project. In a few cases, elaborate analysis is carried out; in most of the cases, however, the analysis is

done in sketchy terms. On the whole, one may say that economic analysis is played in a rather low key. The reasons appear to be as follows:

- Most of the proposals are meant either for the replacement of some worn out equipment forming part of a production complex or for adding capacity at some stage of production to ensure better balancing of capacities at various stages. In these cases, it is difficult to evaluate independently the economics of proposed investments. They are usually labelled 'urgent' or 'necessary' and this prejudgment precludes further thinking.
- Project proposals are reviewed at two or three levels (in one organisation as many as five levels of review are obtained, but this is an exceptional case) before a final decision is made, and the judgment of the reviewing authorities is regarded as more important than detailed analysis.
- It is difficult to estimate accurately the costs and revenues associated with capital investments. The range of error in these estimates, it is argued, does not justify sophisticated analysis.
- In many cases only one type of equipment or machinery satisfied the specific requirements. In the absence of alternatives that can be compared, detailed analysis seems to be unwarranted.

■ Methods of Appraisal and Their Rationale

1. A wide variety of measures are used for evaluating investments. These include measures suggested by capital budgeting literature and several non-standard measures.
2. The most commonly used method for evaluating investments of a small size is the payback method. The following reasons have been given by managers employing this method.

'We don't have ample funds. Most of the components of our compressor are made outside. We take up only those components which have a payback period of three years or less so that our limited funds are not locked up for long.'

'We follow the payback period method because the shorter the payback period the higher the return.'

'Since returns are not assured it is safer to put money in a line where it is quickly recovered.'

3. For investments of a large size, the average rate of return is sometimes used as the principal criterion and the payback period is used as a supplementary criterion. In support of the average rate of return method, one executive said:

'Our aim is to increase profitability. Profits in relation to investment is the average rate of return. This figure tells me whether the project is good. This can be compared with the cost of money.'

Another executive, who appeared familiar with discounted cash flow techniques but who used the average rate of return method, argued as follows:

'The discounted cash flow method calls for estimates of costs and revenues over the whole project life. This is difficult. Very often we can't estimate the life. We have been using machines longer than their life by good maintenance. Changes in cost and revenues also cannot be predicted. Due to these difficulties we use the accounting rate of return method. Here we take our best estimates for 2-3 years and calculate the average return. Once the project is established the balance between cost and revenue can be maintained in normal circumstances.'

4. Discounted cash flow (DCF) techniques, are gaining in importance, particularly in the evaluation of large investments. In one company where informal appraisals are used for smaller outlays, DCF analysis is being used for all independent projects which generally involve substantial outlays. The rationale of this practice was explained by one manager.

'It is not possible to know the yield of an investment in a machine or process independently. Nor is it worthwhile to know because sponsors of such projects provide suitable justification—better quality, fewer breakdowns, etc. Yield calculations are made for independent units. They are needed for proper appraisal.'

5. Several other criteria are used for evaluating investments: profit per rupee invested, cost savings per unit of product, investment required to replace a worker. It appears that these criteria are more intelligible to operations-minded managers. Although in some cases these criteria are closely related to measures suggested in theory, it is difficult to make generalisations about their suitability. The variety of measures used by project sponsors seem to create problems of understanding and comparison for the higher executives.
6. Although specific measures of investment worth are calculated, only four firms, out of the sample of 20 firms studied, seemed to have a well-defined policy about the acceptability of investment projects based on such calculations. By and large, no fixed standards were used for acceptance/rejection of projects. The final decision rested with the top management which combined quantitative measures with subjective judgments in an unspecified manner. The difficulty of adhering rigidly to standards was expressed by three managers:

'There are intangible factors, too, which must be considered along with the economics of the project. In view of this, standards cannot be rigidly defined. Moreover, we have to consider our liquidity. If we have sufficient funds we may accommodate more projects. If we do not have money—the problem that we have today—we may not be able to okay otherwise good investments.'

'Our cost of money has been rising. How can we work with fixed standards?'

'For replacement investments we have more or less a fixed standard—15 percent after tax. This is not for few projects. Here we may require 20 percent or even 25 percent depending on the circumstances.'

7. Limited funds do not appear to be a serious constraint with prosperous firms. A common refrain is: "We will get the funds if we have good projects." Other constraints, more serious than the funds constraint, seem to hinder investment activity. As one manager put it:

'If our investment is slow, it is mainly due to governmental delays in approving the proposed collaboration—not for want of money.'

The situation with less prosperous concerns is different. Limited funds often pose a serious bottleneck with firms which have poor financial resources. In these firms investments are made only when they are unavoidable. In other words, they adopt the criterion of 'non-postponability', to use a term suggested by one manager.

▣ Room for Improvement

On the basis of the foregoing, we make the following suggestions for improving capital budgeting in practice:

1. As far as possible the criteria of investment evaluation should be standardised. The use of many measures makes comparison difficult.
2. The concepts used in analysis must be clearly defined. Vague, qualitative phrases should be substituted by quantitative measures wherever possible. This is necessary to promote understanding and dispel confusion.
3. The characteristics of various methods must be properly understood. Wrong notions like "the inverse of payback is equal to the rate of return" and "net present value and yield are alike" must be corrected.
4. Discounted cash flow techniques should receive greater emphasis. They are theoretically superior and practically feasible. The use of these techniques compels a firm to 'look ahead' which in itself has a significant payoff. This advantage, however, can be enjoyed only if the 'look ahead' is done carefully and realistically. If it is done in a very mechanical fashion then no advantage is likely to accrue.

The argument of some executives that discounted cash flow techniques require difficult-to-obtain information and that many persons are not familiar with them, reflects inertia and a non-progressive outlook. Determined efforts to introduce discounted cash flow techniques can overcome these hurdles.

To sum up, evaluation must be carried out in explicit, well-defined, preferably standardised terms and should be based on sound economic logic. Informal and cursory treatment should give way to thorough and rigorous analysis. It must be realised that the prerogative of investment decision making has a concomitant responsibility—to base such decisions on a careful and sound evaluation.

▣ Findings of a Recent Survey

A recent survey of capital budgeting practices in India, conducted by U.Rao Cherukeri, revealed the following:

- Over time, discounted cash flow methods have gained in importance and internal rate of return is the most popular evaluation method.
- Firms typically use multiple evaluation methods.
- Accounting rate of return and payback period are widely employed as supplementary evaluation methods.
- Weighted average cost of capital is the most commonly used discount rate and the most often used discount rate is 15 percent in post-tax terms.
- Risk assessment and adjustment techniques have gained popularity. The most popular risk assessment technique is sensitivity analysis and the most common methods for risk adjustment are shortening of the payback period and increasing the required rate of return.

8.9 INVESTMENT APPRAISAL: INTERNATIONAL PRACTICE

While a comprehensive discussion of international practice is beyond the scope of this book, an inkling of the techniques of evaluation used in the U.S. and Japan, the two largest economies of the world, will be provided here.

Evaluation Techniques in the U.S.

To learn about the methods of evaluation used by business firms in the U.S., we will review the findings of a study conducted by William Petty and David Scott.

The level of importance assigned to the five basic evaluation techniques, viz., accounting return on investment, payback period, net present value, internal rate of return, and profitability index (benefit-cost ratio) is shown in Exhibit 8.12.

Exhibit 8.12 *Evaluation Techniques*

Technique	Level of Importance					
	None	Slight	Moderate	Fair	High	No Response
Accounting return on investment	12.35%	15.29%	17.06%	8.82%	33.53%	2.94%
Payback period	1.76	12.35	25.29	28.82	30.00	1.76
Net present value	8.82	16.47	20.59	15.29	33.20	5.29
Internal rate of return	7.65	9.41	4.71	14.71	59.41	4.12
Profitability index or benefit-cost ratio	31.17	18.82	15.29	7.65	11.18	15.88

▣ Evaluation Techniques in Japan

Japanese firms appear to rely mainly on two kinds of analysis: (a) one year return on investment analysis, and (b) residual investment analysis. While the former needs no explanation, the latter may require some elaboration. The manner in which the residual investment analysis is done is illustrated in Exhibit 8.13. Examining this exhibit we find that the residual investment analysis is similar to the discounted payback analysis. This analysis shows how long it will take for the residual investment in the project to become zero after taking into account the time value of money. This period is conceptually equal to the discounted payback period.

Exhibit 8.13 *Residual Investment Analysis*

Year	Cash Flow	Imputed Interest @ 10%	Adjusted Cash Flow	Residual Investment
0	1000	—	—	—
1	200	100	100	900
2	200	90	110	790
3	300	79	221	569
4	300	57	243	326
5	400	33	367	—
6	400	—	—	—
7	300	—	—	—
8	300	—	—	—

In general, it appears that Japanese firms use methods which are less complicated and sophisticated than the ones used by American firms. Why? Several reasons are offered to explain this difference: (a) Japanese managers, in general, have limited formal business training. (b) There is a great deal of consensus decision making in Japanese firms which necessarily calls for the use of relatively simpler methods. (c) Japanese firms put considerable emphasis on verbal scenario analysis (as opposed to complex calculations) and careful scrutiny of basic assumptions which seems to blend well with a healthy skepticism about the accuracy of quantitative forecasts.

▣ SUMMARY

- A wide range of criteria has been suggested to judge the worthwhileness of investment projects. They fall into two broad categories: discounting criteria and non-discounting criteria. The important discounting criteria are: net present value, benefit-cost ratio, and internal rate of return. The major non-discounting criteria are: payback period and accounting rate of return.
- The net present value (NPV) of a project is the sum of the present values of all the cash flows—positive as well as negative—that are expected to occur over the life of the project.
- The decision rule associated with the NPV criterion is: Accept the project if the NPV is positive and reject the project if the NPV is negative.

- NPV has certain properties that make it a very attractive decision criterion: NPVs are additive; the NPV rule assumes that the intermediate cash flows of a project are reinvested at a rate of return equal to the cost of capital; NPV calculation permits time varying discount rates.
- The standard NPV method is based on the assumption that the intermediate cash flows are reinvested at a rate of return equal to the cost of capital. When this assumption is not valid, the investment rates applicable to the intermediate cash flows need to be defined for calculating the modified net present value.
- When the marginal cost of capital is constant, the optimal capital budget consists of all projects which have a positive net present value at the given marginal cost of capital. However, when the marginal cost of capital increases at discrete points as more and more financing is sought, determination of the optimal capital budget is not easy.
- The benefit cost ratio is defined as the present value of benefits (cash inflows) divided by the present value of costs (cash outflows). A project is considered worthwhile if the benefit-cost ratio is more than 1 and not worthwhile if the benefit-cost ratio is less than 1.
- The internal rate of return (IRR) of a project is the discount rate which makes its NPV equal to zero. In the NPV calculation we assume that the discount rate is known and determine the NPV. In the IRR calculation, we set the NPV equal to zero and determine the discount rate that satisfies this condition.
- The decision rule for IRR is as follows: Accept the project if its IRR is greater than the cost of capital; reject the project if its IRR is less than the cost of capital.
- The IRR and NPV rules lead to identical decisions provided two conditions are satisfied. First, the cash flows of the project must be conventional, implying that the first cash flow (initial investment) is negative and the subsequent cash flows are positive. Second, the project must be independent meaning that the project can be accepted or rejected without reference to any other project.
- There are problems in using IRR when the cash flows of the project are not conventional or when two or more projects are being compared to determine which one is the best. In the first case, it is difficult to define 'what is IRR' and in the second case IRR can be misleading. Further, IRR cannot distinguish between lending and borrowing. Finally, IRR is difficult to apply when short-term interest rates differ from long-term interest rates.
- There are two possible economic interpretations of internal rate of return: (i) The internal rate of return represents the rate of return on the unrecovered investment balance in the project. (ii) The internal rate of return is the rate of return earned on the initial investment made in the project.
- Despite NPV's conceptual superiority, managers seem to prefer IRR over NPV because IRR is intuitively more appealing as it is a percentage measure. Is there a percentage measure that

SECTION V	CAVEATS	233 - 291
	▪ Common Errors : Implementation Schedule & Statutory Clearing	233 – 241
	▪ Entrepreneurs, Entrepreneurship and Small Business	242 – 266
	▪ Assessment and Evaluation of Entrepreneurial Opportunities	267 - 291

IMPLEMENTATION SCHEDULE, STATUTORY CLEARANCES, COMMON ERRORS

You have nearly completed making a business plan. There are however two tasks which you still need to perform - drawing up an implementation schedule and specifying clearances required. Let us explain these.

1. Implementation Schedule :

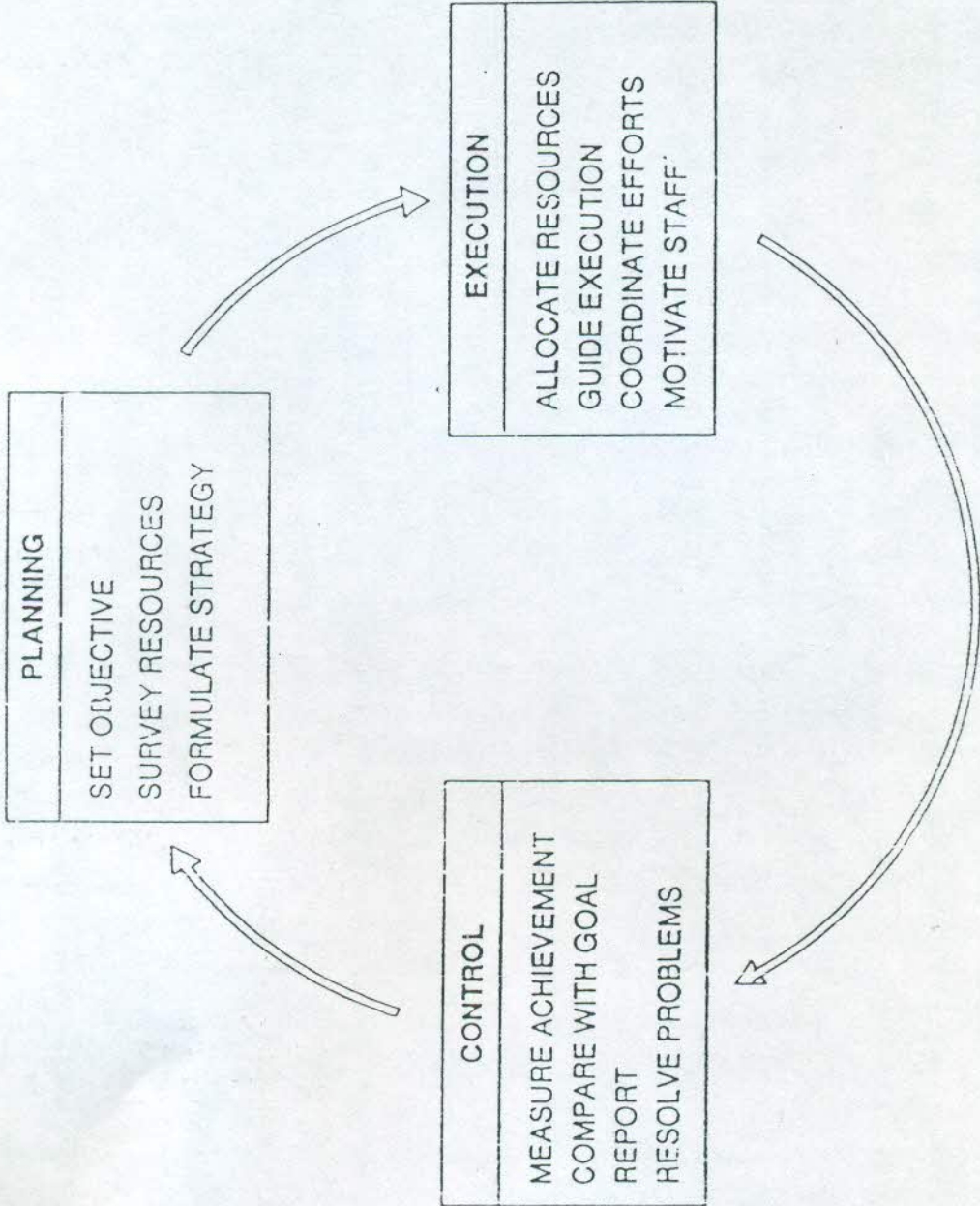
It is essential to draw an implementation Schedule or a time-table for your enterprise. The task of preparing such a schedule forces you -

- to enumerate the various steps which you will have to take prior to commencement of commercial production.
- to appreciate the inter-dependence among these steps and hence the chain-effect of delay in carrying out one step on overall implementation schedule.
- to work out a calendar for bringing in your own funds for implementation.

Implementation schedule is an aid to ensure timely implementation of your plan. Timely implementation is important because if there is a delay, it causes, among other things, a project cost overrun. A project meant to be implemented in 12 months at a cost of Rs. 15 lacs may entail an expenditure of Rs. 20 lacs, if there is a delay in implementation and this may jeopardize the financial viability of the project itself. Hence, the need to draw up a schedule and more importantly, to adhere to it.

You will recall that project cost computation includes interest during construction period. The amount of such interest depends on your schedule for drawal of term-loan funds which in turn is tied up with your implementation progress. Thus, implementation Schedule is required to arrive at an estimate of interest during construction period.

