

PROJECT MANAGEMENT CONCEPTS

1.1 PROJECT

The term “Project” has a wider meaning. A project is accomplished by performing a set of activities. For example, construction of a house is a project. The construction of a house consists of many activities like digging of foundation pits, construction of foundations, construction of walls, construction of roof, fixing of doors and windows, fixing of sanitary fittings, wiring etc. The construction of a house is accomplished by performing the set of activities. Another aspect of “project” is the non-routine nature of activities. Each project is unique in the sense that the activities of a project are unique and non-routine.

A project consumes resources. The resources required for completing a project are men, material, money and time. The nature of resources is that they are limited and scarce. If a person wants to construct a house, the first thing that comes to his mind is the financial budget within which the work should be completed. Thus, resource constraint is a feature of all projects. If one wants to construct a house at an estimated cost of Rs. 10 lakhs and within a period of 6 months, the project should be completed subject to these constraints. Thus, we can define a project as an organized programme of pre determined group of activities that are non-routine in nature and that must be completed using the available resources within the given time limit.

According to Harison, a project can be defined as a non-routine, non-repetitive, one-off undertaking, normally with discrete time, financial and technical performance goals. Project Management institute, USA defines project as ‘a system involving the co-ordination of a number of separate department entities through out the organization and which must be completed within prescribed schedules and time constraints.

According to the **Encyclopaedia of Management**, project is ‘an organized unit dedicated to the attainment of goal—the successful completion of a development project on time, within budget, in conformance with pre-determined programme specifications’.

According to Little & Mirrless, a project is any scheme or part of a scheme for investing resources which can be reasonably analysed and evaluated as an independent unit.

Though Project Management is in the process of getting evolved as a separate branch of study, projects are not new to the earth. One of the seven wonders of the world, the Pyramids date back to

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2650 BC, which stand as the hall mark of Egyptian civilization. The period of construction of the Taj Mahal, another wonder of the world is reported to be during 1626-1648 A.D. It is reported that about 20,000 persons worked for nearly 22 years to complete this spectacular structure, which stands today as mankind's proudest creation. One can imagine the extent of resources and expertise that would have been put forth for the completion of such magnificent projects.

Project management is an organized venture for managing projects. It involves scientific application of modern tools and techniques in planning, financing, implementing, monitoring, controlling and coordinating unique activities or tasks to produce desirable outputs in accordance with the pre-determined objectives within the constraints of time and cost.

Project management consists of the following stages.

- Project planning
- Project scheduling
- Project implementation, controlling and monitoring

Every person, every organization and every nation is concerned with project management. An individual builds a house. It is his project. He performs marriages for his children. These are also projects that he undertakes in his life time. An organization sets up a new factory. It is a project for the organisation. The Government of a country builds highways, dams, thermal power plants, hydro power plants, airports etc. These are all projects that the country undertakes.

Project management as a technique is assuming greater importance since it aims at optimum utilization of resources. Every person is practising project management in his day to day life. When a person uses the shortest route to reach his office, it involves all the stages of project management, viz., planning, scheduling, implementing, controlling and monitoring. He plans for the shortest route; he schedules his starting time; he controls the speed of his vehicle to reach his destination in time. By choosing the shortest route, he tries to optimize the usage of fuel for his car and he also tries to reach the office at the shortest possible time. When a Government plans to build an express highway connecting two important cities covering a distance of several kilometers, it is a project of a greater magnitude than the project of house construction. As a project becomes larger in magnitude, its complexities with regard to planning, scheduling, implementing, controlling and monitoring increases. For effective management of larger and complex projects, systematically devised techniques are followed.

1.2 PROJECT CHARACTERISTICS

Major project characteristics are as below:

Objectives

A project has a set of objectives or a mission. Once the objectives are achieved, the project is treated as completed. For example the objective of a project may be construction of a highway connecting two cities 'A' & 'B', covering a distance of 20 kilometers. Once the construction of the highway is completed the project comes to an end.

Life cycle

A project has a life cycle. The life cycle consists of the following stages:

Conception stage : Where project ideas are conceived.

Design stage	: Where detailed design of different project areas are worked out.
Implementation stage	: Where the project is implemented as per the design.
Commissioning stage	: Where the project is commissioned after implementation. Commissioning of a project indicates the end of its life cycle.

Definite Time Limit

A project has a definite time limit. It can not continue forever. Construction of a highway connecting two cities is a project which is to be completed within a given time limit. Maintenance of the highway is an on going process and it will continue forever. Hence highway maintenance will not come under the purview of project.

Uniqueness

Every project is unique and no two projects are similar. Setting up a Cement plant and construction of a highway are no doubt two different projects having unique characteristics. Constructing a highway between cities A&B and constructing another highway between cities C&D are also unique in themselves, in view of the differences existing in the organization, infrastructure, location, technical specifications and the people behind the projects.

Team work

A project normally consists of diversified areas. There will be personnel specialized in their respective areas. Any project calls for the services of experts from a host of disciplines. Co-ordination among the diversified areas calls for teamwork. Hence a project can be implemented only with teamwork.

Complexity

A project is a complex set of activities relating to diversified areas. Technology survey, choosing the appropriate technology, procuring the appropriate machinery and equipment, hiring the right kind of people, arranging for financial resources, execution of the project in time by proper scheduling of the different activities etc. contribute to the complexity of the project.

Sub-contracting

This characteristic stems forth in view of the complexity of functions and activities of a project. Some of the activities are entrusted to sub-contractors to reduce the complexity of the project. Sub-contracting will be advantageous if it reduces the complexity of the project so that the project manager can coordinate the remaining activities of the project more effectively. In general, the greater the complexity of the project, the larger will be the extent to which sub-contracting will be resorted to. Sub-contracting is also helpful if the sub-contractors are specialized in their field of activity since this will improve the quality of the project.

Risk and Uncertainty

Risk and uncertainty go hand in hand with project. A risk free project cannot be thought of. Even if a project appears to be risk free, it only means that the risk element is not apparently visible on the

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surface and it will be hidden underneath. The risk factor will come to surface when conditions become conducive to it. Some of the risk elements can be foreseen and the project can be strengthened to encounter the risk as and when it emerges. Some other risk elements can not be foreseen. For example, assume that putting up a cotton yarn-spinning mill is the project on hand. If during the project feasibility study it is learnt that there has been a gradual shift among consumers from the usage of cotton yarn to the usage of synthetic yarn, and if it is apprehended that at one stage synthetic yarn will rule over, the machinery can be so chosen that they can be used for both types of yarns. If this is not entirely possible, the choice of machinery can be so done as to avoid major conversion cost while switching over from the manufacture of cotton yarn to the manufacture of synthetic yarn in case the need arises. Such eventualities can be foreseen and planned for. On the other hand the sudden entry of a strong competitor who can upset all our forecasts and projections can not be anticipated. Sudden fall of Government in a country, which is not anticipated may turn the calculations wrong and make the forecasts/projections meaningless.

Customer Specific Nature

A project is always customer specific. This is because the products produced or services offered by the project are necessarily to be customer oriented. It is the customer who decides upon the product to be produced or services to be offered and hence it is the responsibility of any organization to go for projects/services that are suited to customer needs.

Change

A project is not rigid in its life span. Changes occur throughout the life span of a project as a natural outcome of many environmental factors. The changes may vary from minor changes which may have very little impact on the project to major changes which may have a big impact or even may change the very nature of the project.

During the course of implementation, the technology would have improved further and equipments with the latest technology would have already started arriving. In such a case, if the equipment originally planned had not yet been procured, it would be wise to switch over to the equipment with the latest technology. There could also be latest technological innovations in the manufacturing process which may deserve a switch over. All such changes are necessitated in order to keep the project update.

Response to Environments

Projects take shape in response to environments. Indian Government soon after independence set up major projects in the public sector, in the sectors of iron and steel, coal, power generation, heavy equipments manufacture etc. This was in tune with the then need for the development of infrastructure and heavy industries.

Forecasting

Forecasting the demand for any product/service that the project is going to produce is an important aspect. Only if the forecast gives positive indications, the project is taken up for further study. Thus, all projects involve forecasts and in view of the importance attached to forecasts, they must be accurate and based on sound fundamentals.

Rational Choice

Since a project is a scheme for investing resources, the choice of a project is done after making a study of all the available avenues for investing resources and a rational choice among the available avenues is made.

Optimality

A project is always aimed at optimum utilization of resources for the overall development of the organization/economy. Resources are scarce and resources have a cost. Hence, optimum utilization of resources is a must for any project. Many project management concepts have evolved with the aim of achieving optimum utilization of available resources.

Control Mechanism

All projects will have pre-designed control mechanisms in order to ensure completion of projects within the time schedule, within the estimated cost and at the same time achieving the desired level of quality and reliability.

1.3 ATTRIBUTES OF A GOOD PROJECT MANAGER

An effective project manager is one who should have the following skills/capacities.

- Planning and organizational skills
- Personnel management skills
- Communication skills
- Change orientation
- Ability to solve problems in their totality
- High energy levels
- Ambition for achievement
- Ability to take suggestion
- Understanding the views of project team members and having a sympathetic attitude towards them
- Ability to develop alternative actions quickly
- Knowledge of project management methods and tools
- Ability to make self-evaluation
- Effective time management
- Capacity to relate current events to the project/project management
- Ability to handle project management software tools/packages
- Flair for sense of humour
- Solving issues/problems immediately without postponing them
- Initiative and risk taking ability
- Familiarity with the organization
- Tolerance for difference of opinion, delay, ambiguity
- Knowledge of technology
- Conflict resolving capacity
- Team building skills
- Resource allocation skills
- Entrepreneurial skills

1.4 PROJECT CLASSIFICATIONS

The term ‘taxonomy’ refers to the science of classifying things by naming and identifying them. Projects can be classified under different heads, some of which are explained below.

Based on the Type of Activity

Under this category, projects can be classified as industrial projects and non-industrial projects. Industrial projects are set up for the production of some goods. Projects like health care projects, educational projects, irrigation projects, soil conservation projects, pollution control projects, highway projects, water supply projects etc. come under the category of non-industrial projects. Investments in non-industrial projects are made by the Government and the benefits from such projects are enjoyed by the entire society of people. It is difficult to quantify the benefits enjoyed by the society out of non-industrial projects.

Based on the Location of the Project

Under the category, projects can be classified as national projects and international projects. National projects are those set up within the national boundaries of a country, while international projects are set up in other countries. International projects may be either projects set up by the Government or by the private sector. The following are the major forms of international projects.

- Setting up of fully owned subsidiaries abroad
- Setting up of joint ventures abroad
- Setting up of projects abroad by way of mergers & acquisitions

Handling of international projects needs more expertise and greater efforts in view of higher risk proportion and procedural formalities involved.

Based on Project Completion Time

Based on the constraints on project completion time, projects can be classified into two types, viz., normal projects and crash projects. Normal projects are those for which there is no constraint on time. Crash projects are those which are to be completed within a stipulated time, even at the cost of ending up with a higher project cost. For example, construction of canal lining with the condition that the work should be completed before the monsoon starts is a crash project.

Based on Ownership

Based on ownership, projects can be classified into private sector projects, public sector projects and joint sector projects. A private sector project is one in which the ownership is completely in the hands of the project promoters and investors. Profit maximisation is the prime objective of private sector projects since the investors invest their money in such projects only with the sole idea of earning better returns.

Public sector projects are those that are owned by the state. The evolution and growth of public sector enterprises is the natural consequence of the efforts of Governments for undertaking development in a country. The growth of public sector enterprises vary from country to country. In a country that follows only the system of private enterprises (USA, for example) there is hardly any public sector enterprise except for essential sectors like defense sectors, public utility services etc. In socialist countries (China, for example) public enterprises dominate the economy and they have

become public property. In countries that follow a system of mixed economy (India, for example) both private and public sector enterprises exist.

