UNIT-1

CO-ORDINATION AND CONTROL: Project direction communication in a project, MIS project co-ordination, project control requirement for better control of project or role of MIS in project control, performance, control, schedule control, cost Control.

Once the systems and procedures are established for the project and executing agencies are lined up, the stage is set for a smooth take off. But as we have noted before, the sailing thereafter may not be very smooth. Indeed, a project will face rough weather in the beginning, and it will take quite a long time before the project acquires any semblance of stability. It can be appreciated that till the project acquires stability, the project execution system has to depend more on external intervention for survival than on its internal self-regulating capability. As the project enters the stable phase, the need for external intervention, no doubt, reduces but has still to be there or else, as noted before, the work system will disintegrate due to non-availability of support at critical moments.

The external intervention will be in three forms:

1. Direction
2. Coordination
3. Control

Figure 3.1 shows three different periods during the implementation phase of a project: initiation or start-up period, production period and closing period. It has been shown that the initiation period of the project will require lots of direction and coordination with little or no control. But once it enters the stable production period the need for direction reduces considerably and the coordination and control aspects of management gain predominance over direction. The direction aspect of management again fades into insignificance during the closing period of the implementation phase. Also, the need for control reduces considerably.

during the closing period, thus, leaving coordination to play the lead role for achieving results during this period. Therefore, for successful implementation of the project direction, coordination and control would be required all at the same time but in varying proportions. Also, it becomes clear that if they are not brought into play in right proportions at the right time, the progress of the project will suffer.

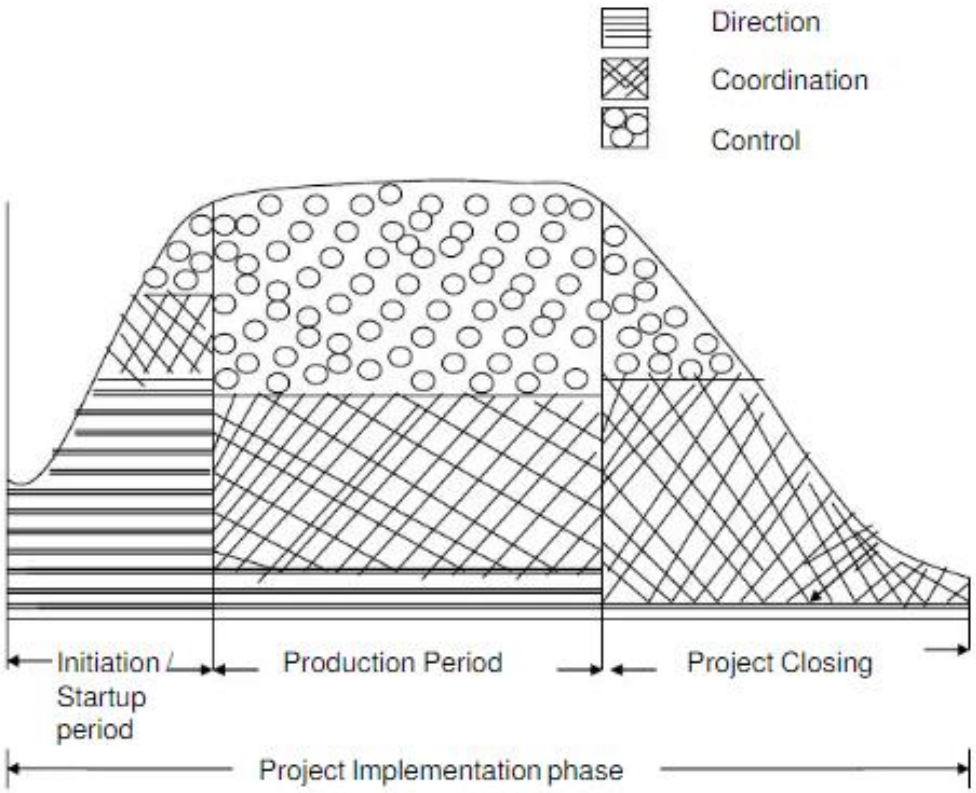


Figure 3.1 Management Effort Schedule

3.1 PROJECT DIRECTION

Project direction refers to the use of authority to channelize the activities of the project on desired lines. Since plans and schedules prescribe what is desirable for time control of a project authorizing them for implementation would constitute project direction towards time control. if this authorization is not there, plans and schedule may not go into work and scheduling system may change into superfluous paper.

Project Initiation Start-up

The need for project direction is maximum at the time of start-up of implementation. This period starts soon after the issue of the project charter. During this period the project manager has to take actions for successful launching of the project. The project charter merely defines the broad scope of work and over-all time and cost target, but it does not go into details. The charter authorizes tbe project manager to spell out the details and to issue directives for realization of the same. Everything at the time of start-up is, therefore, hazy. No one knows exactly what to do and, necessarily, all eyes turn to the project manager for directions.