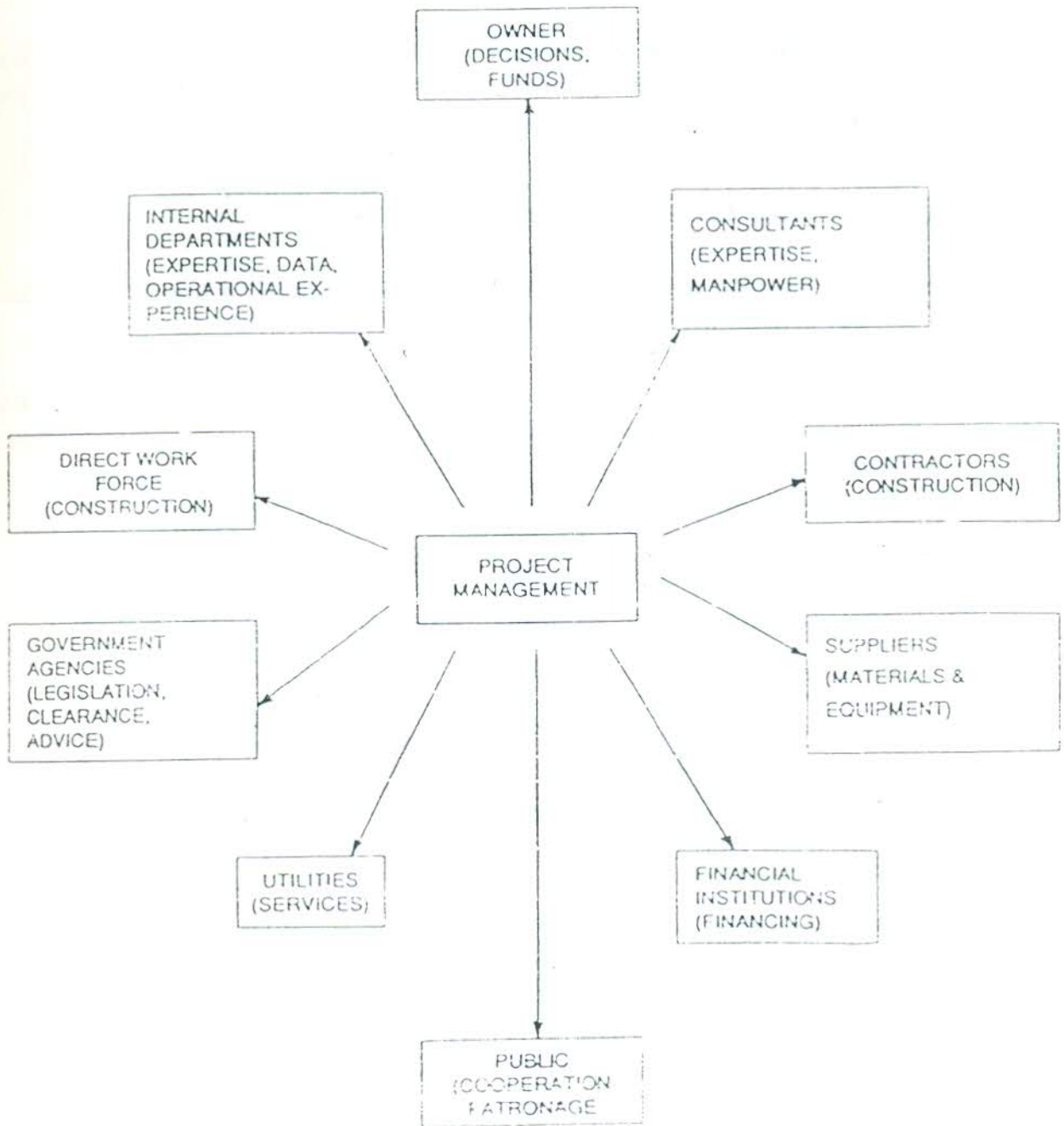
THE PROJECT MANAGEMENT CYCLE



PARTIES COORDINATED BY PROJECT MANAGEMENT

& THEIR INPUTS TO THE PROJECT

MEMBERS TO BE COORDINATED FOR IMPLEMENTATION OF BP



5.2 Major Considerations For Formulating Implementation Schedule :

While working out implementation schedule, bear in mind the following :

- You will like to carry out tasks involving capital expenditure only after the term-loan is sanctioned.
- Some tasks are sequential. For example, machinery can be installed only after it is received. Some tasks are not sequential and can be carried out simultaneously e.g. electrification of factory building and recruitment of manpower.
- Remember, implementation progress is not entirely in your hands.
Look for our flow chart to understand with which all you have to coordinate.
 - * An unhelpful official can hold up your term-loan sanction. A transport strike may delay delivery of machinery by a few weeks.
 - * A State Financial Institution may claim that a loan is sanctioned in one-and-half months, but enquiries with loanees may reveal that in most cases, it takes 3 months. If this is so, provide for 3 months. It is, thus, important to work out a realistic schedule and to build a sufficient margin of safety.

5.3 Implementation Schedule: An Illustration :

Let us look at a typical, simple implementation schedule for a small project.

This is a simplified overall schedule. It is possible to break this up into scores of specific tasks. An interested entrepreneur can use Project Evaluation and Review Technique (PERT)/Critical Path Method (CPM) to gain better insights into all implementation-related operations and to ensure a closer monitoring of implementation progress.

5.4 Statutory Clearances :

There are clearances which you need for setting up an enterprise. You must ascertain what these clearances are. It is imperative, though not compulsory, for you to secure small-scale industry registration. You must seek this from the District Industries Centre. There are industries for which statutory authorities have been set up to control entry and supervise working and even small enterprises are brought within the purview of such control. An illustrative list is as follows .

IMPLEMENTATION SCHEDULE : AN ILLUSTRATION

TASK	1	2	3	4	5	6	7	8	9	10
Study of business plan	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Submission of term loan application	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Term-loan sanction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Negotiations and securing possession of land	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Building construction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Tie-up with supply of utilities (power, water)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Placing order for machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Receipt & installation of machinery	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Recruitment of key manpower	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Trial production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Commencement of commercial production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Industry	Authority
Pharmaceuticals	Drug Control Office
Fruits & Vegetable Processing	FPO Office
Electronics	Industries Commissioner's Office (Production Programme approval)
Powerloom	Textile Commissioner's Officer
Hotel, Restaurant, Amusement Park, Cinema Theatre	Local Body

So, you must arrange to secure clearance from the concerned authority if you contemplate setting up any of the above cited enterprises.

5.5 Common Errors in Business Plan Formulation :

We have covered the ways in which you should go about working on various facets of a business plan. If you work accordingly, you are likely to avoid major errors. However, there are some errors which are so widely noticed that we, though it amounts to repetition, have chosen to highlight these.

(i) Capacity-Utilization Estimates : Gross Unrealism

Over-optimistic and simplistic assumptions with reference to utilization of installed capacity is a pervasive feature of business plans made by beginners. There are so many entrepreneurs who assume 80% capacity-utilization in the first year, 90% in the second year and 100% in the third year. The assumption is made in complete disregard of existing enterprise-performance, market conditions, competition-level and possible technical snags. The business plan, in such a case, is reduced to financial jugglery. It may be exciting to make such assumptions and derive satisfaction from financial-performance projection. But then, the projection is based on a completely false premise. Avoid this temptation. However, for business plans utilising new technologies exploring new markets, utilising high speed machinery etc., the capacity utilisation may start with even lower levels, as the system needs 'tuning'. In such cases superimposition of overall environmental factors and correlating them with such an assumption made by you, becomes necessary.

(ii) Capacity Computation : A Miscalculation

The computation of installed capacity is a technical task not always performed competently. There are several finer points-die-changing time, downtime, periodic shut-down, capacity of other equipments - which tends to lower the overall installed capacity. An exaggerated statement of overall capacity on account of entrepreneur being unaware of such finer points is rather common place. So, be careful that you take into account all relevant factors for capacity-calculation.

(iii) Market Study : A Neglected Task

Market study continues to be a grey area. It is relatively easy to work out technical arrangement and to make financial-performance projection. You are, in these cases, dealing with specific variables. Market study, in contrast, entails a less structured probe and contending with less definite variables. So, there are entrepreneurs who pass by this component of business plan completely. They cite demographic (population, income, etc.) statistics, present sketchy and inaccurate information on demand-supply position, produce stray opinions and conclude that market is just there waiting to be tapped. This is an attitudinal block. Make sure you do not develop such a block.

(iv) Machinery Selection : Serious Errors

This is a subject on which faulty decisions are common. There are machinery-suppliers who may never have made a certain kind of machinery, may not have ability to do so and yet undertake to supply such machinery. The results are sometimes disastrous. There are plastic extruders which can scarcely extrude. These are being sold and bought by entrepreneurs. A small entrepreneur does not have the resources to replace or rectify the machinery. So, take care that you choose sound machines.

(v) Technology-Oriented Products : A Shaky Arrangement

There are products which call for sophisticated technology or are not amenable to being produced in the small-scale sector. The entrepreneur is swayed by reported profit-margins. He relies on a technician who may have worked in comparable enterprise but does not have the capability to line up complete technology. Alternatively, it is not possible to set-up the enterprise within stipulated financial resources. In other words, the technical feasibility is not there. The enterprise is foredoomed to failure.

(vi) Project-Pruning and Resource-straining : Exceeding the Safe Limits

You have a certain amount of money to invest. You are not in a position to exceed a pre-determined financial limit. This is understandable. However, there is an entrepreneurial tendency to somehow squeeze, enterprise-parameters within such limits, even if it is not possible to do so. Thus, an entrepreneur may cut down built-up area or exclude some machinery to keep the project cost down - within his own financial limit. He may make most favourable assumptions on means of finance (75% of project cost to come as term-loan) while some amount of economy or optimism may be in order, this is sometimes carried out to such extreme lengths as to render the enterprise-proposal technically unviable (because important facilities are missing) or unrealistic (in terms of proposed financial resource plan). It is better not to pursue such an enterprise-idea. So, do not distort technical viability or pin your hope on the best deal from financial institutions to fit the proposal within resources at your disposal.

(vii) Accommodating in SSI Limits

Never try to sacrifice important equipments, essential facilities etc. for accommodating the project in SSI sector because this manual hamper your productivity and ultimately viability and growth.

(viii) Project Cost : An Underestimate

The promoters of very small enterprises do not consider P&P expenses and working capital margin.

They, consequently underestimate the project cost and own-resource requirement (margin). Others tend to play down magnitude of working capital margin. This is because if the working capital margin is large, financial institutions expect the entrepreneur to raise his own contribution to project cost. Thus working-capital underestimate is an error you must guard against.

(ix) Selecting the Location : Some Temptations

There are two major errors which an entrepreneur makes in respect of selecting the location. First, he is so completely swayed by the offer of financial incentives (subsidy, income-tax concession), that he does not look into other criteria for choice of location. He may thus choose a location which from the standpoint of market-proximity, raw material availability, manpower position and operating cost-structure, is eminently

unsuitable. Then, there are instances of an entrepreneur choosing a location merely because it is his hometown or he owns ancestral land - though it is not an appropriate location. Do not fall prey to these temptations. If you are selecting a location, take a comprehensive view.

(x) Selling Price : Unfounded Optimism

A new enterprise, despite offering comparable quality, may not be able to realise the selling price, of the products manufactured by it, which established enterprises (existing competitors) can do. This fact is at times overlooked. Worse still, entrepreneurs assume a higher than prevailing price because they believe the quality of their product will be superior. An unrealistic selling price estimate is an error. It is comforting to assume such a price since it will make the enterprise look very profitable. The comfort may be short-lived. So, follow a conservative path while estimating selling price.

(xi) Cashflow in Initial years: Poor Detail

The cashflow during implementation period and initial years is not charted out in sufficient detail. You will be able to do this only if you ascertain the disbursement modalities of financial institution completely and work out a thorough cash-plan with built-in contingencies. They may expect you to spend from your own resources in the first place. The institution may make direct payment to machinery supplier and reduce your flexibility. There are machinery suppliers and others who may expect advance payments from you. If you have not envisaged such payments under your cash-plan, your implementation will grind to a halt.

ENTREPRENEURS, ENTREPRENEURSHIP AND SMALL BUSINESS

The happiest time in a man's life is when he is in red hot pursuit of a dollar with a reasonable prospect of overtaking it.

—Henry Wheeler Shaw, quoted by Robert W. Kent, "Entrepreneurs," Money Talks

INTRODUCTION

Much has been written in recent times about entrepreneurship and what it represents to business, to the community and to government. The theme usually examines an individual, perhaps a team and occasionally a company, and the development of a unique technology or improvement that will be of far-reaching importance to society. Articles and advertisements announce such advances as the V-chip to monitor television violence and software packages that will let the world communicate with the world. There are new franchises and new products promising a new way of life. Perhaps more importantly the media portrays a new age—an "information" age—that will comprise a bright world of tomorrow. All this is a recent phenomenon. Entrepreneurs have only lately become the subject of serious research in the public media, even though some academics have been studying the topic for decades. In this chapter students will acquire a broad understanding of entrepreneurs and where they fit in the system. Specifically they will

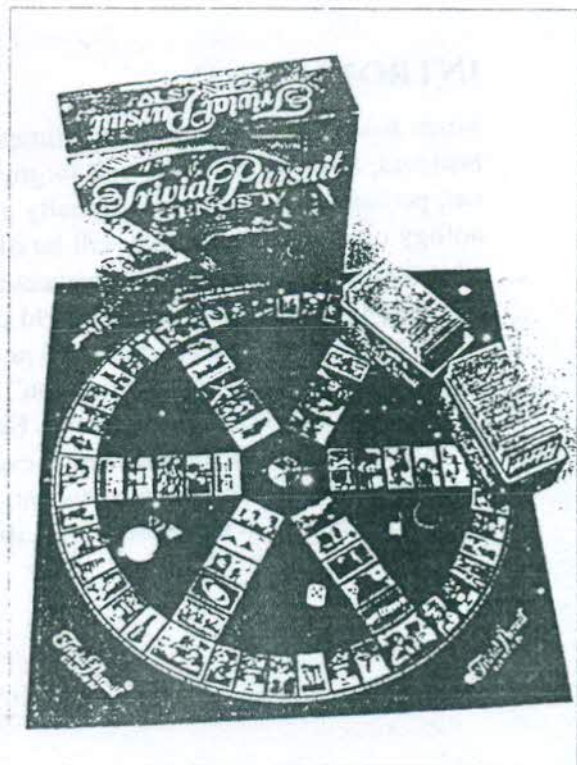
- appreciate the historical importance of entrepreneurs and their contribution to a nation
- recognize the need to have a balance of entrepreneurship, small business and large corporations in a country
- understand the importance of entrepreneurship in terms of an economy, society and the individual
- be able to recognize that entrepreneurs come in many forms, including those that may be desirable and not so desirable
- recognize the difference between a small business person and an entrepreneur

Can Entrepreneurship Be Defined?

The study of entrepreneurship is an unfolding journey. The more information we acquire, the more we learn about the entrepreneur. But even as we learn more we are left with an unclear picture of what makes up this dynamic individual who creates national economies. Despite more than two decades of research and study, a consistent definition that would locate the entrepreneur in a workable framework remains elusive. This is not to say that there are no workable definitions. In fact, Chapter 6 provides a reasonably clear focus on the entrepreneur. Yet there has been no little confusion about the subject.

In part the problem occurs because the subject is relatively new, certainly when compared to marketing or geography, for example. Another factor is that scholars have developed their own personal models that are extracted from their particular research on the topic. A few years ago Donald Sexton, in commenting on the history of entrepreneurial research, observed that academics, for example, "really do not care what you call an entrepreneur as long as you clearly define your sample,"¹ the indication being that academics at that time were more comfortable with the investigative process rather than the subject itself. But much of that has changed and there is a more unified body of thought about what makes an entrepreneur.

Historically, there have been many definitions. Entrepreneurs have been described as a "special kind of manager," one who follows a prescribed procedure or process. Others see the role in a behavioural context and look for answers to such questions as: "If an individual successfully launches a new venture, what personal characteristics and psychosocial attributions make it happen?"² There is little doubt that entrepreneurs



The board game Trivial Pursuit®—a 1980s invention, innovation or improvement depending on how one looks at the product

are a breed apart. The media is full of stories about successful individuals who have created megacorporations in a few short years and amassed a fortune in doing so.

Few students today have not heard of billionaires William Gates of Microsoft, or Sam Walton and Wal-Mart. Many Canadians still marvel at Chris Haney and Scott Abbot, who created Trivial Pursuit[®], a venture that realized sales in excess of \$2 billion within three years of start-up. It is now so broadly used it has its own Web site. In all cases the perception is clear; the public sees an individual or corporation founded by an individual who is dynamic, powerful and a leader in the industry. There is something enigmatic about these individuals. They are looked on with a certain awe because they have had the ability, and perhaps the luck, to create an enterprise or industry that adds to the well-being of the community and the nation.

THE HIATUS

But entrepreneurs have not always been so well regarded. Their resurgence is a recent phenomenon. In the years following the 1950s many scholars believed that entrepreneurship was a fading activity and they focused their attention on the large corporation as the definitive model of the free enterprise system. From World War II to the 1960s, much of new managerial thought was directed to the *science* of management and the decision-making process. During those years the emphasis was on the organizational structure–strategy relationships espoused earlier by Chandler,³ for example, and the influential writings of Alfred P. Sloan, Jr. While commenting on free enterprise at that time, Peter Drucker observed that “the large corporation emerges as the focus of any study of American industrial society,”⁴ and of free enterprise. This notion became so prevalent in the conventional wisdom of the day that many influential people saw the demise of small business and the entrepreneur. A well known U.S. senator prefaced a book on small business with the view that “if you’re a small businessman... you may be as extinct as the village blacksmith.” In the same book a prominent economist declared that “small business is as dead as the dodo.”⁵ There was a certainty that the corporation and its organization was the real fountain of productive economic activity in a nation.

Management schools at the time were more inclined to examine Fayol’s principles of the five managerial functions of planning, staffing, organizing, directing and controlling, to the exclusion of entrepreneurship. Business studies relied on case methodology that stressed managerial solutions to problems set in large organizations. Even today the bulk of textbook and case material still relates to a larger corporate situation and a structured managerial environment. The results of this syllabus has been an educational system that has trained (and still trains) executives for careers appropriate only to big business, big government and big labour. It produced a “culture” that helped coalesce industrial society into one massive kind of organization.