An enterprise is considered as public enterprise when the state or any other national, regional or local authority holds at least 51% of its capital and the enterprise is under the control of the state. In India, public sector undertakings can be owned either by the Central Government or by the State Governments. Government undertakes investment in public sector enterprises due to many reasons.

- Both developing and under-developed countries need a planned economy for their sustained growth. The Government announces industrial and trade policies in tune with its plans to direct the growth of the economy in the desired direction. It becomes imperative for the Government to invest in growth sector.
- Private sector in developing and under-developed countries are not willing to take up investments in many planned sectors (sectors that the Government considers as thrust areas for the development of the economy) either due to huge investments required or due to unattractive returns from the investments in such projects. Hence it becomes the responsibility of the Government to invest and nurture industries in such planned sectors.
- Investment in strategic sectors (defense, space research, atomic research etc.) can not be given to the private sector for obvious reasons. Also, public utility services sectors can also be not left fully to the private sector since the private sector by nature is oriented only towards profit maximization and not in welfare maximization.
- The natural resources of a country are the properties of the Government. The natural resources can be exploited only by the public sector enterprises since the investment required is huge and the ownership of the resources rests with the Government. (example: mining, construction of dams for irrigation purposes, hydro power plants).

Joint sector projects are those in which the ownership is shared by the Government and by private entrepreneurs. The main consideration for the Government's investment in joint sector projects is to make use of the managerial talents, entrepreneurial capabilities and marketing skills of the private entrepreneurs. Joint sector offers hope to the private entrepreneurs since the Government shares the investment required for the project.

Based on Size

Projects can be classified based on the size into three categories, viz., small projects, medium sized projects and large projects. The size is normally expressed in terms of the amount of investment required. The investment limit for the different categories of projects are announced by the Government and this undergoes periodical changes keeping in view the inflation, the decision to offer certain incentives to projects categorized as 'small' scale projects etc. As per the directives of the Govt. of India, projects with investment on plant and machinery up to Rs. 1 crore are categorized as 'small scale projects' while those with investment in plant and machinery above Rs. 100 crores are categorized as 'large scale projects'. Projects with investment limit between these two categories are 'medium scale projects'.

Based on Need

Projects can be classified under the following groups, based on the need for project.

1. New project.
2. Balancing project.
3. Expansion project.
4. Modernization project.

5. Replacement project.
6. Diversification project.
7. Backward integration project.
8. Forward integration project.

New project: A new project idea is conceived and implemented to meet customer needs. The whole concept of business can be viewed as under:

- (i) Finding a gap in terms of customer needs for goods and services.
- (ii) Filling the gap.

A new project can be one that identifies a new product for which there is demand from the customers or it can be a project for the production of a product that is already in the market but the demand for which is in excess of the supply, leaving a gap to be filled in. Identification and formulation of a new project requires special knowledge and skill.

Balancing project: Projects in general have many production units that are linked with one another. The flow of material through different production units shall be such that the output of one production unit exactly matches the input requirement for the subsequent production unit. If this is so, the efficiency of the production line will be the maximum and there will not be any under utilization of production capacity. However, if the production capacity of any particular production unit is less, then this particular production unit sets the maximum limit of production possible for all other units.

Let us illustrate the above concept by an example.

Consider the production of steel furniture. For the simplicity of explaining the concept, let us assume a project for the manufacture of steel cupboards. Let the following are the types of operations involved in the production. (Again, for the sake of simplicity the operations are restricted to only four).

- (a) Cutting of steel sheets to the required sizes.
- (b) Folding of steel sheets as per the design requirements.
- (c) Welding the parts.
- (d) Painting.

Operation (a) above will need cutting machines (technically called shearing machines) operation (b) will need folding machines; operation (c) will need welding machines operation (d) will need air compressors, painting booth, paint spray guns and other related equipments.

If we plan to install a plant with a production capacity of say, 50 Nos. of steel cupboards per shift of 8 hours, it would be ideal if all the above four production departments have capacity to handle 50 Nos. of cupboards per shift. In such a situation, the production line is said to be perfectly balanced. However, this can not be the case in view of many limitations and practical problems. Most of the machinery are manufactured to standard specifications and sizes. In the example quoted above, the folding machine available in the market may be of certain standard capacity. For example purchasing of one machine may not be sufficient for the required production capacity, while purchasing two machines may be in excess of the planned capacity. A compromise is required to be made. If we plan a production capacity of 50 steel cupboards per shift and if the folding machines are available in the capacities of 80, 40 and 30 cupboards per shift (i.e., the folding capacity is adequate to produce 80, 40 and 30 cupboards per shift respectively), we have no necessarily go for the combinations of machines having 40 and 30 cupboards/shift capacity, in which case there will be an excess capacity of 20 cupboards (70-50) in the folding section.

As far as possible, the capacities of the other production units can be increased to match or at least to come nearer to the capacity of the folding section. But, other considerations like the total investment available for the project, the market demand for the product, the standard sizes in which other manufacturing facilities are available etc., impose limitations. Hence it is not uncommon to come across projects that have unutilized capacities in one or more production units.

Cost consideration of investments in manufacturing facilities and demand pattern of products are the two main reasons as to why projects that are newly set up have unutilized capacity in certain production units. A project may foresee a particular production capacity at which it can confidently market its entire production. Having decided upon a particular production capacity, the project is to be so designed that all the production facilities match the planned production capacity. In case a particular production facility (folding section, as in the example given above) can be installed only at a higher level of capacity than what is required, there is no other way except to accept the same. Increasing the production capacity of all other production units in tune with the increased capacity of such unmatched production units may not be practicable for implementation since this will mean both increase in production capacity and increase in investment limits. The management may be averse to both these options because of its own reasons based on other considerations. Hence the project implemented with such constraints will result in under utilization of production capacity of certain production units.

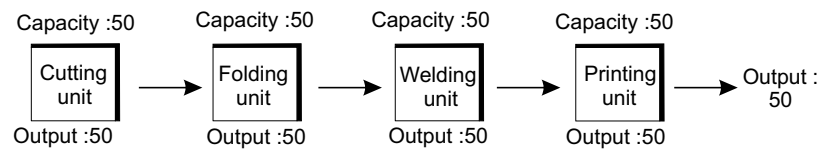


Fig. 1.1 *Balanced Production line*

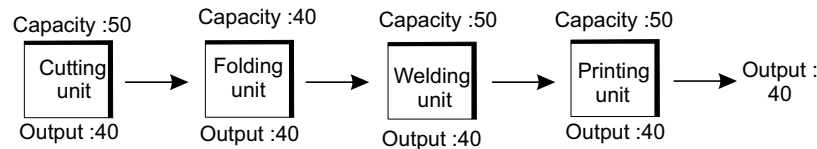


Fig. 1.2 *Unbalanced production line*

As seen from Fig. 1.2, though, the production capacity of cutting unit is 50 (i.e., the unit has cutting capacity needed for the production of 50 cupboards per shift), the cutting unit can not operate at its full capacity in view of the lower capacity of the following production unit viz., folding unit. If cutting unit is operated at its full capacity, stock will start piling up before the folding unit since the folding unit will be receiving additional jobs equivalent to 10 cupboards every shift.

Also, though the production capacity of Welding unit and painting unit is 50 each, these two units also can not operate at their full capacity since these two units will be receiving jobs below their capacity. Thus, in view of the lower capacity of one of the production units, all other production units in the production line (both upstream and down stream) operate at below their capacity.

What is the effect of such unbalanced projects?

Though perfectly balanced projects are rare to come across, attempts should be made to bring about near perfect balance as far as possible. The following are the effects of unbalanced projects.

- (a) There is under utilization of production capacity.
- (b) Idle production capacity will result in lower return on investment.
- (c) If a project that can be balanced remains unbalanced, there is every possibility that a competitor may be able to offer his product at a comparatively cheaper price. The competitor may be a new entrant who sets up a balanced project or an existing producer who upgrades his project from an unbalanced to a balanced one. In such a situation, it is likely that the unbalanced project may face severe threat for its continued existence.

Having understood the concept, we can now define balancing project as under :

A project that is undertaken to improve upon the manufacturing capacity of one or more production units that will result in improvement in the overall production capacity of the project as a whole is called a Balancing project.

In the above example, if a project is undertaken to increase the production capacity of the folding unit from 40 units per shift to 50 units per shift, (provided such a proposal is technically feasible!) it amounts to a balancing project. After implementation of the balancing project, under utilization of capacity in certain production centres gets removed and utilization of production capacity of the remaining production centres improves, resulting in overall increase in production capacity and profitability of the project.

Expansion project : An expansion project is one that is aimed at increasing the plant capacity for the current product range. Assume that a company is engaged in the production of wrist watches and that the plant capacity is 50,000 Nos. of wrist watches per annum. If the company, anticipating further growth in the market demand for wrist watches, plans and implements a project for enhancing the plant capacity from the present level of 50,000 Nos. of wrist watches per to 75,000 Nos. per annum, the company is said to embark upon an expansion project.

Expansion of plant capacity can be done in two ways, viz.,

- (a) by establishing additional plant capacity.
- (b) by acquisition of another organization in same line of activity.

Expansion projects are warranted only where there is definite upward trend in the demand for the product and only after the management of the organization is doubly confident about the long term prospects of the expansion scheme. If there is any short term spurt in the demand for the product which is not expected to last long, is it advisable to plan for expansion? Prudence will indicate that such short term increase in orders is to be executed by diverting a part of the work to outsiders on jobs contract basis, rather than hurrying through an expansion project.

Modernisation project : Technological innovation is a continuous process. When a new technology is evolved and becomes commercially operative, the existing technology becomes obsolete. Any project is set up with the latest available technology. However with, the passage of time, in view of continuing technological upgradation, the projects, become obsolete in technology. There are two aspects of technological obsolescence that deserve consideration, viz,

- (a) The production process would have become obsolete in view of the latest technological innovations. For example, for painting of metal components, 'brush painting' was used long ago which was replaced by 'spray painting'. Spray painting method gave improved finishing and also resulted in economical use of paint. 'Powder coating', a further advanced process of painting gave additional advantages and this replaced spray painting process in many important areas of application. 'Vapocure', which is another improvement over powder coating technology is now being used in many applications.

- (b) More advanced features would have been incorporated in the plant and machinery, with the result the existing old plant and machinery might have become obsolete in technology. For example, CNC Lathes (“Computerized Numeric Control” Lathes) incorporate advanced features which facilitate improved machining operations. With the introduction of CNC lathes, the old-modeled lathes, which did not have any computerized automation features, become obsolete in technology.

Thus, whenever either the plant and machinery becomes obsolete or whenever the production process becomes obsolete there is a need for modernization.

Importance of Modernization

Ignoring the need for modernization will result in reduction of profit margin, which in the course of time may even lead to closure of the organization. Modernization when ignored will result in either of the following two situations.

- (a) The organization that has ignored modernization will be producing products which are inferior in quality as compared to the products produced by its competitors.
- (b) The cost of production would be higher than that of competitors, though there is no difference in quality.

It is also likely that both the above two factors may coexist. Hence for the survival of any organization, modernization of project keeping in tune with the latest developments is a must. Ignoring the need for modernization will only mean that the organization is moving towards its end.

Replacement project : Replacement project involves replacing some of the old machinery with new machinery of the same capacity. Due to ageing and wear and tear of machinery, the maintenance-cost starts mounting up and a stage will come when it will be no more advantageous to keep the worn-out machinery in the production line in view of abnormally high maintenance costs, poor quality of output, reduction in capacity of output, break-down etc.

Hence a replacement project is implemented to reduce the maintenance cost of old machinery and to keep the production going without any obstruction so that delivery schedules are met in time.