The project manager during this period needs to provide directions relating to:

1. Scope of work
2. Specification of results of completed work
3. Basis of work
4. Division of work—imported vs. indigenous, departmental vs. contract, etc.
5. Schedule of work
6. Budget for work
7. Systems and procedure for work
8. Coordination of work
9. Authority and accountability for work
10. Control of work

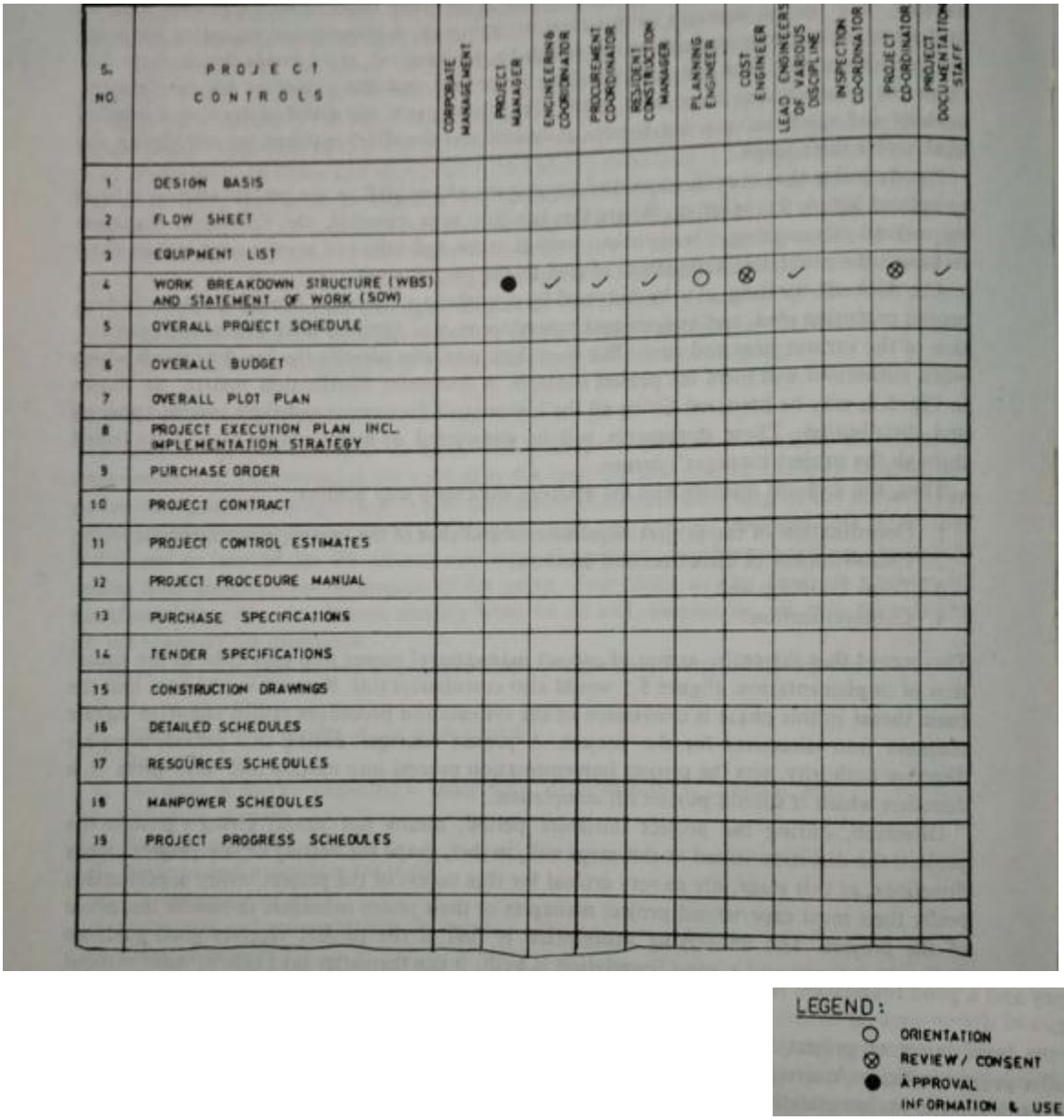
What is required is that these should be converted into directions for the project by authorizing their implementation. However, since the success of a project is heavily dependent on team work, all the items from I to 10 are finalized with the involvement of project participants or else the directives will appear authoritarian, and will unnecessarily Invite opposition. If the directions can be formulated through a participative approach, the same can be issued formally in the name of a project manual with instructions for strict adherence to the same.

Project kickoff meeting/ Project workshop: The finalization of the scope of work, budgets, schedules, and various other items listed earlier is normally initiated with a project kick-off meeting. The project manager in this meeting may make a presentation regarding the scope of the project, performance objectives, schedules, budgets, etc. and provide clarifications that any participant may seek for Understanding the project and the extent of his involvement. Once the classifications have been made, the participants are asked to draw up a detailed work list and assess information inputs, resources and the effort required for completing the work under their scope.

It is desirable that identification and assignment of key staff' to the project team is at least completed before this meeting. Where this has not been possible, the functional managers may attend this meeting. Clarity about project scope and extent of involvement is then likely to hasten the process of assignment of staff to the project team.