Industrial Concentration

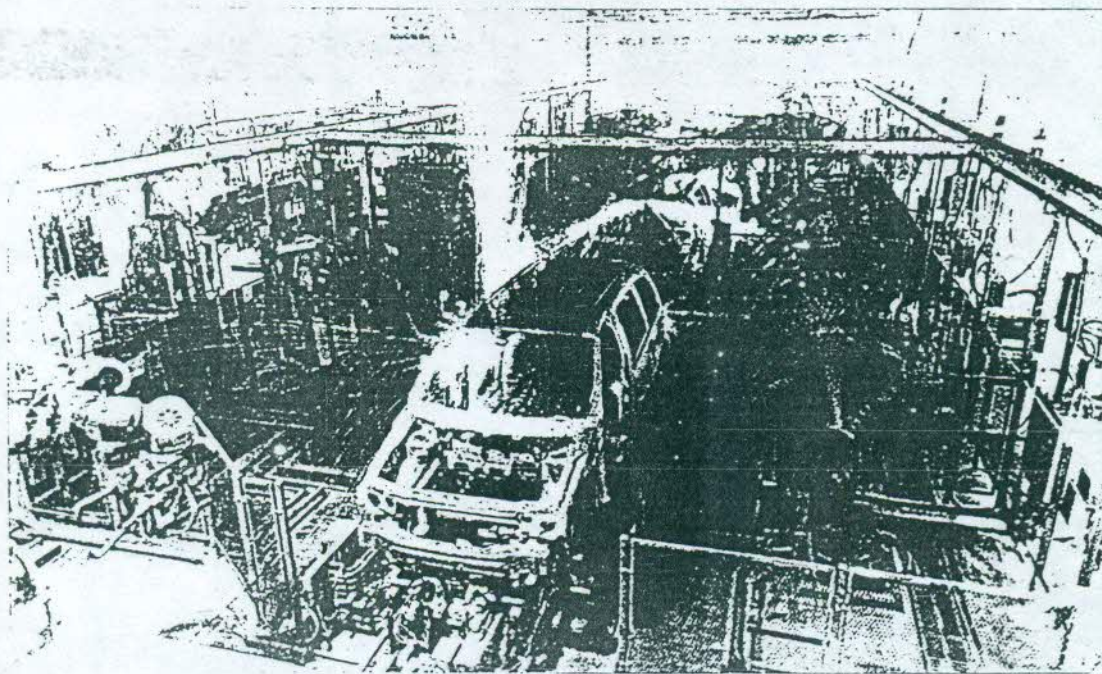
In fact the concentration of industrial power in America reached extraordinary levels with the merging of national defence interests that prompted the notion of an “industrial-military complex.” Early in the second half of the century, former U.S. President Dwight D. Eisenhower warned of the influence of this apparent power base, even as Douglas MacArthur demolished Japan’s *zaibatsu*, or financial empires. Much of the blame for Japan’s aggres-

sion leading to the war in the Pacific was ascribed to a military-industrial complex that worked closely with the zaibatsu, which were controlled by a few families. There is a certain irony in what followed. During the late 1940s the democratization of Japan's economy was intended to do away with the dominance of these cartels. What it did was to create a dynamic economy, one now directed by a new cadre of powerful people who control an economy ranking second in the world.

The drive for concentration of power is, like entrepreneurship, a natural drive and the reasons for its assembly are not unique. It is the final extension of entrepreneurial success where the business founder continues to expand the organization. Once the success of the new venture is assured, the individual soon moves from a dynamic, innovative mode to one of conservation and consolidation. This new position encourages a drive to reduce competition and to have a stronger influence on the environment—a situation that encourages such conditions as taxation structured to favour large businesses, where financial institutions support larger corporations, and where institutions, including labour unions, favour the bigger organizations since it is easier to deal with them.

Entrepreneurial Founders

The created wealth of the industrial world leading into the 20th century was the result of powerful entrepreneurs of the time. In North America these captains of industry included the likes of Thomas Edison, J. P. Morgan, Nemours Du Pont, Henry Ford, Andrew Carnegie and Alexander Graham Bell. In Japan too, among other developing nations, there were national



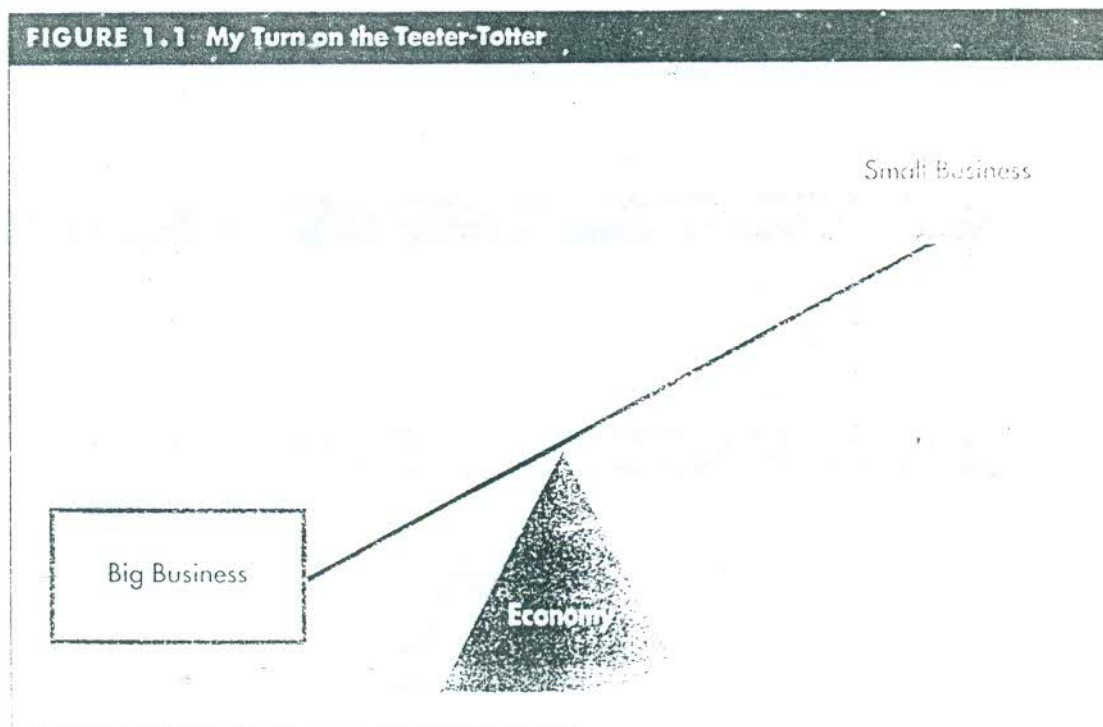
In the postwar years the engine of the economy and source of employment was big, industrial corporations. The trend into the 21st century is toward smaller, entrepreneurial ventures, on their own or within existing organizations.

entrepreneurial heroes. Two of that country's great legends include Yataro Iwasaki and Eiichi Shibusawa. These individuals accomplished more, and their achievements were more spectacular, than those of the Rothschilds in England and the Krupps of Germany, or even of Bill Gates and Microsoft. Iwasaki founded what is now arguably the largest enterprise in the world, the Mitsubishi Group of Companies, while Shibusawa personally established 600 industrial companies in his lifetime. At the beginning of the century, these two collectively represented two-thirds of Japan's manufacturing and transportation industries.⁶

Entrepreneurial individuals have founded great enterprises and hugely expanded their national economies. As these corporations assumed a major proportion of national wealth and employment, it is little wonder they were looked on as bastions of the free enterprise system. Indeed, their power became so evident that society poked fun at them. A humorous cartoonist of the postwar years, Al Capp, parodied big business in the character of one General Bullmoose, whose resolute answer concerning any issue was that "if it was good for Bullmoose, it was good for the nation."

Concentration can be seen as a natural consequence of industrial growth.⁷ During the 1970s the 50 largest corporations in Canada accounted for over 40 percent of all industrial assets. In the United States at that time, big business owned 16 percent of all plants and accounted for 73 percent of manufacturing employment. In the United Kingdom the 100 largest corporations represented half of all manufacturing output. There has always been a need, and ample justification, for the entrepreneurial role in society. Yet, despite the rationale for entrepreneurship and its ability to bring a balance to the economy, the large enterprise continued to expand and control economic thought (see Figure 1.1). A further point on industrial concentration is the fact that economic thought and the study of economics did not then, nor does it now, seriously consider entrepreneurship a component of economic activ-

FIGURE 1.1 My Turn on the Teeter-Totter



y. (Chapters 4 and 5 examine this topic more completely.) The fact remains that managerial, societal and governmental thinking included little regard for the role that entrepreneurship plays in creating national wealth. This shortfall undoubtedly encouraged the trend toward bigness and the justification for it.

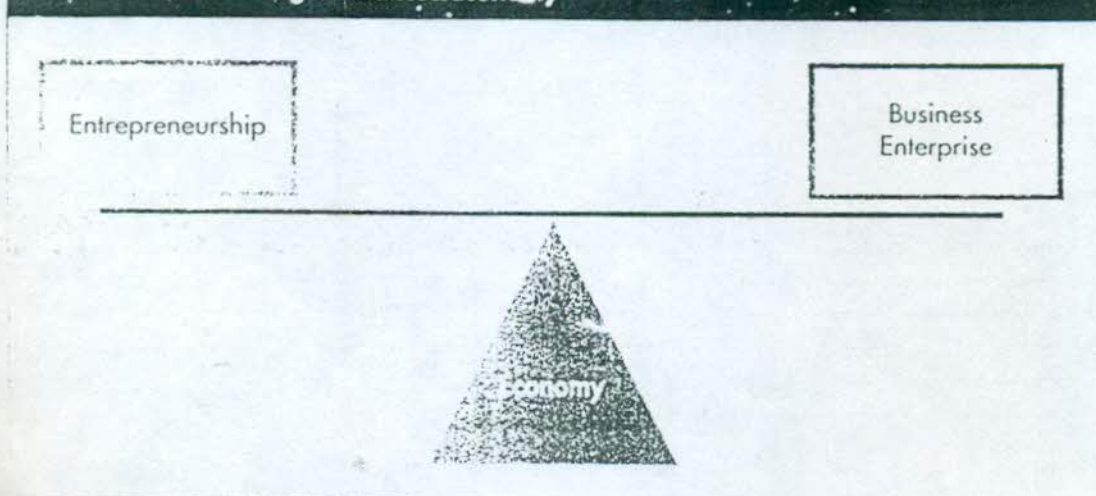
A BALANCED ECONOMY: ENTREPRENEURIAL REBIRTH

Since those early days both governments and institutions have come to see the need for a balanced economy in which entrepreneurship and small business play an important role (see Figure 1.2). Indeed the entrepreneur has reemerged as a national hero, a kind of recycling or historic dialectic. Throughout history the creation of industrial wealth has been a consequence of entrepreneurial action. Soon after American independence created the world's first entrepreneurial democracy, Eli Whitney introduced mass production in the manufacture of muskets for the new army of the republic. Following the Civil War, the U.S. turned from what was essentially an agricultural economy to one based on the industrial revolution, led by great innovators who, years later, were followed by entrepreneurs like Will Durant and Phillip Patterson in America and the Southams, McLaughlins and Bronfmans in Canada. An interesting observation is that great Canadian entrepreneurs were successful in retailing, financial affairs and food distribution; the great American entrepreneurs were in manufacturing and production.

The reemergence of entrepreneurship is taking place on a broad economic and institutional basis. Governments at all levels are now becoming sensitive to the role of entrepreneurship in stimulating the economy and revitalizing industry. Margaret Thatcher's program of privatization in Britain in the 1980s heralded the redesign of governmental policies to encourage entrepreneurial activity. Within a decade her government redirected the British economy from a socialized big business model to an entrepreneurial, free enterprise system with higher levels of employment and more economic promise than ever before.

Educational institutions, particularly undergraduate business schools, have developed advanced courses of study in entrepreneurship and are encouraging academic research in this arena. In the introduction of their text on entrepreneurship, Sexton and Kasarda, note that "the

FIGURE 1.2 Building a Balanced Economy



Employment

During the last two decades as western nations regrouped their economies, it became increasingly evident that the traditional huge "smoke stack" industries were inefficient, if not outdated. The American metallurgical industry (steel mills, foundries and forging operations) was reduced to half its postwar strength. The heart of the U.S. economy, a region that ran through New York, Indiana, Illinois, Ohio and Appalachia, often referred to as the "Rust Belt," laid off millions of workers as auto plants, steel fabricators, durable goods producers and heavy machinery industries closed their doors.

Yet for all the dislocation and loss, the entrepreneur, founding new ventures, picked up the slack and rebuilt the economy. During the period from 1980 to 1987, the Fortune 500 corporations permanently laid off 3.1 million people. At the same time an estimated 7 million new companies created 17 million new jobs.¹¹

Self-Employment

The study of entrepreneurship has an added benefit. It can lay out the model for individuals to start up their own company. Studies at Babson College and Toronto's York University show that a significant number of graduates from programs in entrepreneurial studies go on to establish their own enterprises. These new ventures are enabled by an increased sensitivity to, and alertness for, new opportunities that the graduate acquires by studying entrepreneurship.

SOCIETAL CONSIDERATIONS

A nation gains enormously from entrepreneurship. Beyond the economic and monetary outputs, there are further direct benefits to society in the form of standard of living, social responsibility and sustainable industry.

Standard of Living

The free enterprise system, given a nominal degree of governmental interference, encourages the individual to create new ventures along with other forms of self expression. When this activity is aggregated with thousands of other small businesses, the result is a competitive environment that refutes economic equilibrium (a fiction at the best of times) and produces an increased standard of living.

Table 1.1 illustrates the effect by comparing a *free enterprise* society, a *socialistic* society and the former *Soviet system*.

TABLE 1.1 Comparative Standards of Living

Commodity	U.S.	England	U.S.S.R.
Hamburger (1kg)	43 minutes	57 minutes	128 minutes
Sugar (1kg)	5 minutes	11 minutes	59 minutes
Weekly food basket	12.5 hours	21.4 hours	42.3 hours
Colour TV set (59 cm)	86 hours	177 hours	713 hours

Source: Adapted from "The Standard of Living in the U.S.S.R. and Poland, 1979-1984" by the U.S. State Department, Office of Economic Affairs, Bureau of Economic Analysis, Washington, D.C., 1985.

entrepreneurial revolution that is currently under way will have a greater impact on the future economic growth of the United States than any other event in our nation's history."⁸

Spearheading the revolution are individuals who, for a variety of reasons and motivations, start new ventures, revitalize existing organizations or create new technologies. It has almost become fashionable to be called an entrepreneur. The press, media and business community are quick to ascribe the term to those who perform in a unique manner. There are entrepreneurial small business people, managers, administrators and teachers, to mention a few. Indeed, the term has spawned its own taxonomy including *corporateur*, one who acquires and trades companies in the style of T. Boone Pickens or Carl Icahn; *intrapreneur*, one who creates a new venture within an established organization; and *paper entrepreneur*,⁹ perhaps best characterized by Mike Milken, who specialized in junk bonds and quick arbitrage.

The Importance of Entrepreneurship

Governments, academics, business people and the public have exhibited a growing interest and appreciation for entrepreneurs and what they can do for an economy. International agencies such as the World Bank and the U.S. Peace Corps have begun to introduce their form of "entrepreneurialism" as a recommended stimulant for third world economies. The U.N.'s 1994 International Conference on Population and Development,¹⁰ in furthering the status of women as an instrument of population control, prompted nations to expand their entrepreneurial, small business policies to include women. This was seen as a necessary stimulant to encourage women to gain a certain economic independence which, in turn, would influence family planning and population control.

Entrepreneurship is not only important to an economy, but it also serves to satisfy social and psychological factors in society. The actions and processes that an individual follows in creating a new endeavour, in fulfilling a dream, are a very human and behaviouristic activity. In a free society, individuals are able to play out their ambitions and to grow in character and personality.

Economic Importance

The contribution to a nation's wealth is the ultimate result of entrepreneurship. It shows up in the creation of new technologies that lead to the establishment of new companies. It produces new employment opportunities and leads to the accumulation of capital.

Creativity and Innovation

Even as entrepreneurs create new businesses and increase employment they are also a major source of scientific invention, new technology, and innovation. The U.S. Department of Commerce as early as 1967 acknowledged that most creativity in technology came from individuals and small firms. The major inventions of the 20th century were entrepreneurial initiatives. The telephone was invented in a Brantford, Ontario, farm house by Alexander Bell; the snowmobile was invented by Armand Bombardier, a mechanic, in Valcourt, Quebec; the Wright Brothers introduced America to air flight. Beyond these giants of the industrial world, others such as Royal Little of Tectron Inc., Peter Sprague of National Semiconductors Corporation, and An Wang of Wang Laboratories Mfg. are among the thousands of technological entrepreneurs who created new products and the organizations to manufacture them.

When contrasted to the bureaucratically driven economy of the former Soviet empire, Americans enjoyed a standard of living four times that of the Soviet citizen. Notwithstanding their highly illegal status, Soviet entrepreneurs, operating on a *sub rosa* market level, managed to feed people and prevent the standard of living from decreasing even more. A *Time* article carried the story about the difficulties that Russians were experiencing in the pre-*glasnost* period. Notwithstanding these trials, the article pointed to an offsetting contribution made by enterprising individuals. Over one-quarter of the empire's food production was being supplied from 4 percent of the arable land, land that had been given over to people who worked on the collectives for their own use. In contrast to an enormous inefficiency in the system (its repeated failures to supply grain for bread and a chronic inability to motivate over 20 percent of the labour force who worked in agriculture), the socialistic, centrally planned economy was being fed by illegal entrepreneurs who grew corn, cabbages and livestock ten times more efficiently on their "own land" and sold it on the black markets of the former Soviet Union.¹²

Competition

Entrepreneurship encourages a competitive environment within society. Huge corporations are able to pressure governments to protect their markets, to grant them at least a quasi-monopolistic position in the market. The banking industry in Canada is a singular example of big business and big government working together to dominate a market sector. Every five years the Canadian Bank Act requires the Class A or chartered banks of the country to review their mandate and justify their covenant with government. In most instances the banks use the occasion to access new market opportunities established by entrepreneurial companies and to eventually dominate the field.

The U.S. national defence industry best exemplifies the alliance between government and huge corporate suppliers as evidenced in the outrageous overcharges and regional pork barrelling permitted by elected representatives. In 1989, despite huge overruns in the production of the Stealth Bomber¹³ program, Congress passed a bill approving payment to General Dynamics. During the same Legislative session they went on to grant the corporation freedom to spend an additional \$20 billion.

SOCIETAL FACTORS

Entrepreneurial firms do not command this ability. They are more susceptible to social processes from the communities they inhabit. Alvin Toffler, in his latest visionary publication *Power Shift* (which discusses the role of future changes and who will control them), comments on the emergence of the small, family company as a vitalizing force in business and commerce. He singles out large corporations, suggesting that they are able to exercise power for its own sake, without regard for society, from within a hidden structure. The nature of bureaucratic systems is to serve their own ends, whatever they may be, often to the detriment of those around them. However, the small firm is very visible and is responsive to the community: "In short, whenever family relationships play a part in business, bureaucratic values and rules are subverted, and with them the power structure of the bureaucracy as well."¹⁴

A British study of the role that entrepreneurial firms fulfill in society lists six economic and sociological contributions made by these firms:

- They are competition to larger firms that would otherwise dominate an industry.

- They are the major sources for new jobs.
- They provide a harmonious environment where the owner and workers strive together, shoulder to shoulder, for mutual benefit.
- They can alleviate some of the core city social problems, a direct result of the local employment that they provide.
- They are creators of innovation where innovation is essential for survival.
- They are the seed acorns from which larger corporations grow.