Thus, replacement projects are undertaken with a view to maintaining the same level of operational efficiency or even to better the level of operational efficiency wherever possible.

Diversification project : When a manufacturer wants to offer more than one product, it is described as product diversification and the project meant for this purpose is the diversification project. Diversification is generally of two types viz.,

- (a) Related diversification.
- (b) Unrelated diversification.

Related diversification means making closely related diversifications to the product line. A manufacturer in the line of manufacturing wrist watches may go for adding manufacturing facilities meant for the manufacture of time pieces and alarm clocks, which is an example for related diversification. When a company’s proposed product range are different from the existing ones, we call that the company embarks upon unrelated diversification. Godrej, has a wide range of products like office furniture, cosmetics, edible oil, locks, agrofoods, office automation products etc., which is an example for unrelated diversification.

Diversification projects are necessitated by the urge to explore market potentials in unattempted areas with a view to improving upon the profitability of the organization. It may be noted that diversification project is almost like a new project for an organization but for the fringe benefits that the organization may derive from the infrastructure already available.

Backward integration project : Any manufacturing organization procures raw materials. The raw materials undergo a series of operations resulting into transformation to the form of finished product. The raw material that an organization purchases may be in different forms ranging from crude raw material to value added raw material. For example, iron ore is the raw material for a smelting unit. The smelting unit extracts iron out of the iron ore. Iron may become the raw material for a foundry. The foundry unit produces components of different nature using iron. Iron components molded in a foundry unit may become the raw material for a machinery manufacturing unit. The machinery manufacturing unit purchases components from foundry units, and finishes the components to suit the requirements, add additional design features and use them in assembling a machinery. Thus the output of one industry becomes the raw material for another industry.

If an industry that uses a value added raw material goes for the implementation of a project for the production of this value-added raw material within its production line, the industry is said to be on backward integration. Consider a polythene bag making industry.

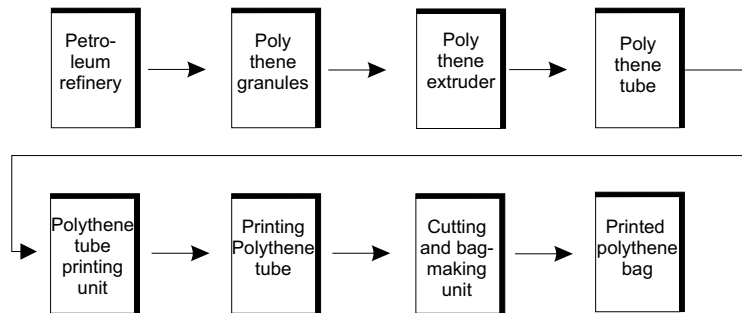


Fig 1.3 Full production line for printed polythene bag manufacture

Polythene granules are obtained as a by-product in petroleum refinery. These granules are the basic raw material for plastic industry. The granules are melted and blown in the form of tubes of continuous length. Conversion of polythene granules into polythene tube of continuous length is done with the help of a polythene extruder machinery attached with necessary blowers and other fittings.

The continuous polythene tube obtained from the extruder is passed through the printing machine where necessary printing is done on the tubes. The printed polythene tubes are passed through cutting and Bag making machine where the tube is cut into standard sizes, and the opening on one side is sealed, thus producing a printed polythene bag.

A polythene Bag-making unit if started with a smaller investment can have only a cutting and Bag-making machinery. Printed polythene tube will be the raw material for such a unit and this raw material, viz., printed polythene tube will be obtained from other manufacturers of this item. If this Bag-making unit wants to go for backward integration it can include a polythene tube printing machinery in its production line, in which case, plain polythene tube will be the raw material required. If after some time, the unit further wants to integrate its production facilities further backward, it can add an extruder machinery whereby it can procure polythene granules as raw material and produce continuous polythene tubes in-house using the extruder.

Thus, the process of backward integration can be continued till a stage is reached where further backward integration does not exist or may not be feasible in view of other constraints. In the example given above, adding production facility for the production of polythene granules in-house is not feasible since it is a different line of activity with very huge investment and more over the polythene granules are only a by-product, the main products being petroleum products meant for usage as fuel.

An organization opts for backward integration under the following circumstances.

- (a) The availability of raw material is irregular in nature, which affects the production line and delivery schedule.
- (b) Storing additional quantity of raw material to avoid stock-out situation results in heavy inventory carrying cost.
- (c) Long lead time for the procurement of certain raw materials.
- (d) High profit margin enjoyed by suppliers of raw material due to wide demand-supply gap.

Since the above pit falls are avoided with backward integration, the profitability and efficiency of the organization is bound to improve after the implementation of backward integration project.

Forward integration project: While backward integration is done by adding manufacturing/processing facilities at the beginning stages of a product line, forward integration is done by adding additional manufacturing/processing facilities at the end of the production line. By including additional manufacturing/processing facilities at the end of production line, the products that are currently produced undergo further processing resulting in further value addition.

Taking the example of manufacture of polythene bag, an organization that produces continuous polythene tubes (using extruder and other connected equipments) may integrate its production facilities forward by adding printing, cutting and bag making facilities so that the finished product becomes printed polythene bags as against continuous polythene tubes. Thus, there is value addition to the finished product which can improve the profitability of the organization.

Be it backward integration or forward integration, the capacity of the production facilities added must match with the existing production facilities.

Fig. 1.4 represents a schematic diagram for backward integration and forward integration. Considering the example already given, a backward integration project shall add extruder capacity to match the capacity of printing, cutting and bag making units while a forward integration project shall add printing, cutting and bag making capacity to match the capacity of extruder unit.

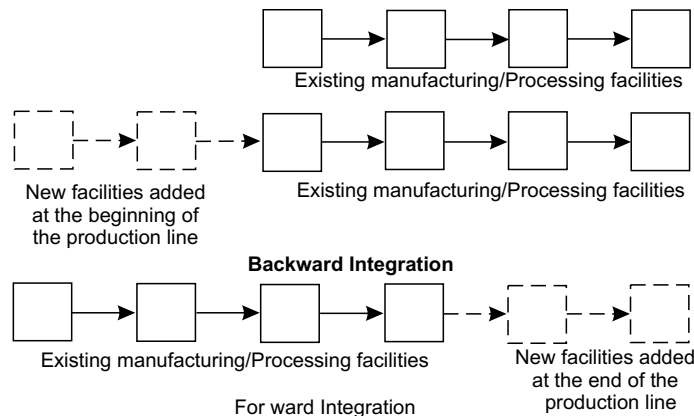


Fig 1.4 Schematic diagram for backward and forward integrations

Illustration 1.1

M/s Threadwell spinners, a new partnership firm has proposal to set up a new cotton yarn spinning unit with an installed capacity of about 2000 spindles, for the manufacture of 20's count cotton yarn. The project promoters, not being exposed to the technical details about the various machinery required for the project, have proposed to purchase the following machinery, after consultations with a few well wishers! (which is not infrequent in real life situations!).

Blow room (with one scutcher)	1. no.
Carding machines	4. nos.
Draw frame	2. nos.
Simplex frame	2. nos.
Ring spinning frames	6. nos.

The promoters have obtained licence for setting up a cotton spinning mill of 2000 spindles capacity. The following are the technical details of the machinery.

Rated capacity @ 100% efficiency:

Ring spinning frame	: 213 grams per spindle per shift (8 hrs)
Simplex frame	: 3.59 kg. per spindle per shift (8 hrs)
Draw frame	: 329 kg per shift (8 hrs)
Carding machine	: 140.30 kg per shift (8 hrs)
Blow room (with one scutcher)	: 1,296 kg per shift (8 hrs)

Ring spinning frames are available with 440 spindles capacity each and Simplex frames are available with 124 spindles capacity each.

Wastages at the different stages of processing are as under:

Wastage in ring spinning frame	: 3.00%
Wastage in simplex frame	: 200%
Wastage in draw frame	: 1.00%
Wastage in carding machine	: 5.00%

Capacity utilization of the ring spinning frame is 90%.

Machine efficiency of the different machines are as under:

Ring spinning frame	: 84.50%
Simplex frame	: 84.00%
Draw frame	: 73.00%
Carding machine	: 85.00%
Blow room	: 80.00%

Find out as to whether the machinery proposed to be purchased by the project promoters are balanced in terms of output. If found unbalanced, suggest the correct scheme of machinery.

Solution:

[Those who are unfamiliar with the process of manufacture of cotton yarn in a spinning mill may refer to the foot note given at the end of this illustration, since knowledge of the manufacturing process is essential for understanding the problem]

Licensed capacity	: 2,000 spindles.
Spindle capacity of one ring spinning frame	: 440 spindles.
Maximum number of ring spinning frames that	

can be purchased so that the licensed capacity	: 4 nos.
is not exceeded	: $(4 \times 440 = 1,760 \text{ spindles})$
Hence,	
Installed capacity of the plant (expressed in terms of spindle capacity of ring spinning frames)	: 1,760 spindles
Effective utilization of spindles $(1,760 \times 0.90)$	: 1,584 spindles
Machine efficiency of ring spinning frame	: 89.50%
Expected output of cotton yarn per shift (8 hrs)	: $0.895 \times [1,584 \times 213] \text{ grams}$ 301.78 kg

[The expected output of 301.97 kg arrived at above is without taking into account the wastages in ring spinning frames. If the wastage of 3.00% is taken into account, the actual output of cotton yarn per shift will be 292.91 kg.]

Required output of simplex frame per shift (8 hrs)	: 301.97 kg.
Rated output of simplex frame per spindle per shift	: 3.59 kg.
Machine efficiency of simplex frame	: 84%
Number of spindles required for simplex frame	: $\left(\frac{301.97}{0.84 \times 3.59} \right)$: 100.14 say, 100 spindles

Since the simplex frames are available with 124 spindle capacity, one simplex frame need to be purchased to take up the required production. Though the spindles of simplex frame required are only 100, since machines are available only in standardized capacities, one simplex frame with 124 spindles is required to be purchased. The proposal of the project promoters to purchase 2 nos. of simplex frames is not well founded since even one simplex frame will have a spare capacity of 24 spindles (124-100).

Required input for simplex frame per shift for getting an output of 301.97 kg. per shift, taking into account: 308.13 kg wastage of 2.00% $[301.197 \div 0.98]$	
Required output of draw frame per shift (8 hrs)	: 308.13 kg
Machine efficiency of draw frame	: 73 %
Rated output of draw frame per shift (8 hrs)	: 329 kg.
Number of draw frames required	: $\left(\frac{308.13}{0.73 \times 329} \right)$: 1.28

The proposal to purchase 2 numbers of draw frames is in order. As seen from the actual requirement of 1.28 draw frames (which is not possible due to practical limitations), there will be spare capacity available in this section.

Required input for draw frame per shift for getting an output of 308.13 kg. taking into account wastage of 1.00% $[308.13 \div 0.99]$:	311.24 kg.
Required output of carding machines per shift	: 311.24 kg.
Machine efficiency of carding machines	: 85%
Rated output of carding machine per shift (8 hrs)	: 140.30 kg.

$$\begin{aligned} \text{Number of carding machines required} &: \left(\frac{311.24}{0.85 \times 140.30} \right) \\ &: 2.61 \end{aligned}$$

The proposal of the project promoters to purchase 4 nos. carding machines is not well founded. As seen from the above, 3 nos. of carding machines are sufficient.