The kick-off meeting can be followed by a workshop where the overall project schedule, project execution plan, and systems and procedure may be finalized after a thorough examination of the various pros and cons. The workshop may also identify the key documents which when authorized will form the project controls. A document distribution matrix, as shown in Figure. 3.2, may be prepared listing all the key control documents and their review,

approval and distribution. These documents will be considered as directions for work when issued through the project manager's memo.



S. NO.	PROJECT CONTROLS	CORPORATE MANAGEMENT	PROJECT MANAGER	ENGINEERING COORDINATOR	PROCUREMENT COORDINATOR	RESIDENT CONSTRUCTION MANAGER	PLANNING ENGINEER	COST ENGINEER	LEAD ENGINEERS OF VARIOUS DISCIPLINE	INSPECTION COORDINATOR	PROJECT CO-ORDINATOR	PROJECT DOCUMENTATION STAFF
1	DESIGN BASIS											
2	FLOW SHEET											
3	EQUIPMENT LIST											
4	WORK BREAKDOWN STRUCTURE (WBS) AND STATEMENT OF WORK (SOW)		●	✓	✓	✓	○	⊗	✓		⊗	✓
5	OVERALL PROJECT SCHEDULE											
6	OVERALL BUDGET											
7	OVERALL PLOT PLAN											
8	PROJECT EXECUTION PLAN INCL. IMPLEMENTATION STRATEGY											
9	PURCHASE ORDER											
10	PROJECT CONTRACT											
11	PROJECT CONTROL ESTIMATES											
12	PROJECT PROCEDURE MANUAL											
13	PURCHASE SPECIFICATIONS											
14	TENDER SPECIFICATIONS											
15	CONSTRUCTION DRAWINGS											
16	DETAILED SCHEDULES											
17	RESOURCES SCHEDULES											
18	MANPOWER SCHEDULES											
19	PROJECT PROGRESS SCHEDULES											

LEGEND:
○ ORIENTATION
⊗ REVIEW / CONSENT
● APPROVAL
INFORMATION & USE

Figure. 3.2, Listing all the key control documents

Thus, the kick-off meeting and the start-up workshop may achieve:

I. Coordination of the project requirements and that of the participating agencies;

2. Establishment of directives and controls;

3. Team building; and

4. Communication.

This means that the entire gamut of project management comes into play even at the initiate ion of implementation. A project manager during this period, using his directive authority, sets

the project implementation process into motion and also gives it a direction which it should pursue till completion.

Direction, during the project initiation period, means not simply giving a push to the project; the direction Issued at this stage will, in fact, shape the destiny of the project. Since directions, at this stage, are so very crucial for the success of the project, many organizations prefer their most experienced project managers or their senior managers to handle this phase of the project. Such being the importance of project initiation, many project management consultancy organizations offer project initiation/start-up services. These consultants would design the project management system in association with the owner, train the project owner, and guide them in the job of implementation and operation of the same. Once the owner gains confidence in the operation of the system and also the project moves into the production stage, they would withdraw from the scene.

Direction during Production Stage

Direction during the initiation Stage, as we have noted, mostly concerns itself in establishing baselines for project performance. Once this is done, the form of direction undergoes a distinct change. Direction after the initiation period can be considered to be of the administrative variety. Invariably, after the start-up period, direction is provided on a case to case basis through formal documents or personal contacts. A group meeting may also be used for this purpose.

On-going directions may refer to approval of work schedules, detailed budgets, specifications, purchase orders, work orders, construction drawings, travels, miscellaneous expenses, changes in baselines, etc. Direction not affecting baselines or project goals can be considered as lower level project directions. It is necessary that lower level directions are provided at appropriate levels down the hierarchy on a day-to-day basis through personal contact. In matters Concerning multiple agencies or baselines or project goals, meetings may be preferred for passing on directions. Under no circumstances should directive authority be too much centralized and kept remote from the users.

Design Review Meetings:

Review meetings provide a forum for participative decision making and communication of directions. A design review meeting is held to critically examine and authorize the basic design

which has to take care of all subsequent work on project hardware. Since the basic design is so important for the project, a critical review by top specialists and approval from appropriate authorities are essential before it is issued down the line for implementation. Thus, the design review meeting docs to the hardware what the kick-off meeting and start-up workshop would do for project organization, systems and procedures.

A design review meeting checks the project design from all angles— functional utility, energy optimization, handling minimization, indigenization, constructability, ease of maintenance, safety, environmental impact and finally economy. Since the resultant effect of any good or bad design is cost, the design finally to be released for implementation must be cost effective. The role of cost engineers at this stage is, therefore, extremely important.

Since the design review would examine the project design from all angles, covering all phases of the project extending into operation and maintenance, the Costing should also take into consideration the entire life cycle of the project. Costing of such a type is known as life cycle costing and the effort being directed at this stage can be termed as value engineering.