Management of small firms is contrary to the bureaucracy of large corporations. Members of the small family firm, for example, have an understanding of what is taking place in the community and the business. There are few if any positions and rankings since titles don't count, and decisions are made often on an organic basis, relying on intuitive, subjective analysis and passion.

This organism is a subcomponent of the society that nurtures it and in most cases is responsive to its local networks of friends, acquaintances and community leaders. Large corporations, as Toffler points out, do not "live" in the communities they occupy. Corporations are directed from head office, and often they are multinational in composition. As such they have neither a local nor a national allegiance.

INDIVIDUAL FACTORS

Another, perhaps more interesting aspect of the social benefit of entrepreneurship is presented by Fleming¹⁶ who suggests that entrepreneurship is a mechanism that permits lower status groups to overcome their social position and to advance, as it were, in society. In this context, entrepreneurship not only offers some form of redress for possible social grievances, but also acts as a class leveller of sorts, diffusing wealth throughout the community. The idea is not new. The Reformation, in loosening the restrictions on business intercourse that prevailed during the 15th century, was seen to have created the same effect. The early Christian Church hierarchy was given to counselling people to stay in their "proper stations in life," a condition relieved by Luther's reforms that allowed people to find their own level in life.

Sustainable Industry

The new emphasis on social responsiveness requires that an undertaking should be sustainable. Any new venture should be competitive, yet not at the expense of society and the environment. It should profit, but also pay its own way. It should be innovative and flexible as to permit a long and productive life.

The history of western industrial nations is a litany of large corporations who failed to serve their communities, of unplanned unemployment, social upset and community abandonment. Taking the place of these declining monoliths are the smaller scale new technology companies. These new enterprises very successfully work within the limits established by local authorities, but they are globally aggressive. A study of the plastics industry on the American west coast discloses a very competitive structure where small firms are able to undercut Asian suppliers by 15-25 percent, confirming Toffler's view that "powerful

microtechnologies make it possible to do locally what previously could be done economically on a national scale."¹⁷

Taken from another vista, entrepreneurship is a factor that encourages innovation, stimulates and revitalizes a company, yet remains responsive to the changing needs of society. In this context the organization that produces goods and services consistent with consumer needs is being not only socially responsive, but also ensures its future. The ongoing dyad between company and customer then leads to the reinvention of the organization and the changes needed to sustain its operations. The two are mutually related: there must be both entrepreneurship and innovation for the model to work.

In offering society a sustainable economic option, Rein Peterson¹⁸ proposes that entrepreneurial small firms (in addition to factors of the rational allocation of labour and capital in a community) would be most likely to "satisfy certain socially acceptable criteria such as regional self-sufficiency." The small new venture is the one that applies appropriate technology and is attuned or adaptable to local cultural and environmental conditions.

Psychological Factors

There is a considerable body of evidence that entrepreneurship, along with other creative forms, is an innate, human condition.¹⁹ That is to say, individuals have a need to express themselves in a creative fashion, to be a painter, a writer, an inventor, or an entrepreneur. Without this outlet there is a presumption that a certain frustration is realized, possibly followed by listlessness and a certain ennui or discontent.

A number of researchers believe that entrepreneurs are driven by psychological characteristics. There is a wide range of discussion as to what variables are at work and they range from concepts of security to personality traits or as a part of "a deviant or marginal person."²⁰ Chapter 5 discusses the subject in more detail, but it is evident that, no matter how one defines the entrepreneur, there is a clear notion that the process does satisfy certain internal, psychological needs. It is in this context, the act of becoming an entrepreneur, that entrepreneurship becomes a mechanism serving the broader community and preserving a certain mental health.

ECONOMIC REPATRIATION

Aside from Toffler's views as to the future, there is a revolution taking place all around the world. Amid the turmoil of political and religious conflicts, nations are reappraising their goals and economic systems. In Asia, Eastern Europe, Africa, South America—in virtually every nation of the world—societies are realigning themselves with an entrepreneurial direction. When asked as to his opinion about the most important social policy a developing nation with a low standard of living could implement, Milton Friedman replied that it would be one that provides a free market economy so that "every country of the so-called 'third world' could become a country of the 'first world' through the establishment of the proper and most productive institutions;"²¹ that is, entrepreneurial businesses.

In many nations, governments have come to realize that large, state-owned enterprises and socialistic institutions simply do not work. Mexico, Brazil, Portugal, the former Soviet Union, China, Canada and many others have begun to privatize state properties. They now realize that these inefficient operations are incapable of fulfilling the economic, social and political objectives that prompted their creation in the first place.²²

The Former Soviet Empire

Nowhere else is the evidence of entrepreneurship as an economic, social and psychological stimulant so manifest as in the now emerging economies of the former Soviet nations. Only a decade ago the U.S.S.R. was looked on with concern, if not fear. The words of Nikita Krushchev, the 1960s leader who was forced to back down by John F. Kennedy over the Cuban missile crisis, still posed a threat. He had promised to "bury" the free world through the might of communism's economic force. Today that threat is not only hollow but seemingly never was a force to contend with. In 1988 Mikhail Gorbachev proclaimed *perestroika*, social acceptance of market forces in the economy. In 1991 the Soviet empire collapsed.

Today the emergence of former Soviet countries into the free market system is truly remarkable, given that all these nations had been saddled with a social, cultural and economic environment that denounced a free market society, decreed free enterprise to be illegal and branded entrepreneurs as members of a "mafia."

One of the more advanced former Soviet nations is Estonia. Four years after declaring independence the country is virtually a free enterprise state, with a stable currency and a positive record of growth. Much of its success can be credited to the government for privatizing land, industry, and commerce, but the machinery that powered the drive was the entrepreneurial spirit of those who started their own companies, took over and made profitable existing businesses, or innovated and revitalized large-scale operations.²³

Another example is Poland, a virtually impoverished country in 1990. All employment was essentially in government and state-owned organizations. By 1994 the country had privatized 95 percent of all enterprises which accounted for 90 percent of all non-government employees.²⁴ Even Russia, the least able to move quickly to a reformed market economy, is making great strides to achieve free enterprise.

The Mafia in Russia A point of interest in the new direction of former bloc nations is their definition of entrepreneurship. For generations the populations of the Baltics, Eastern Europe, Russia and all Soviet republics, were told that free enterprise was illegal. Anyone who profited at the expense of others was committing a serious crime. In fact, those who did were often put to death for profiteering. Buying blue jeans in Europe and selling them in Russia for those who were caught in the years before *perestroika*, brought prison terms and worse. These individuals were characterized by the Soviet state as being equally evil and on par with American gangsters. The comparison stuck and anyone doing business for profit was disdainfully identified as being "mafia."

More recently, brought on by the dramatically reduced economies and an uncertain new environment, some of the "old line mafia," who in the rest of the world would be looked on as entrepreneurs and business people, have stepped over the line and are actually engaged in illegal acts, including murder. It is this new-order "gangster mafia" that now captures media attention even as the so-called old-line mafia continues to spark economic growth.

China's Township Village Enterprises

One of the more astounding economic turnarounds began in 1978 in China when the 11th Central Committee of the Communist Party agreed to Deng Xiaoping's proposals for economic reform. This action, unlike the sustained hostility of the economic philosophy of the

former Soviet Union, legitimized the free market concept and set the pace for Chinese growth. By 1992 it was the fastest growing economy in the world and in 1994 had grown four-fold. Depending on the economic valuation system used to estimate its total GDP, it is arguably at present second only to the U.S. and will likely take the lead in the next decade.

A particularly unique feature of the Chinese entrepreneurial revolution is the formation of a hybrid enterprise that has grown up across the countryside. Local governments in townships and villages have encouraged the formation of firms that are neither state-owned nor fully individually owned, although there are wide variations to this theme. The entrepreneurs, or town/village entrepreneurs (TVEs), despite involvement of state government, are very competitive and globally directed. Many of them export their products directly to the world.

WHAT IS AN ENTREPRENEUR?

There is much debate and introspection when it comes to defining an entrepreneur. Chapter 7 develops a synthesis of the entrepreneurial profile but only by examining the topic in terms of the individual and behaviour. It establishes the linkage between the entrepreneur, the process and outcome of entrepreneurial effort. But the definition is not easily arrived at nor is it likely to be the final statement about what does or does not identify an entrepreneur.

An entrepreneur is an individual who creates something of value at a time and place where there was no such thing before. He or she initiates the development of a desirable product or service and then builds an organization to exploit it.

How or why entrepreneurs bring new ventures into being is unclear. Some may have been influenced by their place of work or their home environment to bring a concept to life. For others the process might be compared to a mystical experience, as with an artist who produces a unique art form. One is hard-pressed to understand how they bring their concepts into being and so entrepreneurship "as such is as difficult as any other artistic activity to explain in terms of origin, method or environmental influence."²⁵

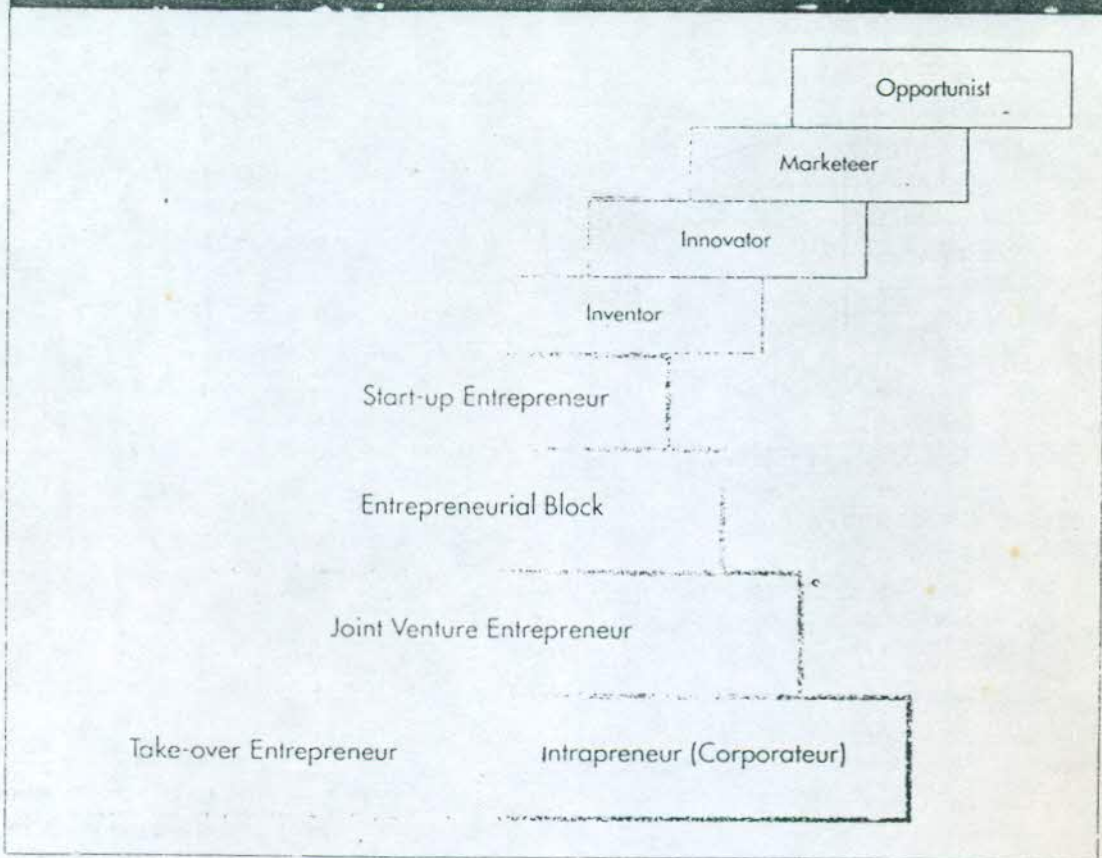
In this activity, there are two concepts at work. The art of creating the new venture, of proceeding through a process, is entrepreneurship. It is what the entrepreneur does.

The literature and exploratory research identify a variety of entrepreneurial forms. Robert Hornaday,²⁶ proposes a progressive structure where, at one point, the entrepreneur is a craftsman who then goes on to become a manager. In this presentation there is the very real appreciation of an entrepreneurial cycle the individual is presumed to follow after the initiation of a new venture. Much like the product life cycle (PLC) in marketing, the entrepreneur is seen to go through an initial formation stage through to a plateau. (Chapter 8 discusses the process in some detail.) There are four primary categories that mark the entrepreneur (see Figure 1.3).

Start-up Entrepreneur

The start-up entrepreneur may be regarded as engaging in the "purest" form of entrepreneurship. It is the first extremity of a continuum that moves from a creative, intuitive application of resources and imagination to the more established role of an entrepreneurial manager in a large, structured organization. In this context the entrepreneur is an individual who arrives at a unique solution to some problem or develops a new science that can be

FIGURE 1.3 Types of Entrepreneur



translated into a usable product or service. The element of risk is highest at this point both in terms of reputation and personal capital. Pons and Fleishman, for example, the arguable co-inventors of cold fusion, were literally driven out of the country to France where they continue their research, hopeful of establishing their invention and recapturing their reputations at a Mitsubishi-financed laboratory.

There are four subcategories of start-up entrepreneurs: the inventor, the innovator, the marketer and the opportunist.

Inventor Defines a unique, new concept, invention or methodology. The invention may have been intuitively developed, the consequence of serendipity or the result of hours of application, as with the cold fusion process.

Innovator Adapts a new technology or methodology to solve a new or existent problem. Creates solutions from scientific or technical developments then goes on to market these in an industry, e.g., Gerry Heffernan of CoSteel.

Marketeer Identifies a need in the market place and satisfies it with a product that is new to

the market or one that substitutes more efficiently for existing products or services as with Trivial Pursuit.

Opportunist Essentially a broker, an arbitrageur, matching needs with services and a commission. Limited creativity. Prime example would be a speculation stock market promoter, a hustler. The presumption is that these individuals are not interested in projects that add to the nation's wealth.

Joint Venture Entrepreneurs

In this form the entrepreneur takes the risk of introducing an established concept (product or service) into a new environment. An example would be the creation of a new franchise in strange territory as with the opening of McDonald's in Pushkin Square, Moscow, in 1990. The Russians own 51 percent and McDonald's Canada owns 49 percent. In this case George Cohen, the company's Canadian President, assumed the entrepreneurial role of introducing an inherently American fast-food service into the then stolid, authoritarian Soviet society.

In contrast to an organizational form of joint venture, Marion Laboratories of Kansas City, Missouri, joins others in a product relationship. It derives the bulk of its revenues from aggressively marketing the discoveries of foreign laboratories.²⁷ This classification would include franchising to a lesser degree and the transfer of new technology as a primary activity.

Take-over Entrepreneurs

Many entrepreneurs begin their journey to success by acquiring an existing business. Ted Turner began his odyssey at 29 years of age by acquiring his father's bankrupt billboard advertising company in 1969. He parlayed this into a number of radio stations in the Atlanta, Georgia, market as a part of the Turner Broadcasting Systems, which now includes CNN, the international all-news service.

In Canada another broadcaster, Ted Rogers of Rogers Cable, took over his father's interest in a Toronto radio station from which he initiated the launch of what would become a multi-billion dollar empire that includes cable operations and production facilities. Ted Rogers, Sr., was a great Canadian inventor in his own right who developed the AC radio tube that permitted improved broadcasting in 1927.

These individuals were not content to manage the assets they had obtained, some at an early age. Rather, they continued to take risks and, motivated by some internal drive, strove to fulfill their own entrepreneurial vision.

The Intrapreneur

The last decade has seen a heightened acceptability of the role of the entrepreneurial manager in the corporation. Peters and Waterman refer to these individuals as champions, taken from Edward Schon's view that within a company "The new idea either finds a champion or it dies."²⁸ In defining his guidelines for a changing society Peter Drucker notes that "we need men who can build a new structure of entrepreneurship on the managerial foundations laid these last fifty years."²⁹

The role of the corporate entrepreneur is to renew the organization by introducing and promoting innovation that leads to managerial productivity, new products or productivity. Very often this individual is a lone ranger attempting to move the corporation or bureaucracy to an advanced position that management has yet to recognize. On the other hand, he is more often a venture team builder who creates the environment that brings with it success. The enormously successful story of the Ford Mustang, introduced in the early 1960s by Lee Iacocca, is a representation of the latter style.

The categories in Table 1.2 classify the roles that entrepreneurs assume. They illustrate the point that an entrepreneur performs a number of functions, each characterized by a dif-

ferent form. They vary from a single, unsupported individual through to one behaving entrepreneurially in a bureaucratic system. The taxonomy *does not indicate what an entrepreneur is*, rather it portrays the settings or situations in which he or she functions.

TABLE 1.2 Taxonomy of Entrepreneurial Functions

Typology	Characterization	Risk	Gain
1. Start-up	Unique solution to problem, invention or innovation	Reputation, personal capital	Accomplishment, independence, wealth
2. Joint venture	Existing solutions in new environments	Personal capital	Share of wealth
3. Take-over	Existing operation, entrepreneurial individual	Personal income, collateral	Wealth, future opportunity
4. Intrapreneur ¹	Entrepreneurial manager in a structured environment	Career, reputation	Income, promotion

→ independence

1. Data from G. Kirzner (ed), *Intrapreneuring* (New York: Harper & Row, 1985), p. 4.

ENTREPRENEURSHIP AND SMALL BUSINESS

There is a "fuzzy set" view when it comes to both small business and entrepreneurship. While the terms are not necessarily mutually exclusive they are separate and discrete. Unfortunately, much of the literature tends to blend small business as an economic activity in which entrepreneurship flourishes. On the other hand there is a relatively similar notion that entrepreneurship is an economic activity that includes small business. Neither concept is appropriate nor correct.