Required input for carding machines per shift for getting an output of 311.24 kg. taking into account wastage of 5.00% $[311.24 \div 0.95]$:

Required input for blow room (with one scutcher) per shift : 327.62 kg.
Machine efficiency of blow room : 80%
Rated output of blow room (with one scutcher) per shift : 1,296 kg.

$$\text{Number of scutchers required for blow room} : \left(\frac{327.62}{0.80 \times 1,296} \right)$$

Hence, blow room with one scutcher is sufficient. : 0.32

The actual requirement of different machineries are as under. (Refer Fig. 1.5)

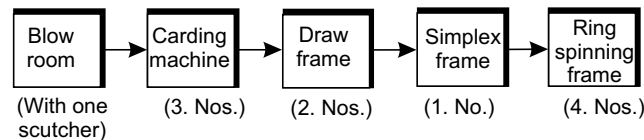


Fig. 1.5

[A comparison of the exact requirement of different machineries with the actual will reveal that there is spare capacity available in all the machineries except in ring spinning frames. This is because of the reason that machines are available only with standardized specifications. If the nature of machines are such that they can be made to order, then perfect balancing can be achieved in the sequence of proposed machinery.]

Note : (manufacturing process in cotton yarn spinning)

Cotton plucked from the fields is processed in ginning mills where cotton is cleaned by removing seeds and trash material. The ginned cotton is the raw material for cotton yarn spinning mill.

The ginned cotton is fed into the blow room machine where the cotton is opened up and cleaned further. The out-put from the blow room machine is in the form of cotton sheets rolled cylindrically. The part of blow room through which the sheet of cotton comes out is called 'scutcher'. There can be one or more scutchers in a blow room depending upon the capacity of the machine.

The sheet of cotton obtained from the blow room is fed into carding machine where the cotton is further cleaned by removing fine foreign material and trash. The output from carding machine is in the form of continuous untwisted strand. (called 'sliver'). The sliver is received in cylindrical drums called 'carding cans' which are shifted to drawing machine (also called draw frame) for further processing.

The input into the drawing machine and also the output from the drawing machine are in the form of 'sliver'. The input into the drawing machine is again opened up inside the drawing machine and

the cotton fibres are realigned to facilitate spinning. The cotton sliver obtained from the draw frame will have cotton fibres oriented properly so that further processing will be effective.

The output from the draw frame is fed into the simplex frame (also called 'speed frame') where the thickness of sliver is reduced and a small amount of twist is introduced. The output from simplex frame is in the form of a thick thread which is wound over bobbins.

The output from the simplex frame is fed into ring spinning frame where the thread is reduced to cotton yarn of required thickness (technically called 'count') and twist. The output from the ring spinning frame viz., cotton yarn is also wound over bobbins).

Illustration 1.2

In the problem given in illustration 1.1. above, if there is no restriction on the installed capacity of spindles (i.e., if the industry is delicensed thereby the ceiling of 2,000 spindles is removed), ascertain the optimum combination of machinery for a blow room with one scutcher.

Solution :

Rated output of blow room (with one scutcher) per shift (8 hrs)	: 1,296 kg.
Machine efficiency of blow room	: 80%
Actual output of blow room per shift, taking into account the machine efficiency – $(1,296 \times 0.80)$	: 1,036.80 kg.
Wastage in blow room	: 7.50%
Input to blow room per shift taking into account wastage $(1036.80 \div 0.925)$	: 1,120.86 kg.
Input to carding machines	: 1,036.80 kg.
Output from carding machines per shift taking into account wastage of 5% (1036.80×0.95)	: 984.96 kg.
Rated output of carding machine per shift	: 140.30 kg.
Machine efficiency of carding machine	: 85%
No. of carding machines required	: $\left(\frac{984.96}{140.30 \times 0.85} \right)$
	: 8.26
	say, 9 carding machines
Input to draw frames per shift	: 984.96 kg.
Output from draw frames per shift taking into account wastage of 1% (984.96×0.99)	: 975.11 kg.
Rated output of draw frame per shift.	: 329 kg.
Machine efficiency of draw frame	: 73%
No. of draw frames required	: $\left(\frac{975.11}{329 \times 0.73} \right)$
	: 4.06

Actual output from 4 draw frames ($329 \times 0.73 \times 4$) : 960.68 kg.
say, 4 draw frames

[Since four draw frames are proposed as against the requirement of 4.06, the actual output from draw frames works out to only 960.68 kg., as against the estimated output of 975.11 kg arrived at earlier.]

Input to simplex frames per shift : 960.68 kg.

Output from simplex frames per shift taking into account wastage
of 2% (960.68×0.98) : 941.47 kg.

Rated output of simplex frame per shift : 3.59 kg. per spindle

Machine efficiency of simplex frame : 84%

No. of spindles of simplex frame required : $\left(\frac{941.47}{3.59 \times 0.84} \right)$
: 321.2

[Since simplex frames are available with spindle capacity of 124 spindles, two simplex frames will be insufficient while three frames will be more than adequate. We can opt for 3 simplex frames to avoid under-utilization of other back process machinery.]

Input to ring spinning frames per shift : 941.47 kg.

Output from ring spinning frames per shift, taking into account
wastage of 3% (941.47×0.97) : 913.23 kg.

Rated output of ring spinning frame per shift : 213 grams per spindle

Machine efficiency of ring spinning frame : 89.50%

No. of spindles of ring spinning frames required : $\left(\frac{913.23}{0.213 \times 0.895} \right)$
: 4,790.

No. of ring spinning frames (with 440 spindles each)
required ($4,790 \div 440$) : 10.88

say, 11 ring
spinning frames

The desired combination of machinery that will more or less balance each other is as under.
(Refer Fig. 1.6)

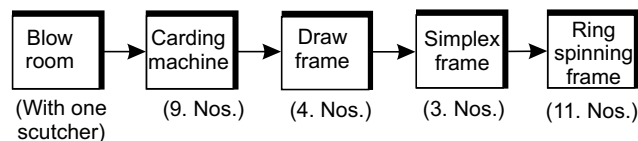


Fig. 1.6

1.5 PROJECT OBJECTIVES

The objectives (or goals) of any project will be,

- To complete the project within the allotted (or budgeted) funds.
- To complete the project within the scheduled time limit.
- To execute the project in such a way that the project meets the quality standards.
- To ensure that the project is completed to the satisfaction of the end users.

Project objectives are to be kept in mind by all the members of the project team through out the period of project implementation. All decisions, whether a major decision or a minor one are to be taken keeping in view the project objectives. The project objectives shall remain as the guiding force for the project team.

Social Objectives

There are certain projects that are implemented purely with social objectives. Such projects, though may have cost, time and quality objectives, rank social objectives as the prime objective. Public health projects, Rural Development projects, irrigation projects etc., are some of the projects that have social objective as the prime objective. In such social projects, the objectives other than the social objective may even be relaxed at times, if that could help achieve the social objectives. For example, if the social objective of irrigating 10000 hectares of land can be fulfilled only if the cost of the project is increased by say, 10% more than what was originally planned, a conscious decision to accommodate the increased cost can be taken as such a decision will help achieve the social objective.

1.6 ESTABLISHING THE PROJECT

The processes involved in establishing a project are:

- Initiating
- Planning
- Organising
- Executing
- Directing & Controlling

Planning, Organising, Executing, Directing and Controlling are applicable for all types of management activities irrespective of whether the management activity relates to project management or management of routine on-going operations. The first and the last processes, viz., initiating and closing are applicable only for project management. Since projects are one-time ventures, they have a beginning and an end which are denoted by the two processes, initiating and closing respectively.

Initiating

This is the starting phase. Initiating involves identification of projects, generation and development of project ideas, formulating a project proposal, appraisal of the project proposal chosen and getting the organisation's commitment and authorization to commence the project. (a detailed account of initiating covering the aspects of project identification, formulation and appraisal is given in para 1.7)

Planning

Planning is the process of deciding in advance about the future course of actions to be taken. In project environment, planning consists of defining all the works required to be carried out so that all the project participants will understand their role in the project team and carry out the work assigned

to them. Planning acquires greater relevance to projects since projects consist of non-routine, non-repetitive tasks.

Project planning involves the following:

- Defining the scope of the project in terms of the product/services to be delivered by the project.
- Forecasting and estimating the resources (men, material, money, machines etc.,) required for the project.
- Breaking down the project into manageable activities and arriving at the logical sequence between the different activities. The logical sequence between the activities is arrived at starting from the terminal activity of the project and working backwards towards the initial activity, deciding in the process, the activities that must be completed before the succeeding activities can be taken up for execution.
- Arriving at an appropriate organisational structure to implement the project .
- Planning for the tentative project completion time. This is done by preparing a master programme schedule that gives the critical dates of major events and control points.
- Scheduling the activities in such a way that the project is completed within the least possible time by carrying out CPM / PERT analysis. (a detailed account of scheduling techniques is given in Unit - III)
- Preparing detailed cost estimates for all the activities.
- Determining the required resources for all the activities.
- Considering the possibilities of adverse occurrences and keeping a contingency plan ready that gives the best cost / benefit results for the given resources.

Organising

Organising is the process of defining and analysing the activities of the enterprise, grouping the activities into distinct areas / departments and establishing the authority-responsibility relationships among them. It also involves organising the resources required for the accomplishment of organisational objectives. In project environment, organising consists of the following sub processes.

Arranging for financial resources

The financial resources required are to be arranged. This shall be done in such a way that availability of financial resources for the execution of the project are timely and adequate.

Building up a project organisation

A project that is well formulated can be of use only if the project is implemented as per the plans proposed. To facilitate execution of projects, the responsibility must be entrusted to a project manager, who must be responsible for coordinating, directing and controlling the implementation of the project. A suitable organisational structure is to be chosen for implementing any project. Personnel required for the project can be drafted from the different functional departments of the organisation. From among the employees of the organisation, those with the required expertise and skill for managing projects can be diverted from their respective functional departments to the project department to look after project related works. When the in-house expertise is not adequate, the work, either in part or full can be entrusted to contractors. Even when the work is entrusted to

contractors, the responsibility of getting the work done through the contractors rests with the project team of the organisation. Since projects require time bound completion of activities, a suitable organisational structure to handle the project / projects at hand shall be devised, clearly establishing the authority relationship among the project team members. (a detailed account of organisational structures is given in para 1.8; a detailed account of organising human resources is given in para 1.9; a detailed account of organising contracts is given in para 1.10; a detailed account of organising systems and procedures for project implementation is given in para 1.11).

Team building

As mentioned above, the personnel required for the project can be drafted from within the organisation or the work can be entrusted to contractors as the nature of the project demands. Some times, experts from outside the organisation may be engaged and their services utilized on contract basis. Since execution of projects require special and unique skills, the personnel are to be given the required training, counseling etc., with a view to improving upon their individual and group skills so that they will function as a team for accomplishing the project objectives.

Tying up of material resources, service providers, contractors

The choice of material resources, suppliers of materials, specifications of materials, service providers, contractors etc., is to be done by the Project Directorate with the approval of the competent authority (who may be the Project Manager, Project Director or the General Manager of the organisation according to the powers entrusted by the organisational set up). These are to be defined in clear terms and documented and circulated among the project executives so that execution of project can proceed smoothly without any hiccup.

Dissemination of information

Effective communication of information among the members of the project team and other project stake holders is vital for the successful execution of a project. A suitable information system should be designed and implemented that is cost effective in collecting and disseminating all relevant information. Apart from being cost effective, the information system should also be accurate and should offer timely information.

Executing

Executing is the process of carrying out the project activities as per the plans. Though the project execution shall as far as possible be done according to the plans originally envisaged, changes / modifications required, if any, are to be incorporated wherever necessary. Since projects are dynamic in nature, flexibility is essential in execution of projects so that the overall objectives of the project are achieved.