A design review without value engineering would be a process which simply double-checks the basic design of the project. The double-checking starts with the project design basis and

Closely examines the various decisions that the designer has made against the results required to be achieved. All concerned specialists includes the designer, will hold a meeting and the designer will be questioned regarding the decisions made by him. Design changes may be suggested either to avoid anticipated problems or to effect the economy. Normally, a cost engineer is not a participant on a non-value engineering review meeting.

The whole idea of a design review of the above type is to avoid costly changes at a later date. Changes made at the drawing board stage are much cheaper than changes at the manufacturing stage or during construction. Moreover, such reviews may identify errors and omissions whose detection at a late stage may throw the entire project into disarray. The cost to make good this omission could be prohibitive.

Value Engineering Review:

Though a design review of the conventional type has cost upper-most in mind, the approach of the review is not through cost. It is quite possible that at the end of the review the cost of the project may go up.

A value engineering review, on the other hand, uses cost as the basis of review and ensures that value is included in the design. Value of an item, in this context, would mean the minimum

cost at which the function provided by the item under review could be obtained from any other item. Thus, when non-functional cost is removed from an item, its value goes up. Figure 3.3 shows value addition processes.

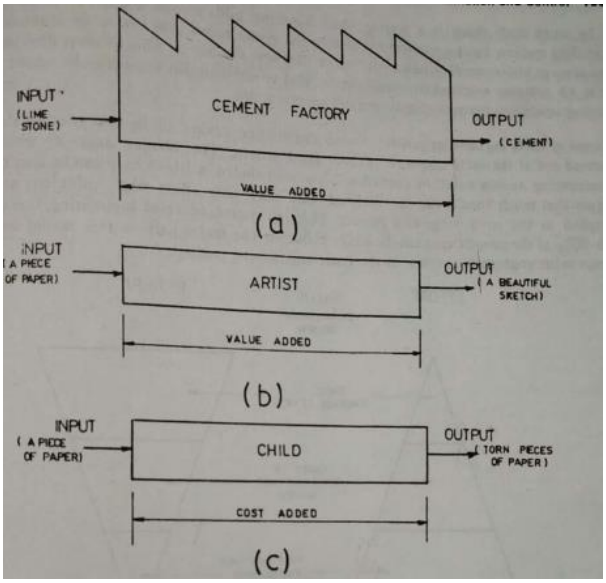


Figure 3.3 value addition process.

In a value engineering review once would compare the hardware cost of an item with its value and would come down heavily on such items which merely add to cost and not to value. If, in this process, the cost of the item can be brought down without compromising the essential performance, the value goes up.

Now when one examines the Working of any plant, the various systems, sub-systems and plant items can be found to be engaged in five major functions. These five functions in work study are:

1. Operation
2. Transportation
3. Permanent storage
4. Temporary storage
5. Inspection/control

It is interesting to note that except function I all the others contribute mostly to cost and not to value. It is quite another matter that these may be all essential functions as far as the working of the hole factory is concerned, but the fact remains that if the occurrence of these functions can be reduced the factory will be able to add more value.

Creativity techniques The search for ideas, however, can be organized. For that matter, value engineering claims to be an organized creative technique. The creation part in value engineering can be achieved through any of the following techniques collectively known as *creativity techniques.* These are:

1. Questioning technique
2. Attribute listing
3. Brainstorming
4. Synectics

The questioning technique can be quite useful for value engineering review of a basic package. When reviewing the basic package the following questions may be asked:
I. What is achieved?
2. How is it achieved?
3. Is it necessary? if not, can the item be eliminated altogether?
4. If the function being achieved is necessary:
(a) Can the same be achieved in some other way?
(b) Can it be achieved by inverting the way of working? As for example, where material is moved to the machine for processing, the question to be asked is whether the same function could be achieved by taking the machine to the material.
(c) Can the function be obtained from another existing item by augmenting the capacity of that item? Or can the item be modified to perform a combination of functions?
(d) Can the sequence of working be rearranged for obtaining the function at least cost?
(e) Can the item be substituted by a different item? Or can materials of construction be changed?
Several ideas would be generated as a result of this questioning. These ideas will have to be checked for techno-economic feasibility, and viable ideas will be incorporated in the basic package.

Purchase Orders and Work Orders

Directions to internal departments or individuals in the owner's organization could be passed on through project charters, project manuals, circulars. Inter office memoranda, group meetings and personal meetings. Thus, some directions are on record, others are not. But directions to vendors and contractors must be on record. Even when this arc passed in meetings, a record of the proceedings in the form of minutes of meeting must be drawn and signed by the attending parties.

The main directions to vendors and contractors are passed in the form of purchase orders and work orders. These documents would provide:

1. Technical directions
2. Commercial directions
3. Managerial directions
4. Administrative directions

If value engineering review is not particularly provided for in the purchase order or work order, the vendor, contractor or the engineering company may not agree for value engineering. There are many such directions which must be included in the documents before they are issued as orders. Once the orders are issued, new stipulations may not be accepted by the vendor or contractor easily. Any change in order, even if mutually agreed, may prove very expensive.