Entrepreneurship

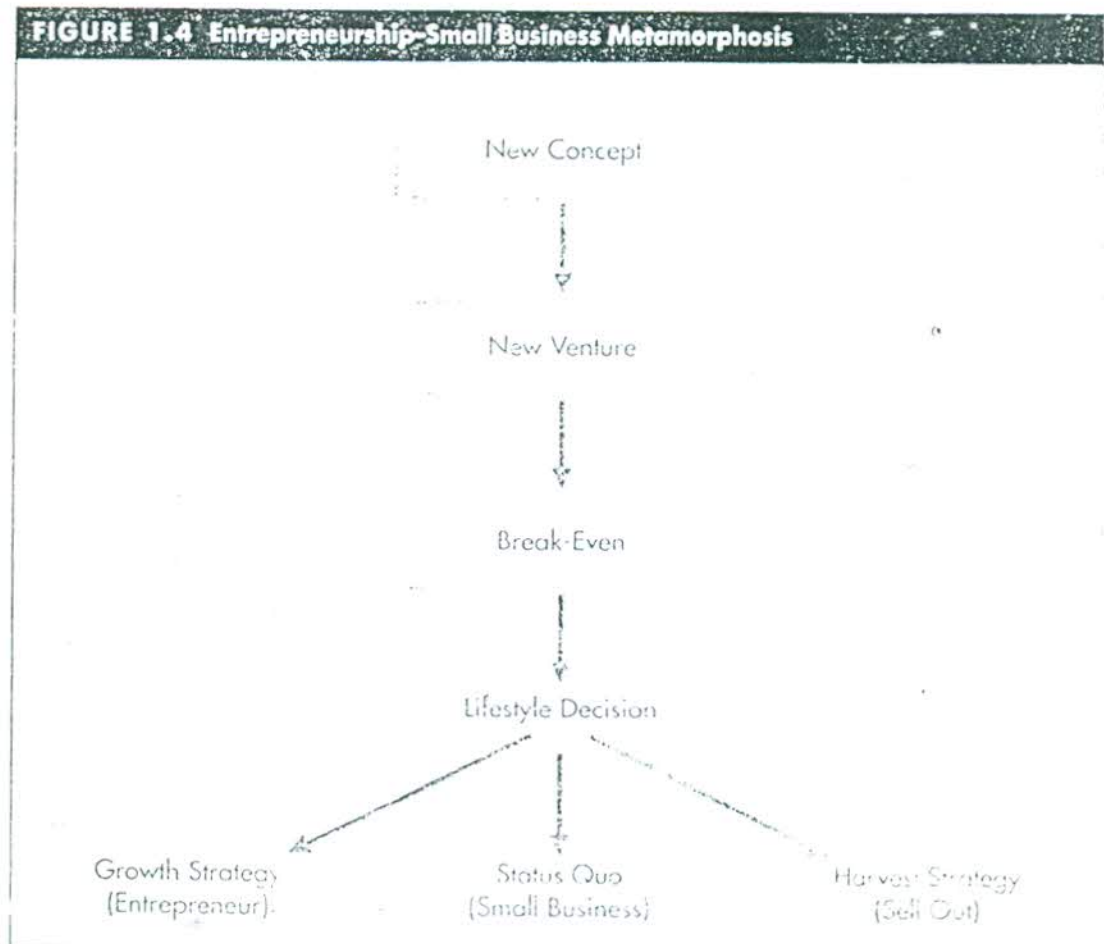
The process of seeking out opportunities that are unique in the macroenvironment, organizing the resources needed to exploit them and building an organization to maintain the goal-seeking drive that initiated the venture is a nominal view of entrepreneurship (see Chapter 8 for the full discussion). The issue is whether the entrepreneur is actually looking for a lifestyle, a self-determined employment, or whether there is a continued drive to build a larger enterprise.

Michael E. Barrier, business consultant and author of the best-selling 1986 book *The E-Myth*, makes the observation that owning a small business does not necessarily mean that one is an entrepreneur.³⁰ The business may be just a job, one that was created through a desire not to have a boss or supervisor. Indeed, one of the more powerful drives in establishing a small business is the need to get away from being directed by another person.

A significant and often determining factor occurs at the point where the entrepreneur, having launched the business, begins to break even or make a profit on the venture (see Figure 1.4). Here the individual, possibly for the first time in some months or years, has the luxury of an alternative course of action. For many it becomes the opportunity to ease off or quit the frantic pace that was a necessary part of the process. Some choose a growth strategy, continuing in an entrepreneurial fashion as they increase the size and scope of their venture. Others elect to sell out, reaping whatever reward they can negotiate, and retire or go on to other perhaps more challenging ventures.

The Small Business

The entrepreneurs who select a status quo strategy now seek a lifestyle where they can afford the luxuries and comforts they had deferred for so long. At this juncture they must now make the transition from an entrepreneur to a manager. As the managerial functions replace the entrepreneurial drive, the operation becomes more administrative in nature until the organization becomes more corporately oriented. Eric Kierans, former cabinet minister in the Canadian government (1968–1976) and professor emeritus at McGill University, made the



observation that a capitalist is an entrepreneur who had "arrived." In this mode the entrepreneurial emphasis is repositioned from *striving and risking* to *status quo and conservation*, which likely categorizes the state of most small businesses.

To this may be added the observations that entrepreneurial firms differ from small businesses in three essential ways. First, the entrepreneurial firm is innovative and continues to improve its product and services. Second, it continues to grow, and seeks a dominant position in the market place. Finally, it continues to take calculated risks, opening new vistas in the market, taking on new products and expanding the organization to fulfill growth objectives.

EXISTING SMALL BUSINESSES

The Canadian Federation of Independent Business and the U.S. National Federation of Independent Business estimate there are almost 20 million small businesses in North America. These vary from small, microbusinesses such as a street vendor, to home-based businesses and larger manufacturing companies. A small business is best characterized by being a hands-on, personally managed company rather than by size as such. A generally accepted definition is one defined, in part, under the U.S. Small Business Act.³¹ It states that a small business is one that:

- a. Is independently owned and managed,
- b. Is not dominant in its field or market and, as a further point
- c. Has sales of less than \$5 million (or fewer than 500 employees).

Arguably not all of these businesses are entrepreneurial. Many exist primarily to provide an income and employment for the owners. Many small business owners hire managers to run the company on a day-to-day basis while they are involved in other activities, possibly including entrepreneurship in other ventures.

In the same context a franchise is not an entrepreneurial venture. Many franchisors conduct in-depth market analysis and go to considerable lengths to examine the managerial abilities of the proposed franchisee before agreeing to the franchise deal. For the most part, a franchise is an extension of the business in a new, but not necessarily different, market.

Managerial Distinctions

In addition to the features that differentiate the small business person from the entrepreneur, there are distinctions in managing style, particularly in terms of strategy and planning.³² The entrepreneurial venture is characterized by an "innovative, strategic orientation," to which the entrepreneur designs all planning and actions. He or she is breaking untravelled ground and each step is guided by the master plan that was created the day the new concept was moved from being an idea to actual implementation. A second element is that the innovation is constantly being tested against new markets, conditions and opportunities. The new venture is created by, or has come to identify, a new marketing opportunity. It may be that the entrepreneur has found an emerging need, previously undetected, and moves to exploit it.

The final element is that the discovery occurs in a niche that others have not been aware of or has come about because of innovation. Carland et al. determine that these

three elements are consistently evident in their identification of what makes up an entrepreneurial venture as distinct from one that is a small business. In fact, they make the observation that if even one of the three factors is evident, then that is sufficient to offset it from being a small business.

The contrast is summarized by noting that the entrepreneurial venture is essentially a "dynamic market-creating activity, that does provide the ongoing focus for the bulk of activities."³³ Table 1.3 sets the differences between the status quo, small enterprise and the dynamic, entrepreneurial operation.

TABLE 1.3 Comparison of Entrepreneurship and Small Business

	Entrepreneurial Firm	Small Business
1. Principals	Entrepreneur	Owner/manager
2. Performance	Judged by a developing marketplace	Judged by existing customers
3. Management style	Hands on, informal	Delegation, use of controls, procedures
4. Objective	Personal goals	Income, return on growth investment
5. Profit	Residual after re-investment	Flow of earnings
6. Attitudes to new situations	Seen as opportunities	Seen as problems
7. Tasks	Identify and pursue opportunities	Problem solving
8. Attitude to risk	If too great, find alternative	Avoid risk
9. Attitude to making a decision	Make decision and take consequences	Ponder, seek out concerns or do a study
10. Deal with crisis	Put out the fire first	Blame someone
11. Attitude toward customers	Close relationships	Arm's length
12. Communication	Oral, answers all calls	Secretary screens calls

Source: Adapted from James W. Carland, Jo Ann C. Carland, Frank Hay and William F. Branson, "Distinctions between Entrepreneurial and Small Business Ventures," *International Journal of Management*, Vol. 5 (1), March 1989.

David Channing's operation and success can be examined in the context of two definitions.³⁴

Small Business Any business that is independently owned and operated, not dominant in its field and one that does not engage in any significantly new marketing or innovative practices, relying on established practices learned while building the business.

Entrepreneurial Venture One that engages in a number of Schumpeter's four categories of behaviour: that is, the goals are (a) to grow, (b) to be profitable, (c) to be innovative in its strategies and management, and (d) to pursue new opportunities.

While the established small business manufacturer, radio station owner, retailer, or fruit grower devotes most of his or her time to husbanding the enterprise, the entrepreneurial

Darlene Valley Park is one of the last remaining pristine areas in British Columbia, Canada. (This is an actual but disguised case.) The over half a million hectares of natural wilderness are easily accessed by road, rail and air, but the government has wisely curbed development within the beautiful snow-covered mountains, clear cold lakes and lush green forests.

During his college years David Channing, a student in mathematics, acted as a summer tour guide for groups wanting to hike through the Darlene

Valley preserve. Each summer he would rent a bus and drive tourists from Vancouver and Seattle up to Darlene Valley. After graduation, and unable to find a job, Channing created his own employment by founding the Darlene Valley Tour Company. Now, some ten years later, Channing owns the largest tour company in the interior of the province and, while he still considers himself to be an entrepreneur, his company maintains a comfortable sales level and an equally comfortable earnings stream year after year.

firm is busy adding to the portfolio, expanding it in new directions and taking on new challenges. In this manner it continues to create something of value to society and to the entrepreneur also.

ENTREPRENEURSHIP AND SOCIETY

The role of entrepreneurship in society has yet to be fully defined. There is no doubt as to the value it provides in economic terms, the considerable service in job creation, the addition of wealth to a community and the innovation it brings to an industry. Another factor is the ready ability to link market needs with new technology. The entrepreneur scans the environment seeking out new opportunities with the sensitivity that identifies the need gap and exploits it with the result of an improved societal value added and prospective improvement in standard of living.

A particular feature of entrepreneurship is that it offers individuals the opportunity to create their own employment. The massive downsizing in government and industry has resulted in few jobs for young people coming out of colleges and universities. As with David Channing, they may be inspired to find their own niche in the world by starting their own enterprise, funded perhaps by their comparatively wealthy "baby boomer" parents. This path may also be an option for those being forced to retire from the labour force, yet who have a life expectancy at age 65 twice what it was a generation ago. It is in this sense that entrepreneurship offers an alternative life career to society and the opportunity to bring further value improvements to the community.

Entrepreneurship has become so pervasive in the culture and value system of society that senior officials look to including it in the affairs of government as a methodology to give back value to the country. In 1993 U.S. Vice President Al Gore presented his report on the National Performance Review to President Bill Clinton. In it he expressed a new approach to government that unshackles the outdated bureaucratic paradigm of government and pro-

posed the adoption of an entrepreneurial paradigm.³⁵ The proposition is that the nation wants a government that puts people first by

- serving its customers
- empowering its employees
- fostering excellence which would then lead to
- creating a clear sense of mission
- delegating authority and responsibility
- replacing regulation with incentives
- developing budget based outcomes
- measuring our success by customer satisfaction

In effect Gore proposed a free enterprise model for the U.S. economy—one that encourages the role of entrepreneurship and social responsibility.

SUMMARY

- *Entrepreneurs* drive the economy, creating new concepts, innovations, new ventures, employment and national wealth.
- *Entrepreneurs* bring a balance to a nation's economic system, offsetting concentrations of power, increasing competitiveness.
- *Entrepreneurship* serves the community first and society by providing an improved standard of living, social responsiveness, sustainable industry. It adds to the social and psychological well being of the community by providing an outlet for creative action.
- *Entrepreneurship* is the productive antithesis of a socialistic system and planned economies. It offers third world countries the opportunity to become first world countries.
- *Entrepreneurs* can be classified in four categories: start-up, joint venture, take-over entrepreneurs and intrapreneurs.
- *Start-up entrepreneurs* can be classed in four categories: inventor, innovator, marketer and opportunist.
- *Entrepreneurship* is not the same as *small business*.

Entrepreneurs are characterized by striving and risk taking, while small business people hold a status quo and conservation approach.

QUESTIONS

1. Discuss the emergence of "big business" as a cultural ethos during the 1960s. What opportunities were available for graduating students in that period?
2. Comparing the "big business" era with the current business period, which is most appealing to graduates? To society? Justify your answer.
3. What are the possible reasons for the poor performance of the former Soviet Union in being able to deliver a good standard of living?

4. How would you go about setting up an entrepreneurial climate in a new country, such as New Guinea?
5. What are the factors that give importance to entrepreneurship in society?
6. Can entrepreneurship assist underdeveloped countries to expand their economies? Raise standards of living?
7. Drawing from the student's own experiences, describe a person who is seen as an entrepreneur. Does she or he fit a common standard?
8. What might be the directions for growth that David Channing could follow? In your view, what are the reasons for his current status?
9. Who is more creative, an entrepreneur or a small business owner? Defend your selection.
10. Interview the owner of a newly established business. Is the owner an entrepreneur? What motives were at work that prompted the start-up?
11. Interview a local owner-managed small business. How does the owner fit the comparison between small business and entrepreneurship? What are her or his observations about the need for future growth? Do you agree or disagree with this direction? If so (or not) explain your reasons.

ENDNOTES

1. Donald L. Sexton and Nancy B. Bowman-Upton, *Entrepreneurship: Creativity and Growth* (New York: Macmillan, 1991), p. 4.
2. Rein Peterson and Kimble Ainslie, *Understanding Entrepreneurship* (Dubuque: Kendall/Hunt Publishing Co., 1998), p. 25.
3. Thomas J. Peters and Robert H. Waterman, Jr., *In Search of Excellence* (New York: Harper & Row, 1981), p. 4.
4. Peter F. Drucker, *Concept of the Corporation* (New York: John Day, 1972), p. 4.
5. Clifford M. Baumbach, *Baumbach's Guide to Entrepreneurship* (Englewood Cliffs, NJ: Prentice Hall, 1980), p. 9.
6. Drucker, *Concept of the Corporation*, p. 4.
7. Rein Peterson, *Small Business: Building a Balanced Economy* (Toronto: Porcepic Press, 1977).
8. John D. Kasarda, *The State of the Art of Entrepreneurship*, ed. Donald L. Sexton and John D. Kasarda (Boston: PWS-Kent Publishing Co., 1992).
9. Diane Frances, *Controlling Interest* (Toronto: MacMillan, 1986), p. 13.
10. Eugene Linden, "Showdown in Cairo," *Time* Vol. 144 (10), September 5, 1994, p. 42.
11. Jeffrey A. Timmons, *New Venture Creation: Entrepreneurship in the 1990's*, 3rd ed. (Homewood, IL: Irwin, 1990), p. 4.
12. *Time* "Future of the U.S.S.R.," September 1991.
13. "Stealth Bomber Over-runs," *Wall Street Journal*, October 1991.
14. Alvin Toffler, *Power Shift* (New York: Bantam Books, 1990), p. 182.
15. David Storey, "Entrepreneurship and the New Firm," *The Survival of the Small Firm, The Economies of Survival and Entrepreneurship*, ed. James Curran, John Stanworth and David Watkins Vol. 1 (Cambridge, U.K.: Gower University Press, 1984).

16. W.J. Fleming, "The Cultural Determinants of Entrepreneurship and Economic Developments," A Case Study of Mendoza Province, 1861-1914, *Journal of Economic History*, Vol. 39 (1), (March 1979) (See KSV, p. 75).
17. Toffler, *Power Shift*, p. 239.
18. Peterson, *Small Business*, p. 48.
19. Kenneth R. Blawatt, "International Notes," *Journal of Small Business Management*, Spring 1995, pp. 74-79.
20. Elizabeth Chell, Jean Hawoth and Sally Brearly, *The Entrepreneurial Personality: Concepts, Cases and Categories* (U.K.: Routledge, 1989), p. 55.
21. Miroslav Sevcik, "A Conversation With Milton Friedman at the Prague School of Economics," *Columbia Journal of World Business*, Spring 1991, pp. 15-17.
22. James E. Austin, Laurence H. Wortzel and John F. Coburn, "Privatizing State-Owned Enterprises: Hopes and Realities," *Columbia Journal of World Business*, Fall 1986, pp. 51-60.
23. Pinter, Francis, *Innovation and the Small and Medium Sized Firm* (Routledge UK: London, 1982), p. 85.
24. Daniel Michaels, "In Poland the Spirit of Capitalism Begins to Take Root, Blossom," *The Journal of Wall Street Europe*, February 1993, p. 1.
25. Harold C. Lindsay, "Entrepreneurial History," *Encyclopedia of Entrepreneurship*, ed. Calvin A. Kent, Donald L. Sexton and Karl H. Vesper (Englewood Cliffs, NJ: Prentice Hall, 1982), p. 13.
26. Robert W. Hornaday, "Dropping the E-Words From Small Business Research: An Alternative Typology," *Journal of Small Business Management*, October 1990, pp. 22-33.
27. David A. Silver, *Entrepreneurial Megabucks* (New York: John Wiley & Sons, 1985), p. 254.
28. Peters and Waterman, *In Search of Excellence*, p. 200.
29. Peter F. Drucker, *The Age of Discontinuity* (New York: Harper & Row, 1969), p. 43.
30. Michael Barrier, "'E-Myth' and Reality," *Nation's Business*, April 1994.
31. It is interesting to note that Canada does not have a Small Business Act.
32. James W. Carland, Jo Ann C. Carland, Frank Hoy, and William R. Boulton, "Distinctions Between Entrepreneurial and Small Business Ventures," *International Journal of Management*, Vol. 5 (1), March 1988, pp. 98-103.
33. Sherwin Rosen, "Economics and Entrepreneurs," in *Entrepreneurship*, ed. Joshua Rosen (Price Institute for Entrepreneurial Studies, Lexington Books, 1983), p. 310.
34. Raymond W.Y. Kao, "Entrepreneurial Decision-Making Behaviour Compared with Corporate Managers in Business Management," *Journal of Small Business and Entrepreneurship*, Winter 1986, p. 12.
35. Ronald C. Moe, "The 'Reinventing Government' Exercise: Misinterpreting the Problem, Misjudging the Consequences," *Public Administration Review*, Vol. 54 (2), March-April 1994.



Video Case

RICHARD BRANSON: ENTREPRENEUR

The video looks at an entrepreneur who has created over 150 new ventures, ranging from an airline to a Vancouver record store.