Directing and Controlling

Directing is the process of guiding the subordinates towards achieving the organisational goals. It involves issuing orders, directives, instructions and commands. Directing aids the subordinates to know what they are expected to do. In a project environment, the project manager is expected to direct his subordinates through the tools of instructions, orders, requests, guidance, supervision, coaching, advice etc., and to inspire them to achieve the project goals (a detailed account of directing projects is given in para 1.12). Controlling is the process of comparing the actual performance of the

project with the planned performance. In other words, it is checking up whether the project progresses exactly in line with what was planned and discovering deviations, if any. (The deviations are often called ‘variances’). Once deviations in terms of time, resource and quality parameters are noticed, they must be analysed, the reasons for the deviations are to be identified and suitable remedial measures are to be taken to correct the deviations and to put the project back on the right track. It must be noted that the three important factors over which control is exercised are time, resource and quality. (a detailed account of controlling project implementation is given in para 1.13).

Closing

Projects are temporary endeavors. Hence, they have a beginning and an end. A project comes to an end when the execution is completed and the project objectives are fulfilled. For every project there must be a formal process called ‘closing’ for declaring the closure of the project. This formal process of closing consists of the following sub-processes.

- Studying and ensuring that the project gives the planned output.
- Closure of contracts, settlement of amounts due to contractors and resolution of any outstanding issues with them.
- Administrative closure which includes passing of information about closure of the project to all the stake holders, employees, executives and to all others who are involved in the project.
- Reallocating men and available material resources, if any to other projects or departments as the case may be.

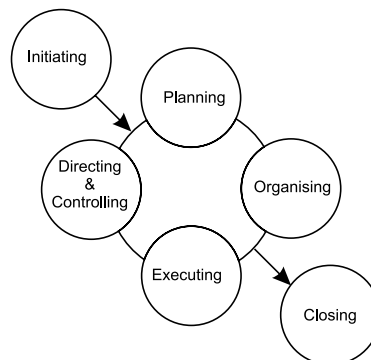


Fig. 1.7

It may be noted that part from initiating and closing that are the first and the last phases of projects, the intermediate four phases can form a cycle. At the execution phase, some difficulties or inconsistencies may be come across due to which certain activities of the project may be required to be replanned. Organising men and material resources may pose hurdles and this may necessitate modifications in the plans envisaged. Similarly, the directing & controlling phase may bring out some deviations from the plan and it may at times point towards revising the plans for correcting the deviations and bringing the project performance in tune with the original plan. (Refer Fig. 1.7)

1.7 INITIATING

The scope of initiating a project, which is the first step, is very wide. It involves identification and formulation of projects, appraisal of projects and getting formal approval from the competent

authority. A detailed account of project identification, project formulation, project cost estimation and project appraisal are discussed in the following pages.

1.7.1 Project Identification

Identifying a new worthwhile project is a complex problem. It involves careful study from many different angles. Following are some of the sources from which new project ideas may emerge.

Performance of Existing Industries

Performance of existing industries provide a good indication about the health of a particular industry. An analysis of the profitability and break-even point of different industries will offer adequate information about the financial health of different industrial sectors. Though these provide an overall picture of industrial health, one should not be simply carried away by the present performance alone. One should be shrewd enough to read the stage of business cycle in which the different industries stand at a particular time. For example, a particular industrial sector might be performing well, but it might have already crossed its saturation stage and might have already fallen into the decline stage of its business cycle. Entering into such an industry will prove to be disastrous. Similarly, the financial performance of another industrial sector that is not so encouraging might have the potential to grow rapidly, since the industry is only in the beginning stage of its business cycle. Such factors are to be carefully analysed before making a final choice.

Availability of Raw Materials

Easy availability of good quality raw materials at cheaper prices is a definite indication that some projects that can make use of those raw materials may be through of. For example in an area where agriculture is the predominant activity and where agricultural produces (like cereals, vegetables and fruits) are available in plenty, the potential can be made use of by setting up food processing industries. Availability of minerals may give lead to chemical industries.

Availability of Skilled Labour

Based on the locally available skilled labour force, suitable industries that can make better use of the skilled manpower can be identified.

Import/Export Statistics

Import/Export statistics may reveal the potential that remain untapped. Higher proportion of import of a particular product and increasing trend in its import indicates that a product, which can serve as an import substitute can be produced locally. Similarly, higher proportion of export of a particular product and increasing trend in its export indicates high export potential for the product.

Price Trend

The trend in the price of various products/services may give an indication about the demand-supply relationship. If the general price level is rising during the past few years and if the rise in price level of a particular product is steeper than the rise in general price level, it may indicate a demand-supply gap. Further detailed study may be undertaken to ascertain the extent of demand-supply gap.

Data from Various Sources

Various publications of Government, banks and financial institutions, consultancy organizations, manufacturer's associations, export promotion councils, research institutions and international

agencies contain data and statistic which may indicate prospective ventures. A study of the working results and balance sheets of existing companies will be useful in knowing the sectors of industry that are performing well. Study of profitability, break-even level, Earnings Per Share (EPS) of various industries may indicate those industries where opportunities exist for new investments.

Research Laboratories

Research laboratories that are engaged in identifying new products/processes often offer new avenues or commercial exploitation. However, proper care should be taken before attempting to go for large scale production of products that have been proved in the laboratory to ensure that conditions under which the products are developed in the laboratory can be simulated in the actual production line also. Failure to correctly simulate laboratory conditions may lead to failure when the product is produced in a large scale.

Consumption Abroad

Those entrepreneurs who are willing to take higher risks can identify projects for the manufacture of products or supply of services which are new to the country, but extensively used abroad. Thus, observing the consumption pattern abroad will help to identify projects with export potential.

Identifying Unfulfilled Psychological Needs

For well established, multi-brand product groups, there may be unsatisfied psychological needs, though the physical needs of the consumers might have been satisfied. Consumer goods like cosmetics, bathing soaps, toothpastes etc., come under this group. New products of this group being introduced and accepted by the consumers indicate the unfulfilled psychological needs of the consumers.

Plan Outlays and Government Guidelines

The Government plays an important role in the economy of a country. Government's plan of outlays in different sectors provide useful pointers towards possible investment opportunities. They indicate the potential demand for goods and services by the different sectors of the economy. The Department of Industrial Development, Government of India, publishes Guidelines to Industries annually which is a valuable source of information to identify the scope for new investments. This publication provides information about production performance of different sectors of industries, the licensed and installed capacity, scope for future exports, location and structure of industries etc.

Analysis of Economic and Social Trends

An analysis of the economic and social trends of the society will be very much helpful in identifying and projecting the demands for various goods and services. For example, the growing desire for leisure points to investment opportunity in recreational activities, rest-houses, resorts etc. The growing awareness of the value of time points to growing demands for fast-foods, high-speed vehicles, better mode of transport, ready-made garments etc.

Possibility of Reviving Sick Units

In any economy there are many industrial units that might have become sick, that are becoming sick, that are in the verge of death and that are weak. An industry that has become weak/sick might still have the capacity to become a financially viable proposition provided the reason for the weakness/

sickness are purely due to factors that are internal to the organization. A promising entrepreneur who has the required entrepreneurial skills can take over a weak/sick unit, revive it and make it to turn around. Infusion of further capital, provision of complementary inputs, revamping the organizational structure etc., are some of the corrective measures that need to be done to nurse an ailing industrial unit and to bring it back to life.

1.7.2 Project Preparation (or Project Formulation)

After having identified a project that prima-facie appears to be a worthwhile project, the project promoter has to further analyse the project to ensure that it has the potential and the investment on it would not go waste, but would yield attractive returns.

Project preparation consists of four stages viz.,

- (a) Pre-feasibility study
- (b) Functional studies (or support studies)
- (c) Feasibility study
- (d) Detailed project analysis (leading to the preparation of Detailed Project Report)

Pre-feasibility Study

A pre-feasibility study has the following main objectives.

- (a) To determine whether the project offers a promising investment opportunity.
- (b) To determine whether there are any aspects of the project that are critical requiring in-depth investigation by way of market surveys, laboratory test, pilot plant test etc.

The preliminary feasibility study should examine.

- (a) The market potential for the selected product/service, the competitors in the field and their market share, the market forecast, the trading practices in the industry in terms of pricing, Credit, Distribution, Government controls etc.,
- (b) The technologies available and the technology suitable for the project, the manufacturing facilities required in terms of plant and machinery.
- (c) The availability, cost and sources of raw materials.
- (d) The plant location.
- (e) The plant capacity.
- (f) The manpower requirement in terms of labour, staff and management personnel, their availability and costs
- (g) The investment required, the return on investment expected, the means of financing the project, the cost of production and commercial profitability.

Pre-feasibility study usually arrives at major parameters like location of project, production capacity, raw material and other inputs etc. It also provides rough estimates of project cost, means of financing, cost of production, sales revenue, financial profitability, social benefits etc. If the pre-feasibility study indicates that the project is a worthwhile proposition, a feasibility study is taken up. If the pre-feasibility indicates certain areas of project that need a detailed study, such studies are taken up before taking up feasibility study. Such studies are also known as support studies or functional studies.

Support Studies (functional studies)

Support studies may be conducted in any of the following areas.

- Market study
- Raw material/input study
- Project location study
- Plant size study
- Equipment selection study etc.

Pre-feasibility study might arrive at a conclusion that the success of the venture depends upon successfully marketing the product in view of the stiff competition prevailing. In such a case, the need for a detailed market study arises. If the detailed market study reveals that marketing the proposed product successfully would be a difficult proposition, there is no point in taking up feasibility study and the project can be better shelved.

The need for a raw material study might arise when there are many different raw materials available for producing the same product and whose cost of procurement, cost of transportation, continuous availability, quality etc., vary widely.

Project location study might look into aspects like nearness of raw material source, nearness of market for the finished product, cost of transportation of raw material/finished product, nearness to air ports/sea ports, availability of labour etc.

Plant size study is undertaken when there are several technologies available, each with a different economic plant size. The study should also take into account the cost of production with each technology, the extent of market that is available for the finished product etc.

Equipment selection study is undertaken when the sources of supply of equipments and the costs vary very much. The capital cost of the equipments, the operational cost, the after-sales support, the operational efficiency of the plant etc., are some of the factors that are studied under equipment selection study.

Note :

[Support studies can also be undertaken even before the pre-feasibility study when a basic input is a decisive factor in deciding the viability of a project. Support studies can also be done simultaneously with a pre-feasibility study or a feasibility study. When a feasibility study finds out the necessity of a more detailed analysis of certain aspects of the project, a support study for the same way be undertaken.]

Feasibility Study

Before making a final decision to take up a project, the technical, economic, commercial and financial justification of the chosen project shall be ascertained in concrete terms. Feasibility study is also known by the term 'techno-economic feasibility study'.

Technical feasibility : It is normally seen that while most of the projects get a fine screening on their financial prospects, the technical feasibility does not get the required attention. For projects concerning manufacturing activities, the technology proposed to be adapted needs careful consideration. In this connection, the technical feasibility can be evaluated by answering the following questions.

- (a) Is the technology proposed to be adapted, the latest one?
- (b) What is the likelihood of the proposed technology becoming obsolete in the near future?
- (c) Is the technology proposed to be adapted, a proven technology?
- (d) Is the technology proposed to be adapted available indigenously ?
- (e) In case of imported technology, is the technology available freely?

In simple terms, Technical feasibility study aims to analyze whether the technology proposed to be adapted is capable of producing the intended goods/services to the requirement and specifications and to the complete satisfaction of the consumers without becoming obsolete in the near future and at the same time proving to be cost effective in the long run.

Economic viability : In simple terms, economy viability is a cursory examination as to whether the investment made on the project will give a satisfactory return to the economy. The major aspects to be looked into are as to whether the project will make better use of available raw material, whether the project will reduce/eliminate the use of some scarce/valuable resources, whether the community as a whole will stand to gain as a result of the project etc.