The most important direction is the technical direction, System specifications, item specifications, scope drawings, standard drawings, performance specifications and record note of agreed variations included in a contract document would provide the technical direction before awarding a contract. Review and approval of vendor drawings, issue of approval for construction drawings and inspection of completed works would provide the technical direction after the contract has been awarded.

Commercial directions of standard nature are mostly covered in the general purchase conditions or general conditions of contract discussed in the earlier chapters. Directions regarding schedule of delivery, sequence of delivery, packing and marking, insurance, destinations, mode of transport, and method of invoicing are normally spelt out to avoid any confusion in these matters.

Administrative directions would refer to routing of the correspondence, drawings and documents, security, personnel administration, appointment of sub-vendors or contractors, inspection notice, change notice, etc., many of which are also covered in the general conditions

of contract. Specific directions would have to be provided if general conditions do not make any mention of the same.

Ongoing Directions

Project start-up, design reviews, purchase order and work orders are one -time directions. But a project will require continuous direction till completion. If the systems and procedures work well, then directions will be required only when unforeseen events occur. Directions otherwise will require to be provided when problems occur during project execution. In either case, a decision has to be made as to what should be done, and the same should be authorized for implementation. Thus, decision-making and direction are part of every-day function of any manager.

For generations, quick decision-making has been considered to be an attribute of a good manager, but good decisions always result from a thorough study of the subject. Such decisions would, of course, be quick, but not necessarily the best. Good decision-making requires a good study of the subject and also a good judgment. These are the attributes of the good decision-maker.

A decision can be made only when these alternative choices could be established through a study of the decision environment. Finally, one can be said to have taken a decision when the best alternative is chosen for implementation.

Routine directions involve five steps:

1. Understanding the decision environment.
2. Establishing the decision alternatives.
3. Evaluation of the alternatives and selection of a course of action.
4. Communicating the decision to the individual or agency who is to implement the decision.
5. Checking up if the decision is working so that the decision could be steered by the consequences.

Figure 3.4 shows decision environment

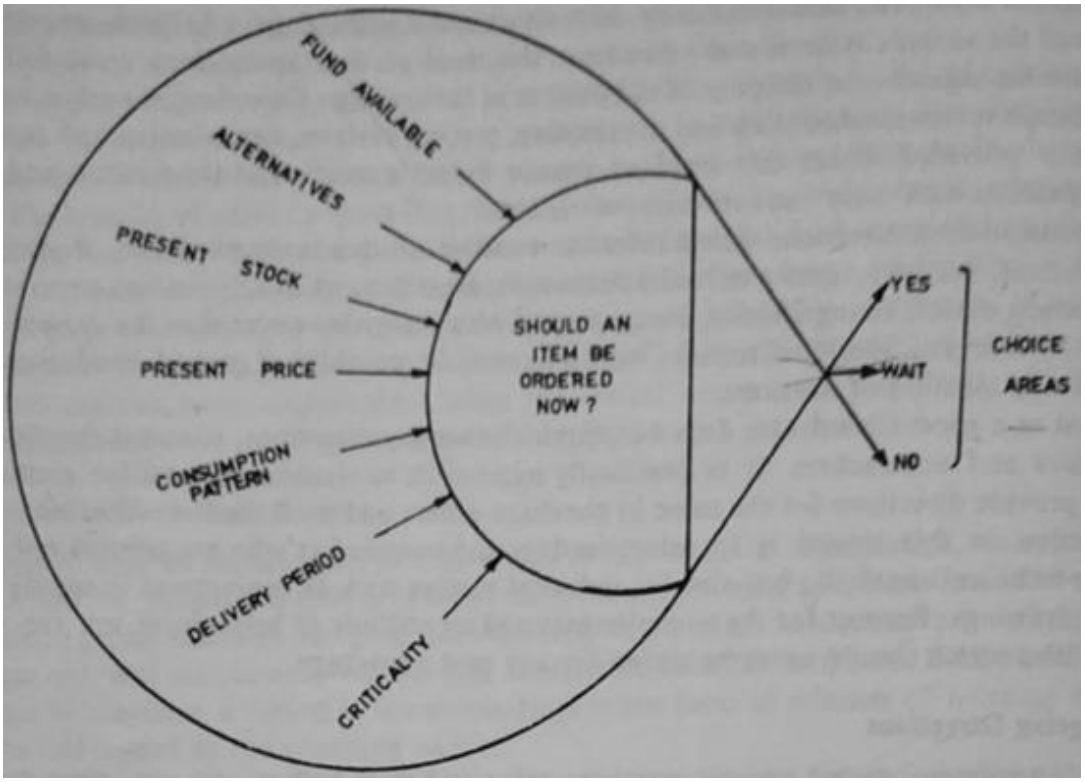


Figure3.4: Decision environment

One can adopt two stances in providing day-to-day directions—reactive or proactive. When a problem springs up suddenly and one is forced to resolve the crisis, the direction process can be called reactive. However it is quite possible to foresee a problem if only one cares to develop one's mental faculty for it. When one takes preemptive steps so that a problem is forestalled, the direction can said to be proactive. While both the situations will exist in real life, there could hardly be a difference of opinion that ongoing direction process should, as far as possible, be proactive.