Branson has a nominal corporate office and low corporate overhead, and he relies almost exclusively on the managing directors of each of his companies to run their own show. Each of these has

an opportunity to become millionaires in the managing of the company.

What can be said of Branson's philosophy? What is the core ideology that fuels virgin growth? Sketch out the future for Branson and his companies.

Video Source: "Richard Branson Pak and Interview," *Venture* 613 (October 20, 1996)

Assessment and Evaluation of Entrepreneurial Opportunities

CHAPTER OBJECTIVES

1. To explain the challenge of new-venture startups
2. To review common pitfalls in the selection of new-venture ideas
3. To present critical factors involved in new-venture development
4. To examine why new ventures fail
5. To study certain factors that underlie venture success
6. To analyze the evaluation process methods: profile analysis, feasibility criteria approach and comprehensive feasibility method
7. To outline the specific activities involved in a comprehensive feasibility evaluation

To avoid all mistakes in the conduct of a great enterprise is beyond man's powers. . . . But, when a mistake has once been made, to use his reverses as lessons for the future is the part of a brave and sensible man.

Minicius
-(209 B.C.)

THE CHALLENGE OF NEW-VENTURE START-UPS

During the past few years, the number of new-venture start-ups has been consistently high. It is reported that more than 600,000 new firms have emerged in the United States every year since the early 1990s.¹ That works out to approximately 1,500 business start-ups per day. In addition, the ideas for potential new businesses are also surfacing in record numbers: the U.S. Patent Office currently reviews more than 10,000 patent applications per month.

The reasons for entrepreneurs starting up new ventures are numerous. One study reported seven components of new-venture motivation: the need for approval, the need for independence, the need for personal development, welfare (philanthropic) considerations, perception of wealth, tax reduction and indirect benefits, and following role models.² These components are similar to the characteristics discussed in Chapter 4 concerning the "entrepreneurial perspective." Although researchers agree that many reasons exist for starting a venture, the entrepreneurial motivations of individuals usually relate to the *personal characteristics* of the entrepreneur, the *environment*, and the *venture* itself. The complexity of these key factors makes the assessment of new ventures extremely difficult. One recent study examined the importance of start-up activities to potential entrepreneurs (those attempting to start a venture). Entrepreneurs who successfully started a business "were more aggressive in making their business real; that is, they undertook activities that made their businesses tangible to others: they looked for facilities and equipment, sought and got financial support, formed a legal entity, organized a team, bought facilities and equipment, and devoted full time to the business. Individuals who started businesses seemed to act with a greater level of intensity. They undertook more activities than those individuals who did not start their businesses. The pattern of activities seems to indicate that individuals who started firms put themselves into the day-to-day process of running an ongoing business as quickly as they could and that these activities resulted in starting firms that generated sales (94 percent of the entrepreneurs) and positive cash flow (50 percent of the entrepreneurs)."³ Another study examined the quantitative and qualitative managerial factors that contribute to the success or failure of a young firm. It was found that firms do not have equal resources starting out. More importantly, the successful firms

1. William J. Dennis, *Business Starts and Stops* (Washington, DC: National Federation of Independent Business, Nov. 1993).

2. Sue Birley and Paul Westhead, "A Taxonomy of Business Start-Up Reasons and Their Impact on Firm Growth and Size," *Journal of Business Venturing* (Jan. 1994): 7-32.

3. Nancy M. Carter, William B. Gartner, and Paul D. Reynolds, "Exploring Start-Up Event Sequences," *Journal of Business Venturing* (May 1996): 151-166.

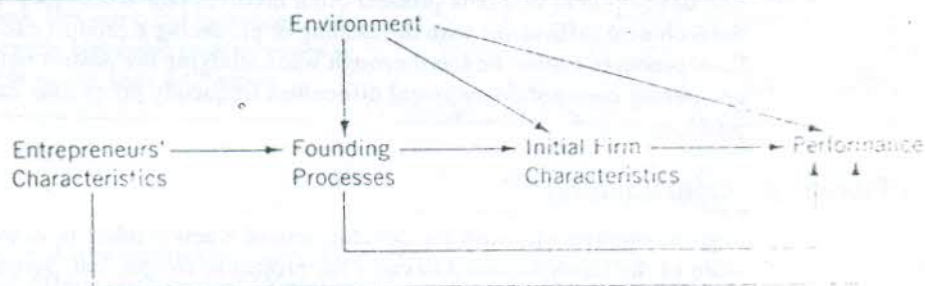
made greater use of professional advice and developed more detailed business plans.⁴ As researcher Arnold C. Cooper points out, the challenges to predicting new-firm performance include environmental effects (the risk of new products or services, narrow markets, and scarce resources); the entrepreneur's personal goals and founding processes (reasons for start-up); and the diversity of the ventures themselves (differing scales and potential).⁵ (See Figure 11.1 for illustration.)

In addition to the problems presented by the complexity of the factors in new-venture performance, it is difficult to obtain reliable data concerning start-up, performance, and failure. Surveys by phone and mail have been used with owners, employees, and competitors to obtain measures of sales, profit, technology, market share, and so forth.⁶ The results are not completely comparable to all ventures or all industries. It is from this pioneering work, however, that more and better data are being gathered for the evaluation of new ventures.

It should be understood that new-venture assessment begins with the idea and venture selection stage. However, most studies of new-venture development deal with established start-up businesses. Researchers Paul Reynolds and Brenda Miller describe a "fully developed new firm" as one that requires the full-time commitment of one or more individuals, is selling a product or service, has formal financial support, and has hired one or more individuals.⁷

Therefore, as ideas develop into new-venture start-ups, the real challenge is for those firms to survive and grow. In order to do this, they need to have a clear understanding of the critical factors for selecting ventures, the known reasons for venture failure, and an effective evaluation process for new ventures.

FIGURE 11.1 THE ELEMENTS AFFECTING NEW-VENTURE PERFORMANCE



Source: Arnold C. Cooper, "Challenges in Predicting New Firm Performance," *Journal of Business Venturing* (Sept. 1992), 405-417. Permission.

4. Robert N. Lussier, "A Nonfinancial Business Success versus Failure Prediction Model for Young Firms," *Journal of Small Business Management* (Jan. 1995): 8-20.
5. Arnold C. Cooper, "Challenges in Predicting New Firm Performance," *Journal of Business Venturing* (May 1993): 241-253.
6. Candida G. Brush and Pieter A. Vanderwerf, "A Comparison of Methods and Sources for Obtaining Estimates of New Venture Performance," *Journal of Business Venturing* (March 1992): 157-170; see also Charles N. Chandler and Steven H. Hanks, "Measuring the Performance of Emerging Businesses: A Validation Study," *Journal of Business Venturing* (Sept. 1993): 391-408.
7. Paul Reynolds and Brenda Miller, "New Firm Gestation: Conception, Birth, and Growth," *Journal of Business Venturing* (Sept. 1992): 405-417.

PITFALLS IN SELECTING NEW VENTURES

The first key area of analysis is the selection of a new venture. This stage of transition from an idea to a potential venture can be the most critical for understanding new-venture development. Presented here are six of the most important pitfalls commonly encountered in the process of selecting a new venture.

Lack of Objective Evaluation

Many entrepreneurs lack objectivity. Engineers and technically trained people are particularly prone to falling in love with an idea for a product or service. They seem unaware of the need for the scrutiny they would give to a design or project in the ordinary course of their professional work. The way to avoid this pitfall is to subject all ideas to rigorous study and investigation.

No Real Insight into the Market

Many entrepreneurs do not realize the importance of developing a marketing approach in laying the foundation for a new venture. They show a managerial shortsightedness.⁸ Also, they do not understand the life cycle that must be considered when introducing a new product or service.

No product is instantaneously profitable, nor does its success endure indefinitely. Entrepreneurs must not only project the life cycle of the new product, but also recognize that introducing the product at the right time is important to its success. Timing is critical. Action taken too soon or too late will often result in failure.

Inadequate Understanding of Technical Requirements

The development of a new product often involves new techniques. Failure to anticipate the technical difficulties with developing or producing a product can sink a new venture. Entrepreneurs cannot be too thorough when studying the project before initiating it. Encountering unexpected technical difficulties frequently poses time-consuming and costly problems.

Poor Financial Understanding

A common difficulty with the development of a new product is an overly optimistic estimate of the funds required to carry the project to completion. Sometimes entrepreneurs are ignorant of costs or are victims of inadequate research and planning. Quite often they tend to underestimate development costs by wide margins. It is not unusual for estimates to be less than half of what is eventually required.

Lack of Venture Uniqueness

A new venture should be unique. **Uniqueness** is the special characteristics and design concepts that draw the customer to the venture, which should provide performance or ser-

8. Theodore Levitt, "Marketing Myopia," *Harvard Business Review* (July/Aug. 1960): 45-56.

WORLD-CLASS FAILURES

Ford's Diesell had innovations galore—and quality problems—from stuck hoods to defective power steering. Estimated loss per car was almost \$1,177, or a total of \$250 million.

DuPont's Corfam: A synthetic leather supposed to do for shoes what nylon did for stockings. Leather was just better. Cost: \$80 million to \$100 million.

Polaroid's Palavision: Edwin Land used Polaroid's wet-chemistry technology to develop an instant movie camera. But videotape technology was far better.

United Artists' *Heaven's Gate*: Almost \$30 million over budget, this Western movie bombed so badly it almost destroyed UA.

RCA's Videodisc: This innovation was supposed to capture the video-recorder market, but it couldn't tape television shows. Loss: \$500 million.

Time's TV-Cable Week: This was a bid to compete with *TV Guide*. Cause of death: ballooning costs to customize editions for each cable system. Loss: \$47 million.

IBM's PCjr: The awkward Chiclet keyboard, the slow microprocessor, an unattractive price, and a late launch caused a major disaster. Cost: \$40 million.

New Coke: Coca-Cola's answer to Pepsi's sweeter formula provoked a national uproar from old-formula loyalists.

R. J. Reynolds' Premier: This cigarette didn't burn or emit smoke, but it simply didn't taste good. Its failure persuaded CEO Ross Johnson to launch his equally disastrous buyout attempt.

NutraSweet's Simplese: This fat substitute was meant to change the way we eat. However, the market is swamped with substitutes, and many consumers like fat.

Source: *Flops: Business World's Top 100*, p. 10.

vice that is superior to competitive offerings. The best way to ensure customer awareness of differences between the company's product and competitors' products is through product differentiation. Pricing becomes less of a problem when the customer sees the product as superior to its competitors. A product that is unique in a significant way can gain the advantage of differentiation.

Ignorance of Legal Issues

Business is subject to many legal requirements. One is the need to make the workplace safe for employees. A second is to provide reliable and safe products and services. A third is the necessity for patents, trademarks, and copyrights to protect one's inventions and products. When these legal issues are overlooked, major problems can result. (See the Contemporary Entrepreneurship box on world-class failures.)

TABLE 11.1 A NEW-VENTURE IDEA CHECKLIST

Basic Feasibility of the Venture

1. Can the product or service work?
2. Is it legal?

Competitive Advantages of the Venture

1. What specific competitive advantages will the product or service offer?
2. What are the competitive advantages of the companies already in business?
3. How are the competitors likely to respond?
4. How will the initial competitive advantage be maintained?

Buyer Decisions in the Venture

1. Who are the customers likely to be?
2. How much will each customer buy, and how many customers are there?
3. Where are these customers located, and how will they be serviced?

Marketing of the Goods and Services

1. How much will be spent on advertising and selling?
2. What share of market will the company capture? By when?
3. Who will perform the selling functions?
4. How will prices be set? How will they compare with the competition's prices?
5. How important is location, and how will it be determined?
6. What distribution channels will be used—wholesale, retail, agents, direct mail?
7. What are the sales targets? By when should they be met?
8. Can any orders be obtained before starting the business? How many? For what total amount?

Production of the Goods and Services

1. Will the company make or buy what it sells? Or will it use a combination of these two strategies?
2. Are sources of supplies available at reasonable prices?
3. How long will delivery take?

CRITICAL FACTORS FOR NEW-VENTURE DEVELOPMENT

A number of critical factors are important for new-venture assessment. One way to identify and evaluate them is with a checklist (see Table 11.1). In most cases, however, such a questionnaire approach is too general. The assessment must be tailor-made for the specific venture.

A new venture goes through three specific phases: prestart-up, start-up, and poststart-up. The prestart-up phase begins with an idea for the venture and ends when the doors are opened for business. The start-up phase commences with the initiation of sales activity and the delivery of products and services and ends when the business is firmly established and beyond short-term threats to survival. The poststart-up phase lasts until the venture is terminated or the surviving organizational entity is no longer controlled by an entrepreneur.

TABLE 11.1 (continued)

4. Have adequate lease arrangements for premises been made?
5. Will the needed equipment be available on time?
6. Do any special problems with plant setup, clearances, or insurance exist? How will they be resolved?
7. How will quality be controlled?
8. How will returns and servicing be handled?
9. How will pilferage, waste, spoilage, and scrap be controlled?

Staffing Decisions in the Venture

1. How will competence in each area of the business be ensured?
2. Who will have to be hired? By when? How will they be found and recruited?
3. Will a banker, lawyer, accountant, or other advisers be needed?
4. How will replacements be obtained if key people leave?
5. Will special benefit plans have to be arranged?

Control of the Venture

1. What records will be needed? When?
2. Will any special controls be required? What are they? Who will be responsible for them?

Financing the Venture

1. How much will be needed for development of the product or service?
2. How much will be needed for setting up operations?
3. How much will be needed for working capital?
4. Where will the money come from? What if more is needed?
5. Which assumptions in the financial forecasts are most uncertain?
6. What will be the return on equity, or sales, and how does it compare with the rest of the industry?
7. When and how will investors get their money back?
8. What will be needed from the bank, and what is the bank's response?

Source: Karl H. Vesper, *New Venture Strategies*, copyright © 1990, 1972. Adapted by permission of Prentice-Hall, Englewood Cliffs, New Jersey.

The major focus in this chapter is on the prestart-up and start-up phases, since these are the critical segments for entrepreneurs. During these two phases five factors are critical: (1) the relative uniqueness of the venture, (2) the relative investment size at start-up, (3) the expected growth of sales and/or profits as the venture moves through its start-up phase, (4) the availability of products during the prestart-up and start-up phases, and (5) the availability of customers during the prestart-up and start-up phases.

Uniqueness

A new venture's range of uniqueness can be considerable, extending from fairly routine to highly nonroutine. What separates the routine from the nonroutine venture is the amount of innovation required during prestart-up. This distinction is based on the need for new process technology to produce services or products and on the need to service new market

OPPORTUNITY COST?

The owners and executives of CE Software had to learn the hard way about the importance of assessing and evaluating entrepreneurial opportunities. The software company, like many, was started in an unusual place: the attic of a computer store. An Iowa college student, Donald Brown, frequented the store and began writing games and other software for the Apple IIs it sold. The software was an immediate success, so he was brought on as one of the three cofounders of the 1981 start-up.

Business went well the first few years and by the end of the decade, CE introduced QuickKeys and QuickMail to offices nationwide, eventually gaining conglomerates such as Disney and Citibank as customers. The programs were among the first to help automate the everyday office, providing e-mail and handling other various tasks, and the demand prompted the Iowa company to go public. Concurrently, the owners knew they needed to create an awareness and stock options to help gain the talent Silicon Valley was easily drawing in. Ten years after the company was started, revenues were at \$8.6 million and profits were a comfortable \$1.4 million. The IPO reminded everyone, including state officials, that good products don't always come out of the Valley. Amidst the good times, the founders luckily realized and acknowledged that the success of

their products was contingent upon the success of Apple Computer and the Macintosh.

Unsure about what avenues to pursue, but with hopes of diversifying, CE's founders hired Ford Goodman of Informix. After only two years, Goodman was appointed CEO, and the company focused on acquisitions to reposition itself and its future. To get in on the booming Windows market, CE acquired Powercore in 1994. The small company created schedule and calendar programs—an item forecasted to sell well in its already familiar corporate market. Unbeknownst to the company, not performing due diligence was yet another bad decision. (In the mid-1980s CE had merged with Anubis, which was also the name of a feared half-man, half-jackal, god-like figure in ancient Egypt. The empty shell of a company CE's owners thought would get it listed on Nasdaq actually deterred customers and thus profits.) CE engineers soon found flaws in Powercore's program, and the product itself didn't become as popular as they had hoped. After suing the company for fraud, CE recovered only its 250,000 shares of stock, losing an interest in the Windows market and a hefty \$3.8 million. Cofounder John Kirk summarized the lesson by saying, "We learned you can't buy the product. You have to buy the people who make the product."

segments. Venture uniqueness is further characterized by the length of time a nonroutine venture will remain nonroutine. For instance, will new products, new technology, and new markets be required on a continuing basis? Or will the venture be able to "settle down" after the start-up period and use existing products, technologies, and markets?

Investment

The capital investment required to start a new venture can vary considerably. In some industries less than \$50,000 may be required, whereas in other industries millions of dollars are necessary. Moreover, in some industries only large-scale start-ups are feasible. For example, in the publishing industry one can start a small venture that can remain small or grow into a larger venture. By contrast, an entrepreneur attempting to break into the airline industry will need a considerable upfront investment.

The second failed merger left owners and workers a little timid to take any more chances. The Internet's free e-mail left no market for their big seller, QuickMail, and corporate disdain for Apple computers provided little hope for QuickKeys. The lack of sales forced CE's stock to fall dangerously low, almost to the point of being thrown off Nasdaq's listing. The founders were upset with Goodman, and Goodman was upset with himself, yearning for the success of his peers back in California. Knowing that some programmers were creating a high-potential product, he pitched a deal. He'd take \$75,000 in severance pay, the new product's source code, and the programmers West to develop a new firm; in return, CE would get a 49 percent stake in the result. Relevance Technologies sold for \$5 million in cash and \$31.5 million in stock in 1998, only two years after the deal was made. CE's stake, however, had been diluted due to venture capitalist involvement and was reduced to \$6.2 million in cash and stocks. While that was still a favorable amount overall, another bad decision was made when CE sold off the stock too early and while it was falling. The stock doubled two months after the company sold its last share at a merger \$18.