Commercial feasibility : Before embarking upon any product/service, the scope for successfully marketing the product/service shall be carefully and accurately assessed. If the product/service proposed is new to the industry, conducting a systematic market survey is a pre-requisite for assessing the probable estimates of likely sales. The likely sales estimated shall be well above the proposed plant capacity in order to overcome pitfalls if any that may remain unnoticed in the estimates made. If the product proposed to be manufactured is one that is already being manufactured by many others, the competitive edge that can be gained in terms of quality, price and consumer acceptability etc, needs to be studied.

Financial feasibility : The financial feasibility examines the workability of project proposal in respect of raising finance to meet the investment required for the project, be it equity, (by way of public issue of shares or by other means) or debt, (by way of term loans from financial institutions or by other means). This apart, the financial feasibility also consists of calculations of cost of debt, cost of procuring capital, cost of servicing the debt and equity and anticipated profits to checkup whether the financial benefits expected are in excess of the financial costs involved.

Detailed Project Report (DPR)

The DPR will contain almost the same information contained in the feasibility study (or techno-economic feasibility report), but in a more detailed format. The main idea of preparation of the DPR is to formally communicate the project promoter's decision of venturing a new project to financial institutions (from where financial assistance is sought for funding the project) for their perusal and to Government departments for getting their approvals.

The main sub divisions of a DPR are the following :

1. General information about the project
2. Background and experience of the project promoters
3. Details and working results of industrial concerns already owned/promoted by the project promoters
4. Details of the proposed project
 - plant capacity
 - manufacturing process

- technical known-how/tie-up
 - management team for the project
 - details of land, building and plant and machinery
 - details of infrastructural facilities (such as power, water, transport facilities)
 - raw material requirement/availability
 - effluents produced by the project/effluent treatment arrangements
 - labour requirements/availability
5. Schedule of implementation of the project
 6. Project cost
 7. Means of financing the project
 8. Working capital requirement/arrangements made
 9. Marketing and selling arrangements
 10. Profitability and cash-flow estimates
 11. Mode of repayment of term loan
 12. Government approvals, local body consents and other statutory permissions
 13. Details of collateral security that can be offered to the financial institution.

TAX INCENTIVES AND PROJECT INVESTMENT DECISIONS

Classical economists were generally of the view that the State should not intervene through its instruments of economic policy to influence the level of investment in the economic system. Till the 1920's, taxes were considered by the States only as resources to maintain internal law and order and to overcome external threats. The Great Depression that swept through the world during the 1930's brought about a radical change in the economic thinking. Lord Keneyes, the proponent of monetary economics observed in his famous work "General theory of employment" as under:

....For my own part, I am now somewhat skeptical of the success of a merely monetary policy directed towards influencing the rate of interest. I expect to see the State which is in a position to calculate the marginal efficiency of capital goods on the basis of general social advantage, taking an ever-greater responsibility for directly organizing investment; since it seems likely that the fluctuations in the market estimation of the marginal efficiency of different types of capital, calculated on the principles I have described above, will be too great to be offset by any practicable changes in the rate of interest....

During the course of time, tax became an effective weapon in the hands of the States of socialistic economies to induce and direct investments. Even in the capitalistic economies, the States started using tax as an instrument for inducing and regulating investments through various tax incentive and tax control measures. For inducing investments, incentives are offered by the States and these incentives for investment stem forth from the following policies of the state:

- Fiscal policy
- Monetary policy
- Commercial policy

Fiscal Policy

Fiscal policy is an important instrument to overcome recession and to control inflation in the economy. In India, fiscal policy of the Government are announced through Budgets. Budget

proposals are eventually enacted as statutes by the parliament and periodical amendments are made thereof. (example: Income tax Act)

Examples of incentives that result due to fiscal policy are as under:

- Depreciation
- Tax holiday
- Investment allowance
- Amortisation of preliminary expenses

Monetary Policy

Monetary policy is concerned with changing the supply of money stock and the rate of interest, for the purpose of stabilizing the economy at full potential output level. At times of recession, monetary policy is used to increase the money supply and reduce the interest rate in order to stimulate aggregate demand in the economy. At times of inflation, monetary policy is used to reduce the aggregate spending by reducing the money supply and raising the interest rate. Interest rate and lending policy are announced by the Central Bank of the country (in India, the Reserve Bank of India).

Examples of incentives that result due to monetary policy are as under:

- Interest rate concession
- Repayment moratorium
- Participation in risk capital
- Reduced security margin
- Refinancing facilities

Commercial Policy

Central Govt. announces major commercial policies. (example: Industrial Policy) These apart, Central and State Governments announce selective, adhoc policies.

Examples of incentives that result due to commercial policy are as under:

- Octroi exemptions
- Subsidised rate for electric power consumed by industries
- Capital investment subsidy
- Sale tax incentives for new industries

TAX PLANNING FOR PROJECT INVESTMENT DECISIONS

The ultimate test of business effectiveness and efficiency is the ratio of resources used to the results obtained, i.e., the ratio of after-tax profits to the share holders' equity.

The following aspects need consideration with regard to tax planning for new investment decisions:

The Income Tax Act

The Income Tax Act, 1922, 1961 and the periodical amendments thereof attempt to serve the objectives of the Government by way of giving preferential treatment to selected sectors of the economy, in tune with the economic policy of the Government.

The prevailing income tax structure is as under:

Firms : A firm assessed as such is taxable at the rate of 35% for the assessment years 2005-06. Apart from this, surcharge at the rate of 10% of the income tax is also payable.

Comapnies : The following rates of income tax are applicable for the assessment year 2005-2006. (refer table 1.1)

Table 1.1

<i>Company</i>	<i>Rates of Income tax</i>
In the case of domestic company	35%
In the case of foreign company:	
(a) Royalty received from Government or an Indian concern in pursuance of an agreement made by it with the Indian concern after 31/03/1961 but before 01/04/1976, or fees for rendering technical services in pursuance of an agreement made by it after 29/02/1964, but before 01/04/1976 and where such agreement has, in either case, been approved by the Central Government.	50%
(b) Other incomes	40%

Co-operative societies : The following rate are applicable for co-operative societies for the assessment year 2005-2006. (Refer table 1.2).

Table 1.2

<i>Net income range</i>	<i>Rates of income tax</i>
Up to Rs. 10,000	10%
Rs. 10,001 to Rs. 20,000	Rs. 1,000/- + 20% for the amount is excess of Rs. 10,000/-
Above Rs. 20,000	Rs. 3,000/- + 30% for the amount is excess of Rs. 20,000/-.

In the following pages we will go through some of imporant sections of the Income Tax Act that affect investment decisions:

Section 10A : A deduction of such profits and gains as are derived by an undertaking from the export of articles or things or computer software for a period of ten consecutive assessment years beginning with the assessment year relevant to the previous year in which the undertaking begins to manufacture or produce such articles or things or computer softward, as the case may be, shall be allowed from the total income of the assessee.

No deduction under section 10A shall be available from the assessment year 2010-11 onwards.

The undertaking must have begun to manufacture or produce articles or things or computer softward during the previous year relevant to the assessment year

(a) commencing on or after 01/04/1981, in any free trade zone

(b) commencing on or after 01/04/1984, in any electronic hardware technology park, or, as the case may be, software technology park

(c) commencing on or after 01/04/2001 in any special economic zone

The benefit shall not be available when the undertaking is formed by splitting up, or reconstruction of a business already in existence, or by transfer to a new business of machinery or plant already used for any purpose.

Section 10B : Provisions similar to provisions in section 10A are available in section 10B in respect of deduction of such profits and gains as are derived by a 100% export oriented undertaking from the export of articles or things or computer software.

Section 30 : In respect of premises taken on rent, the actual rent paid by the assessee and, if he has taken to bear the cost of repairs, the expenditure on repairs are permissible deductions against profits and gains of business. In respect of premises owned by the assessee, no deduction is allowable on account of notional rent; amount spent on current repairs is, however, allowed as deduction.

Section 31 : The expenditure incurred current repairs in respect of the plant, machinery and furniture used for business purposes is allowable as deduction under this section. If however, expenditure is incurred to bring into existence an advantage of an enduring nature, or a new capital asset, it can not be regarded as an expenditure on current repairs. Similarly, the premium paid in respect of insurance against risk of damage or destruction of such assets is an allowable deduction.

Section 32 : This section deals with allowance for depreciation.

From the assessment year 1988-89, depreciation is admissible on the basis of block of assets. To ascertain the amount of depreciation, one should find out the following :

(a) Written down value of block of assets

(b) Rate of depreciation

No depreciation is admissible where the written down value has been reduced to zero, though the term 'Block of assets' has been defined by section 2(11) to mean a group of assets falling within a class of assets, comprising (a) tangible assets, being buildings, machinery, plant or furniture and (b) intangible assets, being known-how, patents, copyrights, trade marks, licences, franchises or any other business or commercial rights of similar nature.

Refer table 1.3 for the block of assets and the applicable Rates of depreciation.

Table 1.3

Number	Nature of Asset	Rate of Depreciation
Block-1	Buildings: Residential buildings other than those covered under Block-3	5%
Block-2	Buildings: Office, factory, godowns or buildings which are mainly used for residential purposes and which are other than those covered under Block-3	10%
Block-3	Buildings : (a) used as hotels (b) dwelling units each with plinth area not exceeding 80 square metres	20%

Cont.

Table 1.3

<i>Number</i>	<i>Nature of Asset</i>	<i>Rate of Depreciation</i>
Block-4	Buildings: New buildings (Other than those covered under Block-3 with dwelling units each with plinth area not exceeding 80 square metres acquired after 31/03/1999 but before 01/04/2002	40%
Block-5	Buildings: Temporary erections such as wooden structures	100%
Block-6	Furniture: Any furniture/fittings not covered by Block-7	10%
Block-7	Furniture: Furniture and fittings used in hotels, restaurants and boarding houses, schools, colleges and other educational institutions, libraries, welfare centers, meeting halls, cinema houses/theatres and circuses and furnitures and fitting let out on hire for use on the occasion of marriages and similar functions.	15%
Block-8	Plant and machinery: Any plant and machinery not covered by Block 9, 10, 11, 12, 13 or 14.	25%
Block-9	Plant and machinery : (a) motor cars other than those used in a business of running them on hire, acquired or put to use on or after 01/04/1990. (b) Ocean-going ships including dredgers, tugs, barges, survey launches and other similar ships used mainly for dredging purposes and fishing vessels with wooden hull. (c) Vessels ordinarily operating on inland waters being speed boats	20%
Block-10	Plant and machinery: Buses, lorries and taxies used in the business of running them on hire, aeroplanes and machinery used in semi conductor industry and plant or machinery which satisfies conditions of rule 5 (2). Further, it includes commercial vehicle acquired after 30/09/1998, but before 01/04/1999.	40%
Block-11	Plant and machinery: Containers made of glass or plastic used as refills (applicable from assessment year 1997-98)	50%
Block-12	Plant and machinery: Computers (application from the assessment year 1999-2000) and commercial vehicle acquired in replacement of condemned vehicle of 15 years of age which is put to use before 01/04/1999 (if acquired during 01/10/ 1998 and 31/03/1999) or before 01/04/2000 (if acquired during 1999-2000)	60%
Block-13	Plant and machinery: Air pollution control equipments, water pollution control equipments, energy saving devices, renewal energy devices, solid waste control equipments, recycling and resource recovery systems, wooden parts used in artificial silk manufacturing machinery, cinematograph films, bulbs of studio lights, rollers in flour mills, sugar works and steel industry, gas cylinders, wooden match frames, plant used in field operations by mineral oil concerns, some plants used in mines, quarries and salt works, direct fire glass melting furnaces and books owned by assesses carrying on a profession or carrying on business in running lending libraries.	100%

Cont.