Project review meetings The most practiced method for identification of problems and providing directions, by covering steps 1 to ***5*** listed above, is to hold regular weekly or monthly project review meetings. It is necessary to fix up the agenda and frequency for these meetings at the beginning of the project so that everyone could do their homework for attending these meetings. These meetings could be held at different levels of project management hierarchy and accordingly the agenda, frequency and also the participants would be different.

Reviews with contractors are normally held at the site. Normally, these are held every week. Similarly, all review meetings with vendors are usually held at the vendor's worksite. There is normally no fixed frequency. Review of the engineering company can be held once a month or

quarterly at the owner's office or at the site. Whereas reviews within an engineering company are invariably held every month with all the inter-related disciplines attending the same. Obviously, the agenda in the various review meetings will be different. However, in general, a project review meeting should discuss:

1. Status of implementation of the decisions taken in the previous meeting
2. Progress achieved during the review period with agreed targets
3. Problems
4. Decisions regarding problems
5. Agreed action programme and progress target up to next review date

Minutes issued after the meeting would provide the directions till the next review. They must be issued by the next working day, but participants must be directed to take their own notes and proceed with implementation without waiting for the minutes.

Review meetings of the above type will force people to be on the look-out for signs of problems all the time. However, despite these meetings, problems may pop up almost every day without notice and directions will have to be provided immediately as they cannot be allowed to wait till the next review meeting. Project management, therefore, must have a good communication system so that signals sounding these problems are picked up instantly and directions provided via the same channel with the same speed. If this cannot be done, these minor matters will snowball into big problems and may even cause irreparable damage to the project.

Communications in a Project:

For on going directions a two-way communication system is essential. For that matter, the entire process of direction, coordination and control in a project revolves around communication. This has been diagrammatically explained in Figure. 3.5The figure shows that while direction leads to coordination and control direction itself is effective only when there are two-way communications all around. Such being the importance of communication, it is

often concluded that projects are run by communications.

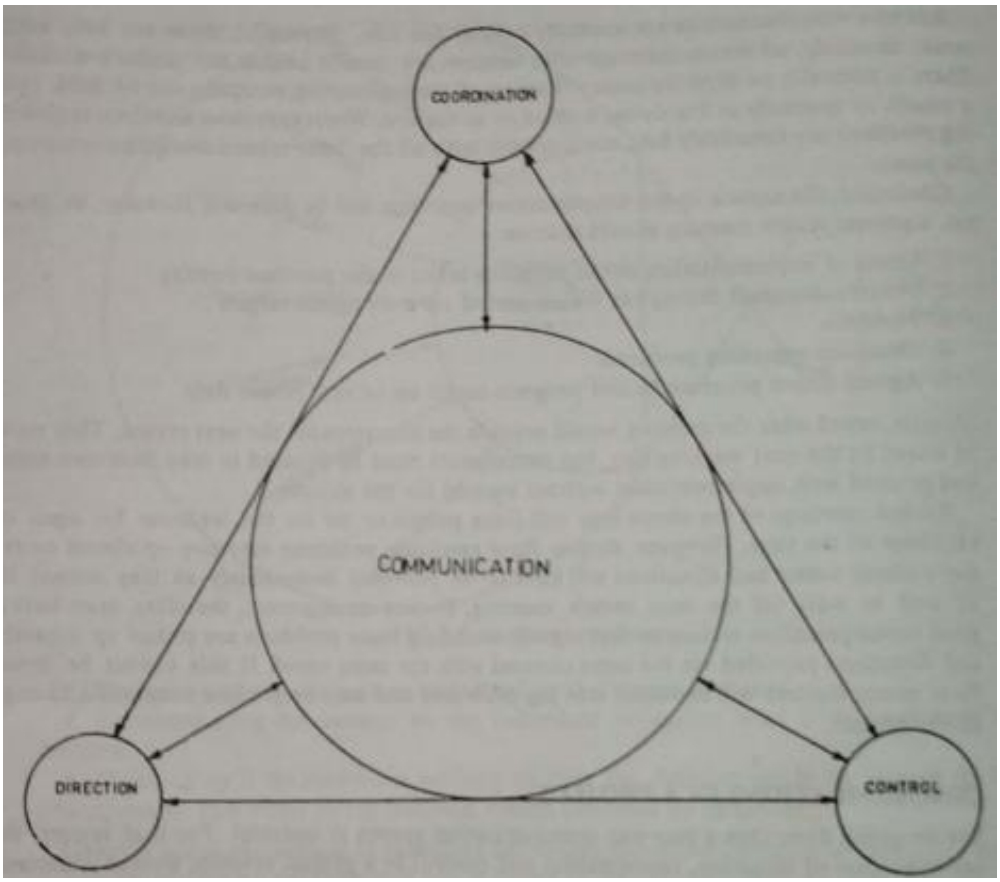


Figure 3.5 Communication as key to direction, coordination and control

For effective communication, the process of communication must be understood.