Long-time employee Christian Gurney took over as CEO in 1998, but the company was in shambles. New products weren't taking off and the company was posting losses. Even though the firm had adapted QuickKeys for Windows, the late entrance failed to capture any interest. Gurney didn't want to spend what money the company did have on a marketing campaign, so he trimmed the work force to 30 and began looking for other opportunities for the software manufacturer. An Internet merger seemed the appropriate thing to do, especially since experts and investors were expecting just that. ATIO, a hot new business-to-business start-up in Minneapolis, is just what the founders and employees needed to perk up. ATIO is not yet profitable, but CE knows most Internet start-ups never find a net profit until at least the third year. CE's morale is high and the stock is rising. "We're going to do something exciting, something hot. We used to have fun at CE, and we'll have fun again," says Kirk.

Source: Adapted from P.B. Gray, "Dead Company Works for a New Small Business Plan," *Entrepreneur* (March 2000): 65-70.

Another finance-related critical issue is the extent and timing of funds needed to move through the venture process. To determine the amount of needed investment, entrepreneurs must answer questions such as these: Will industry growth be sufficient to maintain break-even sales to cover a high fixed-cost structure during the start-up period? Do the principal entrepreneurs have access to substantial financial reserves to protect a large initial investment? Do the entrepreneurs have the appropriate contacts to take advantage of various environmental opportunities? Do the entrepreneurs have both industry and entrepreneurial track records that justify the financial risk of a large-scale start-up?⁹

9. Robert C. Ronstadt, *Entrepreneurship* (Dover, MA: Lord Publishing, 1984), 74.

Sales Growth

The *growth of sales* through the start-up phase is another critical factor. Key questions are as follows: What is the growth pattern anticipated for new-venture sales and profits? Are sales and profits expected to grow slowly or level off shortly after start-up? Are large profits expected at some point with only small or moderate sales growth? Or are both high sales growth and high profit growth likely? Or will initial profits be limited with eventual high profit growth over a multiyear period? In answering these questions, it is important to remember that most ventures fit into one of the three following classifications.

Lifestyle ventures appear to have independence, autonomy, and control as their primary driving forces. Neither large sales nor profits are deemed important beyond providing a sufficient and comfortable living for the entrepreneur.

In **small profitable ventures**, financial considerations play a major role. Additionally, autonomy and control are important in the sense that the entrepreneur does not want venture sales (and employment) to become so large that he or she must relinquish equity or an ownership position and thus give up control over cash flow and profits, which, it is hoped, will be substantial.

In **high-growth ventures**, significant sales and profit growth are expected to the extent that it may be possible to attract venture capital money and funds raised through public or private placements.¹⁰

Product Availability

Essential to the success of any venture is *product availability*, the availability of a salable good or service, at the time the venture opens its doors. Some ventures have problems in this regard because the product or service is still in development and needs further modification or testing. Other ventures find that because they bring their product to market too soon, it must be recalled for further work. A typical example is the software firm that rushes the development of its product and is then besieged by customers who find "bugs" in the program. Lack of product availability in finished form can affect the company's image and its bottom line.

Customer Availability

If the product is available before the venture is started, the likelihood of venture success is considerably better than otherwise. Similarly, venture risk is affected by *customer availability* for start-up. At one end of the risk continuum is the situation where customers are willing to pay cash for products or services before delivery. At the other end of the continuum is the enterprise that gets started without knowing exactly who will buy its product. A critical consideration is how long it will take to determine who the customers are and what their buying habits are. As Ronstadt notes:

The decision to ignore the market is an extremely risky one. There are, after all, two fundamental criteria for entrepreneurial success. The first is having a customer who is willing to pay you a profitable price for a product or a service. The second is that you must actually produce and deliver the product or service. The farther a venture removes itself from certainty about these two rules, the greater the risk and the greater the time required to offset this risk as the venture moves through the prestart-up and start-up periods.¹¹

10. Adapted from Ronstadt, *Entrepreneurship*, 75.

11. *Ibid.*, 79.

WHY NEW VENTURES FAIL

Every year many millions of dollars are spent on starting new enterprises. Many of these newly established businesses vanish within a year or two; only a small percentage are successful. Most studies have found that the factors underlying the failure of new ventures are, in most cases, within the control of the entrepreneur. Some of the major reasons for the failure of new ventures follow.

Researchers Bruno, Leidecker, and Harder examined 250 high-tech firms and found three major categories of causes for failure: product/market problems, financial difficulties, and managerial problems.¹²

Product/market problems involved the following factors:

- *Poor timing.* In 40 percent of the cases studied, a premature entry into the marketplace contributed to failure.
- *Product design problems.* Although these may be related to timing, product design and development became key factors at earlier stages of the venture, and when the essential makeup of the product or service was changed, failure resulted.
- *Inappropriate distribution strategy.* Whether it was based on commissioned sales representatives or direct sales at trade shows, the distribution strategy had to be geared toward the product and customer.
- *Unclear business definition.* Uncertainty about the "exact" business they were in caused these firms to undergo constant change and to lack stabilization.
- *Overreliance on one customer.* This resulted in a failure to diversify and brought about the eventual demise of some of the firms.

In the financial difficulties category were the following factors:

- *Initial undercapitalization.* In 30 percent of the case studies, undercapitalization contributed to failure.
- *Assuming debt too early.* Some of the firms attempted to obtain debt financing too soon and in too large an amount. This led to debt service problems.
- *Venture capital relationship problems.* Differing goals, visions, and motivations of the entrepreneur and the venture capitalist resulted in problems for the enterprise.

Managerial problems involved two important factors:

- *Concept of a team approach.* These problems associated with the managerial team were found: (1) hirings and promotions on the basis of nepotism rather than qualifications, (2) poor relationships with parent companies and venture capitalists, (3) founders who focused on their weaknesses rather than on their strengths (though weakening the company, they supposedly were building their skills), and (4) incompetent support professionals (for example, attorneys who were unable to read contracts or collect on court judgments that already had been made).
- *Human resource problems.* Inflated owner ego, employee-related concerns, and control factors were all problems leading to business failure. The study also revealed such interpersonal problems as (1) kickbacks and subsequent firings that resulted in an almost

12. Albert V. Bruno, Joel K. Leidecker, and Joseph W. Harder, "Why Firms Fail," *Business Horizons* (March/April 1987): 50-58. For a more recent comparison, see Fahri Karakaya and Halil Kolsu, "New Product Development Process: An Investigation of Success and Failure in High Technology and Non-High Technology Firms," *Journal of Business Venturing* (Jan. 1994): 49-66.

total loss of customers, (2) deceit on the part of a venture capitalist in one case and on the part of a company president in another, (3) verbal agreements between the entrepreneur and the venture capitalists that were not honored, and (4) protracted lawsuits around the time of discontinuance.

In a more recent study of successful ventures (firms listed in the *Inc.* 500 group of fastest-growing privately held companies), the most significant problems encountered at start-up were researched in order to systematically sort them into a schematic. Table 11.2 lists the types and classes of problems identified during the first year of operation. The researcher also surveyed the current problems the owners of these successful firms encountered in order to explore the possible changes in problem patterns of new firms. It was found that dominant problems at **start-up** related to sales/marketing (38 percent), obtaining external financing (17 percent), and internal financial management (16 percent). General management problems were also frequently cited in the start-up stage (11 percent). In the **growth stage**, sales/marketing remained the most dominant problem (22 percent), but it was less important than in the start-up stage. Internal financial management (21 percent) continued to be a dominant problem, as were human resource management (17 percent) and general management (14 percent). Additionally, more regulatory environment problems occurred in the growth stage (8 percent) than were mentioned in the start-up stage

TABLE 11.2 TYPES AND CLASSES OF FIRST-YEAR PROBLEMS

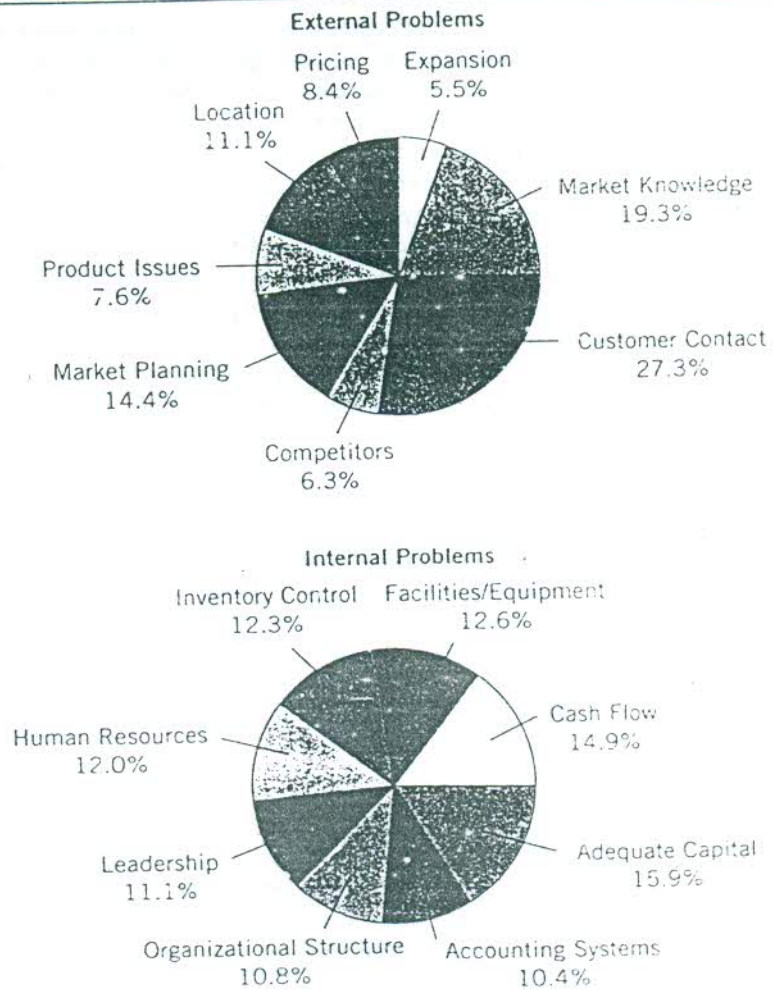
1. <i>Obtaining external financing</i>	Other or general production/operations management problems
Obtaining financing for growth	
Other or general financing problems	6. <i>General management</i>
2. <i>Internal financial management</i>	Lack of management experience
Inadequate working capital	Only one person/no time
Cash-flow problems	Managing/controlling growth
Other or general financial management problems	Administrative problems
3. <i>Sales/marketing</i>	Other or general general management problems
Low sales	7. <i>Human resource management</i>
Dependence on one or few clients/customers	Recruitment/selection
Marketing or distribution channels	Turnover/retention
Promotion/public relations/advertising	Satisfaction/morale
Other or general marketing problems	Employee development
4. <i>Product development</i>	Other or general human resource management problems
Developing products/services	8. <i>Economic environment</i>
Other or general product development problems	Poor economy/recession
5. <i>Production/operations management</i>	Other or general economic environment problems
Establishing or maintaining quality control	9. <i>Regulatory environment</i>
Raw materials/resources/supplies	Insurance

Source: David E. Terstra and James D. Olson, "Entrepreneurial Start-up and Growth: A Classification of Problems," *Entrepreneurship Theory & Practice* (Spring 1993): 17.

(1 percent). Finally, organizational structure/design (6 percent) emerged as a problem in the growth stage.¹³ It is important for entrepreneurs to recognize these problem areas at the outset because they remain challenges to the venture as it grows.

Another study of 645 entrepreneurs focused on the classification of start-up and growth problems experienced internally versus externally.¹⁴ Figure 11.2 depicts the types

FIGURE 11.2 INTERNAL AND EXTERNAL PROBLEMS EXPERIENCED BY ENTREPRENEURS



Source: H. Robert Dodge, Sam Fullerton, and John E. Robbins, "Stage of the Organizational Life Cycle and Problem Perception for Small Businesses," *Strategic Management Journal* 15 (1994): 121-134. Reprinted by permission of John Wiley & Sons, Inc.

13. David E. Terpstra and Philip D. Olson, "Entrepreneurial Start-up and Growth: A Classification of Problems," *Entrepreneurship Theory and Practice* (spring 1993), 5-20.
14. H. Robert Dodge, Sam Fullerton, and John E. Robbins, "Stage of the Organizational Life Cycle and Problem Perception as Mediators of Problem Perception for Small Businesses," *Strategic Management Journal* 15 (1994): 121-134.

of problems and the percentage of firms that reported these problems. **Internal** problems involved adequate capital, cash flow, facilities/equipment, inventory control, human resources, leadership, organizational structure, and accounting systems. **External** problems were related to customer contact, market knowledge, marketing planning, location, pricing, product considerations, competitors, and expansion. The researchers found that the "intensity of competition" rather than life-cycle stages was crucial in changing the relative importance of the problem areas. Thus, entrepreneurs need to recognize not only that start-up problems remain with the venture but also that the increasing competition will adjust the relative importance of the problems.

In a recent study conducted by researchers Andrew Zacharakis, G. Dale Meyer, and Julio DeCastro, the differing perceptions of new-venture failure were examined. Internal and external factors were identified and ranked by a sample of venture capitalists as well as a sample of entrepreneurs. Entrepreneurs attributed new venture failure in general to *internal* factors 89 percent of the time. In contrast, venture capitalists overwhelmingly attributed the failure of most new ventures to *internal* causes (84 percent).¹⁵ (See Table 11.3 for complete results.)

A fourth "failure" or problem study dealt with a proposed failure prediction model based on financial data from newly founded ventures. The study assumed the financial failure process was characterized by too much initial indebtedness and too little revenue financing. As shown by the failure process schematic in Table 11.4, the risk of failure can be reduced by using less debt as initial financing and by generating enough revenue in the initial stages. Further, the study recognized the risk associated with the initial size of the venture being developed. Specific applications of the model included the following:¹⁶

TABLE 11.3 DETERMINANTS OF NEW-VENTURE FAILURES

Entrepreneur	Rank	Venture Capitalist	Rank
I—Lack of management skill	1	I—Lack of management skill	1
I—Poor management strategy	2	I—Poor management strategy	2
I—Lack of capitalization	3	I—Lack of capitalization	3
I—Lack of vision	4	E—Poor external market conditions	4
I—Poor product design	5	I—Poor product design	5
I—Key personnel incompetent	6	I—Poor product timing	6

E = External factor.
I = Internal factor.

Source: Andrew L. Zacharakis, G. Dale Meyer, and Julio DeCastro, "Differing Perceptions of New Venture Failure: A Matched Exploratory Study of Venture Capitalists and Entrepreneurs," *Journal of Small Business Management* (July 1999): 8.

15. Andrew L. Zacharakis, G. Dale Meyer, and Julio DeCastro, "Differing Perceptions of New Venture Failure: A Matched Exploratory Study of Venture Capitalists and Entrepreneurs," *Journal of Small Business Management* (July 1999): 1-14.

16. Erkki K. Laitinen, "Prediction of Failure of a Newly Founded Firm," *Journal of Business Venturing* (July 1992): 323-340.

TABLE 11.4 THE FAILURE PROCESS OF A NEWLY FOUNDED FIRM

1. Extremely high indebtedness (poor static solidity) and small size
2. Too slow velocity of capital, too fast growth, too poor profitability (as compared to the budget), or some combination of these
3. Unexpected lack of revenue financing (poor dynamic liquidity)
4. Poor static liquidity and debt service ability (dynamic solidity)

A. Profitability

1. Return on investment ratio defined on end-of-the-year basis

$$= \frac{\text{Net Profit} + \text{Interest Expenses}}{\text{Total Capital at the End of the Year}} \times 100$$

B. Liquidity

Dynamic

2. Cash flow to net sales

$$= \frac{\text{Net Profit} + \text{Depreciations}}{\text{Net Sales}} \times 100$$

Static

3. Quick ratio

$$= \frac{\text{Financial Assets}}{\text{Current Debt}}$$

C. Solidity

Static

4. Stockholders' capital to total capital

$$= \frac{\text{Total Capital} - \text{Debt Capital}}{\text{Total Capital}} \times 100$$

Dynamic

5. Cash flow to total debt

$$= \frac{\text{Net Profit} + \text{Depreciations}}{\text{Total Debt}} \times 100$$

D. Other Factors

Growth or Dynamic Size

6. Rate of annual growth in net sales

$$= \frac{\text{Net Sales in Year } t}{\text{Net Sales in Year } t-1} \times 100$$

Size

7. Logarithmic net sales

$$= \ln(\text{Net Sales})$$

Velocity of Capital

8. Net sales to total capital

$$= \frac{\text{Net Sales}}{\text{Total Capital at the End of the Year}}$$

Source: Erkki K. Laitinen, "Prediction of Failure of a Newly Founded Firm," *Journal of Business Venturing* (July 1992): 326-328. Reprinted with permission.

1. *Role of profitability and cash flows.* The entrepreneur and manager should ensure that the products are able to yield positive profitability and cash flows in the first years.
2. *Role of debt.* The entrepreneur and manager should ensure that enough stockholders' capital is in the initial balance sheet to buffer future losses.
3. *Combination of both.* The entrepreneur and manager should not start a business if the share of stockholders' capital in the initial balance sheet is low and if negative cash flows in the first years are probable.
4. *Role of initial size.* The entrepreneur and manager should understand that the more probable the negative cash flows and the larger the debt share in the initial balance sheet, the smaller the initial size of the business should be.
5. *Role of velocity of capital.* The entrepreneur and manager should not budget for fast velocity of capital in the initial years if the risk of negative cash flows is high. More sales in comparison to capital means more negative cash flows and poorer profitability.
6. *Role of control.* The entrepreneur and manager should monitor financial ratios from the first year, especially the cash-flow-to-total-debt ratio. Risky combinations of ratios (Z-scores)—especially negative cash flows, a low stockholders' capital-to-total-capital ratio, and a high velocity of capital—should be monitored and compared with industrial standards. The entrepreneur should try to identify the reasons for poor ratios and pay special attention to keeping profitability at the planned level (with control ratios).

THE EVALUATION PROCESS

A critical task of starting a new business enterprise is conducting solid analysis and evaluation of the feasibility of the product/service idea getting off the ground. Entrepreneurs must put their ideas through this analysis in order to discover if the proposals contain any fatal flaws.

Asking the Right Questions

Many important evaluation-related questions should be asked. Ten sets of preliminary questions that can be used to screen an idea are presented here.

1. Is it a new product/service idea? Is it proprietary? Can it be patented or copyrighted? Is it unique enough to get a significant head start on the competition? Or can it be easily copied?
2. Has a prototype been tested by independent testers who try to blow the system or rip the product to shreds? What are its weak points? Will it stand up? What level of research and development should it receive over the next five years? If it is a service, has it been tested on guinea pig customers? Will they pay their hard-earned money for it?
3. Has it been taken to trade shows? If so, what reactions did it receive? Were any sales made? Has it been taken to distributors? Have they placed any orders?
4. Is the product or service easily understood by customers, bankers, venture capitalists, accountants, lawyers, and insurance agents?
5. What is the overall market? What are the market segments? Can the product penetrate these segments? Can any special niches be exploited?