Table 1.3

<i>Number</i>	<i>Nature of Asset</i>	<i>Rate of Depreciation</i>
Block-14	Plant and machinery: Ships being vessels ordinarily operating on inland waters other than speed boats.	10%
Block-15	“Know-how”: Know-how acquired after 31/03/1998. [Know-how means any industrial information or technique likely to assist in the manufacture or processing of goods or in the working of a mine, oil-well or other sources of mineral deposits (including searching for discovery or testing of deposits for the winning of access thereto)	25%
Block-16	Patnets: Patents acquired after 31/03/1998	25%
Block-17	Copyrights: Copyrights acquired after 31/03/1998	25%
Block-18	Trade marks: Trade marks acquired after 31/03/1998	25%
Block-19	Licences: Licences acquired after 31/03/1998	25%
Block-20	Franchises: Franchises acquired after 31/03/1998	25%
Block-21	Other rights: Any other business or commercial rights of similar nature acquired after 31/03/1998	25%

Set Off and Carry Forward of Unabsorbed Depreciation

From the assessment year 1997-98 depreciation allowance will be set off and carried forward as follows:

- (a) If in the assessment of the assessee full effect can not be given to depreciation allowance (including accumulated depreciation allowance) owing to profits or gains being less than the allowance or there being no chargeable profit or gain for that previous year, then that unabsorbed depreciation shall be set off against the profits and gains (if any) of any business or profession carried on by him.
- (b) If the unabsorbed depreciation allowance can not be wholly set off under (a) above, the amount not so set off shall be set off against any other income of the taxpayer for the same year.
- (c) If the unabsorbed depreciation can not wholly set off, the amount not so set off shall be carried forward to the following assessment year and it shall be set off against the profits and gains of any business or profession carried on by him.
- (d) The unabsorbed depreciation can be carried forward for 8 assessment years. The time limit of 8 assessment years shall not apply in the case of a company for the assessment year beginning with the assessment year relevant to the previous year in which the said company has become a sick industrial company under section 17(1) of the Sick Industrial Company (Special provisions) Act, 1985 and ending with the assessment year relevant to the previous year in which the entire net-worth (i.e., paid-up, capital plus free reserves) of such company becomes equal to or exceeds the accumulated losses. “Free reserves” for this purpose means all reserves credited out of the profits and share premium account but does not include reserves credited out of revaluation of assets, write back of depreciation provisions and amalgamation.
- (e) Carry forward of unabsorbed depreciation is possible only if the business or profession for which the allowance was originally computed is continued to be carried on by him in the previous year relevant for the assessment year in which he wants to set off the unabsorbed depreciation.

Section 35D : This section deals with amortisation of preliminary expenses. Certain preliminary expenses [Section 35D(2)] incurred after 31/03/1970 by an Indian Company or a resident non-corporate assessee before the commencement of business or after the commencement of business in connection with the extension of an industrial undertaking or setting up of a new industrial unit, qualify for amortisation. The aggregate amount of the expenditure can not exceed 5% of the cost of the project [as defined under section 35D(3)]. While the ceiling limit of 5% of the cost of the project applies to all assesses, an Indian company is given an option to elect an alternative limit of 5% of the capital employed [as defined under section 35D(3)]. One fifth of the qualifying expenditure is allowable as deduction in each of the five successive years beginning with the year in which the business commences or, as the case may be, the previous year in which extension of the industrial undertaking is completed or the new industrial unit commences production or operation.

Section 35-D2: Expenditures that can be considered as preliminary expenses are as under:

- (a) expenditure in connection with
 - (i) preparation of feasibility report
 - (ii) preparation of project report
 - (iii) conducting market survey or any other survey necessary for the business of the assessee
 - (iv) engineering services relating to the business of the assessee;
 Provided the above works are carried out by the assessee himself or by a concern which is for the time being approved in this behalf by the Board.
- (b) legal charges for drafting any agreement between the assessee and any other person for any purpose relating to the setting up or conduct of the business of the assessee.
- (c) where the assessee is a company, also expenditure—
 - (i) by way of legal charges for drafting the memorandum and Articles of Association of the company
 - (ii) on printing the Memorandum and Articles of Association
 - (iii) by way of fees for registering the company under the provisions of the Companies Act, 1956
 - (iv) in connection with the issue, for public subscription, of shares in or debentures of the company, being underwriting commission, brokerage and charges for drafting, typing, printing and advertisement of the prospectus;
- (d) such other items of expenditure (not being expenditure eligible for any allowance or deduction under any other provision of the Act) as may be prescribed.

Section 35-D3: the term ‘Cost of the project’ includes;

- (a) When the assessee incurs the expenditure before the commencement of his business: “the actual cost of the fixed assets, being land, Buildings, leaseholds, plant, machinery, furniture, fittings and railway sidings (including expenditure on development of land and buildings), which are shown in the books of the assessee as on the last day of the previous year in which the business of the assessee commences.
- (b) Where the assessee incurs the expenditure after the commencement of his business, in connection with the extension of his industrial undertaking or in connection with his setting up of a new industrial unit: “the actual cost of the fixed assets, being land, buildings, leaseholds, plant, machinery, furniture, fittings and railway sidings (including expenditure on development

of land and buildings), which are shown in the books of the assessee as on the last day of the previous year in which the extension of the industrial undertaking is completed or, as the case may be, the new industrial unit commences production or operation, in so far as such fixed assets have been acquired or developed in connection with the extension of the industrial undertaking or setting up of the new industrial unit of the assessee.

The term “Capital employed” means:

- (a) When the assessee incurs the expenditure before the commencement of his business: “the aggregate of the issued share capital, debentures and long term borrowings as on the last day of the previous year in which the business of the company commences”.
- (b) Where the assessee incurs the expenditure after the commencement of his business, in connection with the extension of his industrial undertaking or in connection with his setting up of a new industrial unit.

“...the aggregate of the issued share capital, debentures and long term borrowings as on the last day of the previous year in which the extension of the industrial undertaking is completed or, as the case may be, the new industrial unit commences production or operation, in so far as such capital, debentures and long term borrowings have been issued or obtained in connection with the extension of the industrial undertaking or the setting up of the new industrial unit of the company.

Section 80-IA : The section provides deductions in respect of profits and gainss from industrial undertaking or enterprises engaged in infrastructure development, telecommunication services, industrial parks and power generation, transmission and distribution.

An undertaking providing infrastructure facility must carry on business of

- 1. developling or
- 2. maintaining and operating or
- 3. developing, maintaining and operating any infrastructure facility.

Infrastructure facility means

- (a) a road,bridge, airport, port, inland water ways and inland ports, rail system or any other public facility of a similar nature as may be notified by the board in this behalf in the Official Gazette.
- (b) A highway project including housing or other activities being an integral part of the highway project and
- (c) A water supply project, irrigation project, sanitation and sewerage system.

For undertakings engaged in providing infrastructure facility, subject to other conditions as specified in the Act, 100% of the profit is deductible for the first five years and 30% for the next five years.

An undertaking engaged in providing telecommunication services should have started providing telecommunication services whether basic or cellular, radio paging and domestic satellite service or network of trunking and electronic data interchange service at any time after 31/03/1995, but before 31/03/2000. The deduction of profits available for such undertakings is as under: (Table 1.4)

Table 1.4

<i>Assessee-enterprises</i>	<i>% of profit deductible</i>	<i>Period of deduction commencing from the initial assessment year</i>
Owned by a Company	100%	First 5 years
Owned by a Company	30%	Next 5 years
Owned by any other person	100%	First 5 years
Owned by any other person	25%	Next 5 years

An undertaking that develops and operates industrial parks must satisfy the following conditions:

- (a) It develops and operates or maintains and operates an industrial park notified for this purpose in accordance with any scheme framed and notified by the Central Government.
- (b) The industrial park must start operation during 01/04/1997 and 13/03/2002

The deduction of profits available for such undertakings is similar to the provisions as applicable for undertakings engaged in providing telecommunication services. (Table 1.4)

In respect of power generation/distribution, a new unit must be set up in any part of India for the generation or generation and distribution of power and it begins the operation at any time during 01/04/1993 and 31/03/2003. Alternately, it starts transmission or distribution by laying a network of new transmission or distribution lines at any time between 01/04/1999 and 31/03/2003. Deduction under this section is not available if the undertaking is formed by transfer of machinery or plant previously used for any purpose.

The deduction of profits available for such undertakings is also similar to the provisions as applicable for undertakings engaged in providing telecommunication serviced. (Table 1.4). However, the eligible profit is to be arrived at as under:

<i>Activity</i>	<i>Profit available for deduction</i>
Only power generation	Profit from generation of power
Generation and distribution	Profit from generation and distribution of power
Laying a network of new transmission	Profit derived from laying of such network of new lines for transmission or distribution
Or distribution lines for starting transmission	
Distribution of power	

Section 80-IB : Section 80-IB provides tax concessions to certain industrial undertakings other than infrastructure development undertakings. Deduction under this section is available for the following:

- (a) Business of an industrial undertaking. (b) Operation of ship. (c) Hotels. (d) Industrial research. (e) Production of mineral oil and (f) developing and building house projects.

Refer table below (Table 1.5) for the details of deduction in profits allowed.

Income Tax Relief to Exporters and Foreign Exchange Earners

Section 80HHB: To encourage project exports, section 80HHB provides tax relief to an Indian company or resident tax payer as below :

Table 1.5

	<i>Small Scale Industrial Undertaking</i>	<i>Industrial under taking (including cold storage) set up in an industrial backward Stage (eight schedule)</i>	<i>Industrial under taking (including cold storage) set up in Category "A" Notified backward district</i>	<i>Industrial under taking (including cold storage) set up in Category "B" notified backward district</i>	<i>Cold chain facility for agricultural produce</i>
Nature of article to be produced	Any	Any	Other than those given in Eleventh Schedule	Other than those given in Eleventh Schedule	Cold chain facility for agricultural produce
Time limit for commencement of production or operation	Between 01/04/1991 and 31/03/2000		Between 01/10/1994 and 31/03/2000	Between 01/10/1994 and 31/03/2000	Between 01/04/1999 and 31/03/2003
Amount of deduction					
(a) Owned by a company	30% for the first 10 years next 5 years	100% for the first 5 years and 30% for the next 5 years	100% for the first 5 years and 30% for the next 5 years	100% for the first 3 years and 30% for the next 5 years	30% for the first 10 years
(b) Owned by a co-operative society	25% for the first 12 years next 7 years	100% for the first 5 years and 25% for the next 7 years	100% for the first 5 years and 25% for the next 9 years	100% for the first 3 years and 25% for the next 5 years	25% for the first 12 years
(c) Owned by any other person	25% for the first 10 years next 5 years	100% for the first 5 years and 25% for the next 5 years	100% for the first 5 years and 25% for the next 5 years	100% for the first 3 years and 25% for the next 5 years	25% for the first 10 years

Deduction from profits of an amount equal to 50% thereof in computing the total income of the assessee is allowed. The profits and gains must have been derived from the business of

- The execution of a foreign project undertaken by the assessee in pursuance of a contract entered into by him
- The execution of any work undertaken by him and forming part of a project undertaken by any other person in pursuance of a contract entered into by such other person with the Government of a foreign state or any statutory or other public authority of agency in a foreign state or a foreign enterprise.

Section 80HHC : Under the provisions of section 80HHC, of the Income Tax Act, 100% deduction is allowed in respect of profits derived from export of goods or merchandise outside India, except mineral oil, minerals and ores and services. As a measure to provide incentive to supporting manufacturers/processors who sell goods to an Export House/Trading House for export, the benefit of deduction under section 80HHC was extended with effect 01/04/1989 to manufacturers and with effect from assessment year 1991-92 to processors.

Section 80RRA : Any remuneration received in foreign currency from any employer or for any service rendered outside India is entitled to a rebate of 75% on such remuneration as is brought into India in convertible foreign exchange with a period of six months from the end of the previous year.