Communication does not mean merely passing on a message—top-down or bottom-up—it includes understanding of the message sent by the recipient, as intended by the sender. If the message sent by the sender has not been understood by the receiver as was intended, no communication has taken place. Thus, when two-way communications are being talked of mere provision of channels for both top-down and bottom-up message transmission is not enough; there has to be genuine effort on the part of the sender to check and verify by obtaining feedback if the message has been received and interpreted as it was intended. The receiver, similarly, should seek clarification and confirmation of his understanding for effective communication.

Organizing for Communication

Since communication is the key to successful project management every effort must be made to ensure complete communication between participating members of a project team. The physical aspects can easily be organized and luckily the mental aspects can also be partially

taken care of by proper organization of the communication system. If, however, for some reason the mental aspects arc not taken care of, the physical aspects of Communications may endlessly increase without any result.

The organization chart itself provides the official communication network but not all organizations are communication effective. The first step for speedy project management is, therefore, to ensure that communication takes place freely. Departmentalization chain of command, levels, distance, etc, should not be allowed to stand as barriers to communication. While instructions must flow through a chain of command, information flow should not have any such restriction. The project manager could make this point clear at the very beginning of the project.

Physical distance between the interacting groups would always present barriers to communication. One may work within the same office but by shutting oneself within a cabin a physical distance can be created. A physical distance can also be created by making oneself unapproachable even in an open working area. Many communication problems can be avoided if the interacting groups could be made to sit together in the same office space.

To meet the requirements of communication, the owner may like to post his representative at the engineering company's office or at the contractor's office. This also means that the site must be managed from the site itself and not from the head office. Where the people can not be brought together, it is necessary to bridge the distance through good communication devices. In the beginning of the project itself communication devices like telex, telephone, hotlines, and courier services should be established even where usual postal services exist. Facilities to visit site through rail, road, air or helicopter, may be established to ensure physical closeness which is so essential for good communication.

Even when people are housed in the same office, or at the same work place such as the construction site, effective communication will not take place automatically unless some positive efforts are made in that direction. Perhaps, it is better to over communicate than to be conservative in this matter, for communication voids do invariably get filled up with rumours. Where official channels for communications do not exist, grapevines operate and as a result communication gets distorted. This would create misunderstanding, lack of trust, defensive records and in the long run may cause undesirable communications. it is, therefore, necessary to communicate as much as possible through formal channels.

Effective communication in a project would require a communication-oriented action plan. The actions that may be taken in this regard are as below:

1. Organization of work, people and work place with communication orientation
2. Selection and installation of appropriate communication devices
3. Project review and coordination meetings at predetermined frequency
4. Predetermined document distribution matrix
5. Establishing healthy attitude towards communication by appropriate directions
6.Installing structured reporting systems
7. Implementing routine communication systems and procedures
8. Establishing a control room
9. Running an in-house magazine
10. Using desk-top computers for communication

In the action plan, organization of work and people is a basic project management requirement. It is suggested that this must receive a communication orientation.

Feedback Communication

When a document is dispatched there must be a feedback about its receipt and understanding of the contents. Similarly, when a work has to be performed, there must be a feedback on its progress and problems. When this requirement is kept in view, the following things will happen:

I. An enquiry will require to be responded as to whether a quotation will be forwarded or not
2. A purchase order will have to be accepted by the vendor regarding the various terms and conditions specified in the order
3. A drawing has to be commented upon by the engineer specifying if a revised drawing incorporating comments has to be submitted or not similar things must happen after any communication from a party giving directions to another party.

Reporting System Feedback communication can also be organized and obtained by issuing appropriate directions. Thus, when a work is contracted out, along with many other issues, the feedback requirement too can be clearly spelt out in the contract. No doubt in this way only the major requirements can be spelt out, but that itself will go a long way in improving the

management of a project. Figure 3.6 shows computerized real time information processing system

The periodic feedback reports that any contractor would be asked to furnish may relate to:

- Drawings and documents to be prepared
- Equipment and materials to be procured
- Equipment to be manufactured at shop
- Equipment to be fabricated at site
- Erection and commissioning work