6. Has market research been conducted? Who else is in the market? How big is the market? How fast is it growing? What are the trends? What is the projected life cycle of the product or service? What degree of penetration can be achieved? Are there any testimonials from customers and purchasing agents? What type of advertising and promotion plan will be used?
7. What distribution and sales methods will be used—jobbers, independent sales representatives, the company sales force, direct mail, door-to-door sales, supermarkets, service stations, company-owned stores? How will the product be transported: company-owned trucks, common carriers, postal service, or air freight?
8. How will the product be made? How much will it cost? For example, will it be produced in-house or by others? Will production be by job shop or continuous process? What is the present capacity of company facilities? What is the break-even point?
9. Will the business concept be developed and licensed to others or developed and sold away?
10. Can the company get—or has it already lined up—the necessary skills to operate the business venture? Who will be the workers? Are they dependable and competent? How much capital will be needed now? How much more in the future? Have major stages in financing been developed?¹⁷

Profile Analysis

A single strategic variable seldom shapes the ultimate success or failure of a new venture. In most situations a combination of variables influences the outcome. Thus it is important to identify and investigate these variables before the new idea is put into practice. The results of such a profile analysis enable the entrepreneur to judge the business's potential.

The internal profile analysis in the *Experientia!* Exercise at the end of this chapter is one method of determining the resources available to a new venture. This checklist approach allows entrepreneurs to identify major strengths and weaknesses in the financial, marketing, organizational, and human resource factors needed for the venture to progress successfully. In this manner entrepreneurs can prepare for possible weaknesses that may inhibit the growth of their venture. More important, many of the reasons cited for venture failure earlier in this chapter can be avoided through a careful profile analysis.

Feasibility Criteria Approach

Another method, the *feasibility criteria approach*, was developed as a criteria selection list from which entrepreneurs can gain insights into the viability of their venture and is based on the following questions:

- *Is it proprietary?* The product does not have to be patented, but it should be sufficiently proprietary to permit a long head start against competitors and a period of extraordinary profits early in the venture to offset start-up costs.
- *Are the initial production costs realistic?* Most estimates are too low. A careful, detailed analysis should be made so no large, unexpected expenses arise.

17. John G. Burch, *Entrepreneurship* (New York: Wiley, 1986), 68-69.

- *Are the initial marketing costs realistic?* This answer requires the venture to identify target markets, market channels, and promotional strategy.
- *Does the product have potential for very high margins?* This is almost a necessity for a fledgling company. Gross margins are one thing the financial community understands. Without them, funding can be difficult.
- *Is the time required to get to market and to reach the break-even point realistic?* In most cases, the faster the better. In all cases, the venture plan will be tied to this answer, and an error here can spell trouble later on.
- *Is the potential market large?* In determining the potential market, entrepreneurs must look three to five years into the future because some markets take this long to emerge. The cellular telephone, for example, had an annual demand of approximately 400,000 units in 1982. However, by the late 1990s this market was estimated to grow by at least 45 percent annually.
- *Is the product the first of a growing family?* If it is, the venture is more attractive to investors. If they do not realize a large return on the first product, they might on the second, third, or fourth.
- *Does an initial customer exist?* It is certainly impressive to financial backers when a venture can list its first ten customers by name. This pent-up demand also means the first quarter's results are likely to be good and the focus of attention can be directed to later quarters.
- *Are the development costs and calendar times realistic?* Preferably, they are zero. A ready-to-go product gives the venture a big advantage over competitors. If costs exist, they should be complete and detailed and tied to a month-by-month schedule.
- *Is this a growing industry?* This is not absolutely essential if the profits and company growth are there, but it means less room for mistakes. In a growing industry, good companies do even better.
- *Can the product and the need for it be understood by the financial community?* If the financiers can grasp the concept and its value, the chances for funding will increase. For example, a portable heart-monitoring system for postcoronary monitoring is a product many will understand. Undoubtedly, some of those hearing the presentation will have already had coronaries or heart problems of some sort.¹⁸

This criteria selection approach provides a means of analyzing the internal strengths and weaknesses that exist in a new venture by focusing on the marketing potential and industry potential critical to assessment. If the new venture meets fewer than six of these criteria, it typically lacks feasibility for funding. If the new venture meets seven or more of the criteria, it may stand a good chance of being funded. (See the Contemporary Entrepreneurship box.)

Comprehensive Feasibility Approach

A more comprehensive and systematic feasibility analysis, a **comprehensive feasibility approach**, incorporates external factors in addition to those in the criteria questions. Figure 11.3 presents a breakdown of the factors involved in a comprehensive feasibility study of a new venture—technical, market, financial, organizational, competitive. A more detailed feasibility analysis guide is provided in Table 11.5, which identifies the specific ac-

18. Gordon B. Bate, *Entrepreneurship: Playing to Win* (Reston, VA: Reston Publishing, 1974), 33-34.

EMERGING THEMES FROM SURVIVING FOUNDERS OF ENTREPRENEURIAL FIRMS

1. Know yourself. Founders placed great importance on understanding their skills and deficiencies and recognizing what motive lay behind the urge to found a company. "Look in the mirror a lot."
2. Love your product. Several founders spoke in terms that suggested a service orientation: The function of the firm was to supply customers with something these customers literally had to have. This was particularly true of the smaller firms serving a primarily R&D or laboratory market.
3. Honor your customer. Many of these founders expressed a great deal of loyalty to the markets they served. They felt a personal responsibility to satisfy their customers.
4. Treat your people well. This was probably the one theme heard most often across the interviews. Over the long term, the partners one joined with, the people one hired, and the way these people were treated was felt to be a critical success factor. "As

long as you were fair with the people you were dealing with, and treated them right, you never had to worry." "You've got to really be an astute judge of people. That is by far the most important thing you can do: study people."

5. Keep your integrity. Several founders mentioned this point as a bedrock principle. Most had experience with other people or businesses that did not follow this injunction. Feelings ran high on this point.

These injunctions summarize the themes that emerged from surviving founders' answers to two questions: (1) What have you learned over 20 years of successfully managing a new venture? (2) What advice would you give to someone starting a new venture today?

Source: Albert V. Bruno, Edward I. McQuinn, and Carol G. Jorgensen, "The Evolution of New Technology Ventures over 20 Years: Patterns of Failure, Merges, and Survival," *Journal of Business Venturing* (July 1992): 30. Adapted with permission.

tivities involved in each feasibility area. Although all five of the areas presented in Figure 11.3 are important, two merit special attention: technical and market.

TECHNICAL FEASIBILITY The evaluation of a new-venture idea should start with identifying the technical requirements, the **technical feasibility**, for producing a product or

FIGURE 11.3 KEY AREAS FOR ASSESSING THE FEASIBILITY OF A NEW VENTURE



TABLE 11.5 SPECIFIC ACTIVITIES OF FEASIBILITY ANALYSES

Technical Feasibility Analysis	Market Feasibility Analysis	Financial Feasibility Analysis	Analysis of Organizational Capabilities	Competitive Analysis
Crucial technical specifications	Market potential	Required financial resources for:	Personnel requirements	Existing competitors
Design	Identification of potential customers and their dominant characteristics (e.g., age, income level, buying habits)	Fixed assets	Required skill levels and other personal characteristics of potential employees	Size, financial resources, market entrenchment
Durability		Current assets		Potential reaction of competitors to newcomer by means of price cutting, aggressive advertising, introduction of new products, and other actions
Reliability		Necessary working capital	Managerial requirements	
Product safety	Potential market share (as affected by competitive situation)	Available financial resources	Determination of individual responsibilities	
Standardization	Potential sales volume	Required borrowing	Determination of required organizational relationships	
Engineering requirements	Sales price projections	Potential sources for funds	Potential organizational development	Potential new competitors
Machines	Market testing	Cost of borrowing		
Tools	Selection of test	Repayment conditions	Competitive analysis	
Instruments	Actual market test	Operation cost analysis		
Work flow	Analysis of market	Fixed costs		
Product development	Marketing planning issues	Variable costs		
Blueprints	Preferred channels of distribution, impact of promotional efforts, required distribution points (warehouses), packaging considerations, price differentiation	Projected cash flow		
Models		Projected profitability		
Prototypes				
Product testing				
Lab testing				
Field testing				
Plant location				
Desirable characteristics of plant site (proximity to suppliers, customers), environmental regulations				

Source: Hans Schollhammer and Arthur H. Kurloff, *Entrepreneurship and Small Business Management* (New York: John Wiley & Sons, 1979), 55. Copyright © 1979 by John Wiley & Sons, Inc. Reprinted by permission of John Wiley & Sons, Inc.

service that will satisfy the expectations of potential customers. The most important of these follow:

- Functional design of the product and attractiveness in appearance
- Flexibility, permitting ready modification of the external features of the product to meet customer demands or technological and competitive changes
- Durability of the materials from which the product is made
- Reliability, ensuring performance as expected under normal operating conditions
- Product safety, posing no potential dangers under normal operating conditions

- Reasonable utility—an acceptable rate of obsolescence
- Ease and low cost of maintenance
- Standardization through elimination of unnecessary variety among potentially interchangeable parts
- Ease of processing or manufacture
- Ease in handling and use¹⁹

The results of this investigation provide a basis for deciding whether a new venture is feasible from a technical point of view.

MARKETABILITY Assembling and analyzing relevant information about the marketability of a new venture are vital for judging its potential success. Three major areas in this type of analysis are (1) investigating the full market potential and identifying customers (or users) for the goods or service, (2) analyzing the extent to which the enterprise might exploit this potential market, and (3) using market analysis to determine the opportunities and risks associated with the venture. To address these areas, a variety of informational sources must be found and used. For a market feasibility analysis, general sources would include the following:

- *General economic trends:* various economic indicators such as new orders, housing starts, inventories, and consumer spending
- *Market data:* customers, customer demand patterns (for example, seasonal variations in demand, governmental regulations affecting demand)
- *Pricing data:* range of prices for the same, complementary, and substitute products; base prices; and discount structures
- *Competitive data:* major competitors and their competitive strength

More attention is given to marketing issues in Chapter 8. At this point it is important to note the value of marketing research in the overall assessment and evaluation of a new venture.²⁰

Thus, as demonstrated by Table 11.5, the comprehensive feasibility analysis approach is closely related to the preparation of a thorough business plan (covered in detail in Chapter 10). The approach clearly illustrates the need to evaluate each segment of the venture *before* initiating the business or presenting it to capital sources.

As one venture capitalist has stated, "The risks in entrepreneurship are you, your team, and any fundamental flaws in your venture idea. You must make a reasonable first evaluation of these risks." As an aid to this evaluation, Table 11.6 provides a list of representative functions that are keys to assessing a new venture.

SUMMARY

The complexity of factors involved in new-venture start-up (as shown in Figure 11.1) makes it difficult to clearly assess and evaluate each one. In addition, the difficulty of obtaining reliable data on failed firms adds to this dilemma. Improvements are being made, however, and new-venture assessment is becoming a stronger process.

19. Hans Schollhammer and Arthur H. Kuriloff, *Entrepreneurship and Small Business Management* (New York: Wiley, 1979), 58.

20. Gerald E. Hills, "Marketing Analysis in the Business Plan: Venture Capitalists' Perceptions," *Journal of Small Business Management* (Jan. 1985): 38-46.

TABLE 11.6 REPRESENTATIVE FUNCTIONS TO EVALUATE FOR NEW VENTURES

Marketing and Sales

- *Market research and evaluation:* ability to design and conduct market research studies and to analyze and interpret study results; familiarity with questionnaire design and sampling techniques
- *Strategic sales:* experience in developing marketing strategies and establishing sales forces and then planning appropriate sales, advertising, and promotional programs and setting up an effective network distributor or sales representative organization
- *Sales management and merchandising:* ability to organize, supervise, motivate, and provide merchandising support to a direct sales force; ability to analyze territory and account sales potential and to manage a sales force to obtain target market share
- *Direct selling:* experience in identifying, meeting, and developing new customers; demonstrated success in closing sales
- *Service:* ability to perceive service needs of particular products; experience in determining service and spare parts requirements, handling customer complaints, and managing a service organization
- *Distribution management:* ability to organize and manage product flow from manufacturing through distribution channels to the ultimate customer, including familiarity with shipping costs, scheduling techniques, carriers, and other factors
- *Overall marketing skills:* Give yourself a combined rating reflecting your skill level across all the marketing areas.

Operations

- *Manufacturing management:* knowledge of the product processes, machines, work force, and space required to produce the product; experience in managing production to produce products within time, cost, and quality constraints
- *Inventory control:* familiarity with techniques of controlling in-process and finished-goods inventories of materials
- *Quality control:* ability to set up inspection systems and standards for effective quality control of incoming, in-process, and finished materials
- *Purchasing:* ability to identify appropriate supply sources, negotiate supplier contracts, and manage incoming flow of material into inventory; familiarity with economical order quantities and discount advantage
- *Overall operations skills:* Give yourself a combined rating reflecting your skill level across all the operations areas.

Research, Development, and Engineering

- *Direction and management of applied research:* ability to distinguish and keep a prudent balance between long-range projects at the frontiers of your technology, which attract the most creative individuals, and shorter-range research in support of current product development activity
- *Management of development:* ability to plan and direct work of development engineers and to use time and cost budgets so perfectionists do not ruin you but product performance, appearance, and production engineering needs can still be met
- *Management of engineering:* ability to plan and direct engineers in the final design of a new product for manufacture and in the engineering and testing of the production process to manufacture that new product
- *Technical know-how:* ability to contribute personally to research, development, and engineering because of up-to-date, in-depth knowledge of the technologies in which your company is involved
- *Overall research, development, and engineering skills:* Give yourself a combined rating reflecting your skill level across the previous areas.

Financial Management

- *Raising capital:* ability to decide how best to acquire funds for start-up and growth; ability to forecast the need for funds and to prepare budgets; familiarity with sources and vehicles of short- and long-term financing
- *Money management:* ability to design, install, maintain, and use financial controls; familiarity with accounting and control systems needed to manage money; ability to set up a project cost-control system, analyze overhead/contribution/absorption, prepare profit-and-loss and balance sheets, and manage a bookkeeper

TABLE 11.6 REPRESENTATIVE FUNCTIONS TO EVALUATE FOR NEW VENTURES

- *Specific skills:* cash-flow analysis; break-even analysis; contribution analysis; budgeting and profit-planning techniques; profit and loss, balance sheet, and present value analysis of return on investment and payback
- *Overall financial skills:* Give yourself a combined rating reflecting your skill level across all of the financial areas.

General Management and Administration

- *Problem solving:* ability to anticipate potential problems and plan to avoid them, ability to gather facts about problems, analyze them for real causes, and plan effective action to solve the problems; thoroughness in dealing with the details of particular problems and in follow-through
- *Communications:* ability to communicate effectively and clearly, both in speech and in writing, to the media, the public, customers, peers, and subordinates
- *Planning:* ability to set realistic and attainable goals, identify obstacles to achieving the goals, and develop detailed action plans to achieve those goals; ability to schedule own time systematically
- *Decision making:* ability to make decisions on your best analysis of incomplete data
- *Project management:* skill in organizing project teams, setting project goals, defining project tasks, and monitoring task completion in the face of problems and cost/quality constraints
- *Negotiating:* ability to work effectively in a negotiating situation; ability to quickly balance value given and value received
- *Personnel administration:* ability to set up payroll, hiring, compensation, and training functions
- *Overall administrative skills:* Give yourself a combined rating reflecting your skill level across all of the administrative areas.

Personnel Management

- *Leadership:* ability to understand the relationships among tasks, the leader, and the followers; ability to lead in situations where appropriate; willingness to manage actively, supervise, and control activities of others through directions, suggestions, inspiration, and other techniques
- *Listening:* ability to listen and understand without interrupting or mentally preparing your own rebuttal at the expense of hearing the message
- *Helping:* ability to ask for and provide help and to determine situations where assistance is warranted
- *Criticism:* ability to provide performance and interpersonal criticism to others that they find useful; ability to receive feedback from others without becoming defensive or argumentative
- *Conflict resolution:* ability to confront differences openly and to deal with them until resolution is obtained
- *Teamwork:* ability to work well with others in pursuing common goals
- *Selecting and developing subordinates:* ability to select and delegate responsibility to subordinates and to coach them in the development of their managerial capabilities
- *Climate building:* ability to create, by the way you manage, a climate and spirit conducive to high performance; ability to press for higher performance while rewarding work well done
- *Overall interpersonal skills:* Give yourself a combined rating reflecting your skills across all of the personnel management areas.

Legal and Tax Aspects

- *Corporate law:* familiarity with legal issues relating to stock issues, incorporation, distribution agreements, leases, and so on
- *Contract law:* familiarity with contract procedures and requirements (governmental and commercial), including default, warranty, and incentive provisions; fee structures; overhead, general, and administrative expenses allowable; and so forth
- *Patent law:* experience with preparation and revision of patent applications; ability to recognize a strong patent; familiarity with claim requirements
- *Tax law:* familiarity with general state and federal reporting requirements for businesses and with special provisions concerning Subchapter S corporations, tax shelters, fringe benefits, and other issues
- *Overall legal and tax skills:* Give yourself a combined rating reflecting your skill level across all of the legal and tax areas.

Source: Pratt's Guide to Venture Capital Sources (Wellesley, MA: Venture Economics, 1992)

A number of pitfalls may occur in the selection of a new venture: lack of an objective evaluation of the venture, lack of insight into the market, inadequate understanding of technical requirements, poor financial understanding, lack of venture uniqueness, and failure to be aware of legal issues.

When assessing a new venture, an entrepreneur needs to consider several critical factors: the uniqueness of the good or service, the amount of capital investment required to start the venture, the growth of sales, and the availability of the product.

Some major reasons new ventures fail are inadequate knowledge of the market, faulty product performance, ineffective marketing and sales effort, inadequate awareness of competitive pressures, rapid product obsolescence, poor timing, and undercapitalization. In drawing together these and other reasons, recent research reveals three major categories of causes for failure: product/market problems, financial difficulties, and managerial problems. In addition, entrepreneurs face internal and external problems.

The feasibility of the entrepreneur's product or service can be assessed by asking the right questions, by making a profile analysis of the venture, and by carrying out a comprehensive feasibility study.

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