Section 115J: This section deals with what is known as 'Minimum Alternate Tax'. According to this section, notwithstanding anything contained in any other provision of the Income Tax Act, where in the case of an assessee being a company [other than a company engaged in the business of generation or distribution of electricity], the total income as computed under the Act in respect of any previous year relevant to the assessment year commencing on or after 01/04/1998 (but before 01/04/1991), is less than 30% of its book profit, the total income of such assessee chargeable to tax for the relevant previous year shall be deemed to be an amount equal to 30% of such book profit. This minimum tax of 30% of book profit is known as 'Minimum Alternate Tax' (MAT). Non-corporate exporters, i.e., proprietary and partnership firms have not to pay MAT.

Some of the other sections of the income tax act that are relevant as under:

- **Section 33AC:** deals with deductions available to an Indian Public Limited Company engaged in the business of operation of ship.
- **Section 35:** deals with deductions available for expenditure on scientific research.
- **Section 35-A:** deals with deductions available for expenditure on acquisition of patent rights and copy rights.
- **Section 36(1)III:** Interest paid on capital borrowed for the purposes of business or profession is allowed as deduction.

Zero Based Project Formulation

An entrepreneur who finds bright prospects for a particular project, goes further into the details about the project formulation in order to study its viability aspects. Any project has many intricacies that are to be carefully assessed for arriving at the formulation that offers the best alternative. There is an inherent instinct in the minds of many project promoters to visualize the project from a particular bench mark. For example, an entrepreneur who finds bright prospects for say 'plastic moulded chairs and furnitures' will start visualizing the capital investment required for the project in terms of cost of land, cost of construction of building, cost of plant and machinery etc., In doing so,

he takes it for granted that the elements of the project cost (viz., land, building, plant and machinery, etc.) are essentially required for the project and he proceeds with further estimates and projections based on this assumption. A logical and rational project formulation is possible if the project promoter poses the question “Is it necessary”? to every component of the project cost. This may reveal an entirely different aspect of the project. Thus, the thinking in the minds of the project promoter should start from zero base in order not to err on project formulation.

Why to Invest in Fixed Assets at All?

When we say that the project promoter should ask the question “Is it necessary”? for all the components of the project cost, the same logic is also applicable for the project cost as a whole. Thus, the very first question to be posed is—“Is it worth investing in fixed assets for the creation of manufacturing facilities”? The product proposed to be manufactured may be such that there are already many manufacturers in the field and mere trading may work out to be a more profitable venture as compared to setting up a new plant by investing in fixed assets. In such a case, the project reduces to entering into tie-up with existing manufacturers for dealership/distributorship, arranging for godown for stocking the goods, arranging fleet of vehicles for procurement and delivery of goods etc. Such a venture may be a proposition with better return and lesser investment as compared to setting up the required manufacturing facility with heavy investment and not so attractive return.

Consideration of Investment on Components of Project Cost

When it is conceived that going for own production will offer a better return and competitive edge and will prove to be advantageous in the long run, the next step to be analysed is as to what are all the investments that are absolutely essential and what can be avoided/deferred. Investment in building is a major component of the project cost in many projects. It is to be studied as to whether construction of building is absolutely necessary. If the manufacturing facilities can be housed in a leasehold building, the chances of getting a suitable building on lease and its effect on project profitability vis-a-vis the project profitability considering investment on building need to be studied before taking a decision to go for investment on building. If the project needs a building of unique nature and getting such a suitable building on lease is not possible, the investment on building can be accepted and further considerations as to the nature of construction, area of construction etc., are to be studied with a view to bringing down the cost of construction to the minimum, without compromising on the functional requirements that are to be satisfied by the building.

Coming to the investment on plant and machinery, there are many aspects that need consideration. The cost of plant and machinery should be studied with reference to the available brands/models/specifications and those that are best suited for the project are to be chosen. A high precision, high cost machinery may not always be the one that is desirable for the project. The precision level required of the machine may be below that of the best available machine in the market, but still it may serve the purpose well. Such situations will lead to choosing machines of moderate cost with moderate precision level. Another aspect that needs consideration is the capacity utilization of the plant and machinery. The type and nature of plant and machinery chosen should be such that all the plant and machinery are utilized to their fullest capacity by the project. If any machine lies idle, it indicates inefficient planning and investment on plant and machinery.

Some machines may come with a certain minimum capacity. If the minimum capacity available for a particular machine is more than what is needed for the project, such machine, if included in the

project, will remain mostly idle. The chances of getting such machining works done through job-order basis from other industrial units (i.e., sub-contracting) may be studied so that investment on such a machine can be avoided, which will improve the profitability of the project. Apart from studying the option of sub-contracting for those machines that will not be put into optimum use, the scope for sub-contracting other works also wherever it works out profitable is to be examined. For example, the cost of a particular machine might have increased heavily in the recent past and those industrial units that had acquired similar machines in the past could be in a position to undertake job-works at cheaper rates or could hire out such machines at cheaper rents in view of their comparatively lower capital investment. Thus, the pros and cons of new investment on plant and machinery vis-a-vis opting for sub-contracting is to be studied before arriving at the investment pattern on plant and machinery.

In respect of electricals, the investment of captive power plants (i.e., power generators) deserves major consideration. It is not always found necessary to have a captive power generator of capacity equal to the total connected power load. Some of the equipments need not be always in operation and power requirement for such equipments can be deducted while arriving at the capacity of power generator required. Careful analysis is required regarding the production processes, the power requirement of each process and the processes that can be stopped with out affecting the out put of the plant etc., in order to arrive at the capacity of captive power generator.

Thus, each element of the fixed cost requires an unbiased, rational study with out any pre-conceptions in order to arrive at a decision as to their necessity for inclusion in the project or otherwise and a project formulated with such an analysis will, in all probability, prove to be a successful venture since unwated costs are avoided.

1.7.3 Project Appraisal

Project appraisal is a process of detailed examination of several aspects of a given project before recommending the same. The institution that is going to fund the project has to satisfy itself before providing financial assistance for the project. The lending institution has to ensure that the investment on the proposed project will generate sufficient returns on the investments made and that loan amount disbursed for the implementation of the project will be recovered along with interest within a reasonable period of time. The concept of security oriented lending has given way for the introduction of purpose oriented lending. Purpose oriented lending can be successful only if a detailed appraisal of the project is done before committing funds on the project. The various aspects of project appraisal are explained in this chapter.

(a) Technical Appraisal

Technical appraisal broadly involves a critical study of the following aspects, viz.,

1. Selection of process/technology
2. Scale of operations
3. Raw material
4. Technical know-how
5. Collaboration agreements
6. Product mix
7. Selection and procurement of plant and machinery
8. Plant layout

9. Location of the project
10. Project scheduling and implementation.

Selection of Process/Technology

For manufacturing a product, more than one process/technology may be available. For example, steel can be manufactured either by the Bessemer process or by the open-hearth process. Cement can be manufactured either by the wet process or by the dry process.

The choice of technology also depends upon the quality and quantity of the product proposed to be manufactured. If the quantity required to be produced is large, mass production techniques should be followed and the relevant technology is to be adopted. The quality of the product depends upon the use to which it is meant for. A product of pharmaceutical grade or laboratory grade should have high quality and hence sophisticated production technology is required to achieve the desired quality. Products of commercial grade do not need such high quality and the technology can be chosen accordingly. There is no point in choosing a sophisticated technology meant for getting high quality products, where the product is meant for commercial use for which high quality is not required. Such unwarranted emphasis on quality will only land the project in trouble since the consumers will not be ready to pay higher price merely for the sake of high quality which they do not really need.

In the choice of technology, as far as possible, the latest technology should be chosen provided there are no other constraints. However, in choosing the latest technology it must be seen that the technology has been proved successful for large-scale production at factory level. Relying only on the technology proven in the laboratory is to be avoided.

A new technology that is protected by patent rights etc., can be obtained either by licensing arrangement or the technology can be purchased outright. Under licensing arrangement, the right to use the patented technology and to get the related technical know-how are mutually agreed upon between the licensor and the licensee. Getting a technology under licensing arrangement is suited when the cost of purchasing the technology outright is huge/when there is a rapid technological advancement in the field with the result that is every possibility of the technology becoming outdated shortly.

Technology can be purchased outright if the cost of acquisition is affordable, if there is no likelihood of significant improvement in technology in the foreseeable future and if the technology can be implemented and maintained without the need for continuous support from the seller of the technology.

Appropriate technology: A technology appropriate for one country may not be the ideal one for another country. Even within a country, depending upon the location of the project and other features, two different technologies may be ideal for two similar projects set up by two different firms at two different locations. The choice of a suitable technology for a project calls for identifying what is called the 'appropriate technology'.

The term 'appropriate technology' refers to that technology that is suitable for the local economic, social and cultural conditions. Appropriate technology can be identified by asking the following questions.

- Does the technology make use of the locally available raw material ?
- Can the technology be implemented and maintained by the locally available manpower ?
- Is the technology in tune with the local social and cultural conditions ?
- Does the technology protect ecological balance etc. ?

For example, textile yarn spinning frames manufactured in Europe were designed in such a way that the manual labour requirement to operate the machine is kept at the minimum while the electric power consumption by the machine is allowed to stand at a higher level. This technology is suited for European conditions where the cost of electric power is comparatively cheaper while getting manual labour is comparatively costlier. Indian conditions demand an opposite proposition since manual labour can be procured at a comparatively cheaper cost while the cost of electric power is comparatively higher. Hence, the choice of appropriate technology should be dealt with adequate care.

Scale of operations

Scale of operations is signified by the size of the plant. The plant size mainly depends on the market for the output of the project. Economic size of the plant varies from project to project. Economic size of the plant for a given project can be arrived at by an analysis of capital and operating costs as a function of the plant size. Though the economic size of the plant for a given project can be theoretically arrived at by the above process, the final decision on the plant size is circumscribed by a number of factors, the main factor being the promoter's ability to raise the funds required to implement the project. If the funds required to implement the project at its economic size is beyond the promoter's capacity to arrange for and if the economic size is too big a size for the promoter to manage, the promoter is bound to limit the size of the project that will suit his finance and managerial capabilities. Whenever a project is proposed to be set up at a size below its economic size, it must be analyzed carefully as to whether the project will survive at the proposed size (which is below the economic size). Performance of existing units operating at below economic size (will throw some light on this aspect).

Other factors like special problems of fabrication of equipments, transportation and erection of equipments, problems associated with availability of production inputs on a sustained basis etc., also impose restrictions on the plant size.

Raw Material

Selection of raw material: A product can be manufactured using alternative raw materials and with alternative processes. The process of manufacture may sometimes vary with the raw material chosen. If a product can be manufactured by using alternative raw materials, the raw material that is locally available may be chosen. Since the manufacturing process and the machinery/equipment to be used also to a larger extent depend upon the raw material, the type of raw material to be used should be chosen carefully after analyzing various factors like the cost of different raw materials available, the transportation cost involved, the continuous availability of raw material etc. Since the process of manufacture and the machinery/equipments required depend upon the raw material used, the investment on plant and machinery will also to some extent depend upon the raw material chosen. Hence the cost of capital investments required on plant and machinery should also be studied before arriving at a decision on the choice of raw material.

For example, precipitated calcium carbonate can be produced using either lime stone or shell-lime as the raw material. Shell-lime will be available near seashore while lime stone will be available in areas with lime stone deposit. Since the quantity of raw material to be handled is comparatively large, the cost of transporting the raw material from the place of availability to the factory site will also be considerable. Also, though the end product is the same, there will be minor changes in the plant and machinery requirement for processing the different raw materials viz., limestone and shell lime. All these factors are to be analyzed before choosing the raw material to be used and the appropriate process of manufacture.