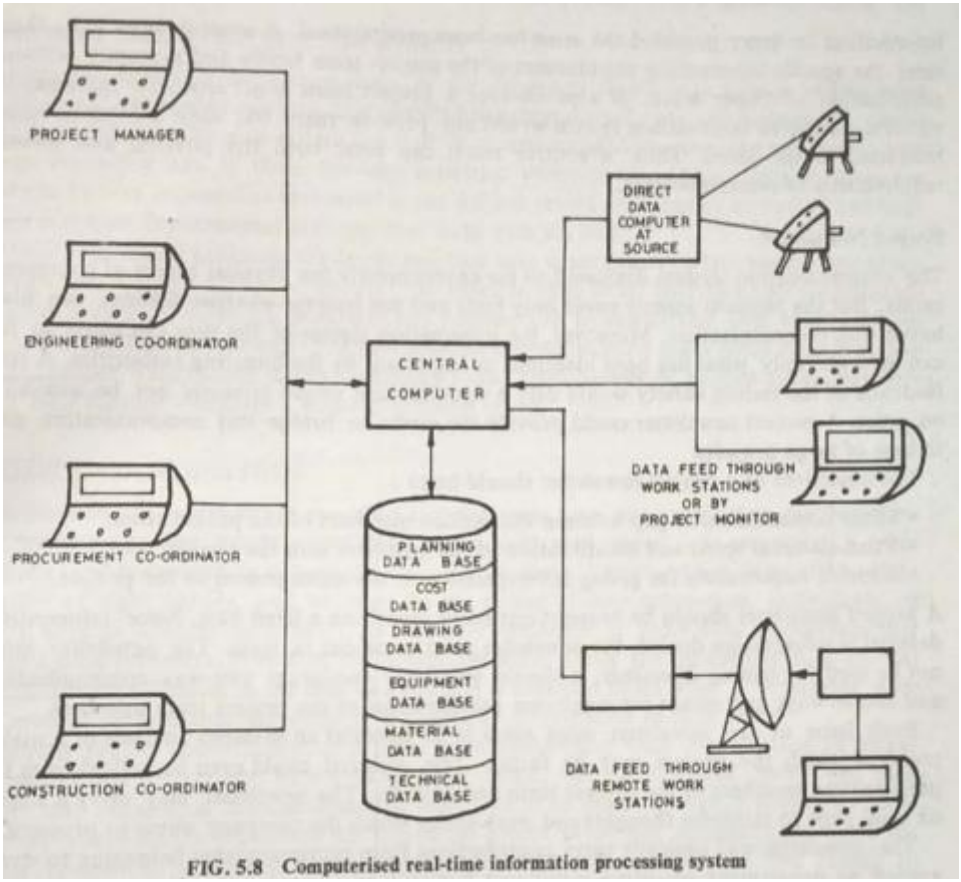


Figure: 3.6 Computerized real time information processing system

Project feedback reports of the above type have by and large been standardized and any one engaged in the management of a project can ask for these without being involved in the complexities of information technology. Normally every agency could be asked to forward feedback reports as listed above periodically. These reports should cover all the phases of the project life and carry information for coordinators/managers who are to issue directions. Since in a large project no single coordinator may look after all the aspects of a contractor's work, the feedback information will require to be processed. This problem, however, does not exist

for small projects where one coordinator may look after all the aspects of a work and has direct access to all the necessary details.

Control Room

We have, however, experience of using the control room as a substitute for the feedback system. Though a control room is mostly used by the directing authorities for centralizing information and issuing directions on a real-time basis, it can be kept open for use by the working agencies as well. In most projects the control room has been used for holding project review meetings. But when executing agencies are directed to feed and collect information from the control room on a daily basis1 the two-way communication can take place on a day-to-day basis.

A control room is basically a conference room with facilities for data record, data processing and data display. The displays in most cases are in the form of S-curves, pie-charts, Bar charts, histograms, layouts or plain tables. Various display devices like magnetic boards, which can be updated without any effort, are used. These days with the availability of micro-computers, almost all the control rooms are using micro-computers not only for usual data storage and data processing but also for graphics. All the tables and charts, therefore, can be prepared on the computer every day and displayed for study and use by the visitors to the control room. A latest set of printouts can also be made available to the participants of the review meetings on the date of a meeting.

The displays of the above type will provide some basic information which will have day- to-day use. But the control room personnel should be in a position to provide any other

Information on query provided the same has been programmed A control room can, thus, meet the specific information requirement of the project team briefly and promptly without proliferation of paper work. It also enables a project team to get any other information which a structured information system would not provide them but they are nevertheless interested in the same. Thus, a control room can meet both the physical and mental requirements of communication.

PROJECT COORDINATION

Coordination can be defined as the effort to bring parts into proper relation for harmonious functioning. One would agree that a well-coordinated project is as pleasing as a piece of music,

and requirements in both the cases are the same. The blend has to be right—right quantity of right variety, and so must be the timing of their interaction. Individuals, no doubt, have to perform right, but it is not the excellence of individual performers that makes a good orchestra. How they relate together while giving the performance is all that counts. The coordinator, in the case of a project, is expected to do what a conductor does in a musical performance; the name of the game is coordination in both cases.

Perhaps project coordination is a little more challenging than coordination of music. The parties in a project may have a script, as in music, but no rehearsal. Everyone in a project may know what is to be done and when it is to be done through a project schedule or project coordination procedure but individual efforts would not automatically meet the overall requirement unless someone having the view of the whole does the fine tuning to match the efforts of the participating members for the desired end result.

A vendor may be able to dispatch equipment earlier than the stipulated date but it will not bring much good to the project if the foundation cannot be expedited. The vendor can do hardly anything to change the priorities of the civil work being done but if he succeeds in doing so the overall progress of the project may improve. This can be done only by someone overseeing the work of both the parties. Situations like this will arise every now and then throughout the implementation phase of the project, and as has been shown in Figure 3.7.

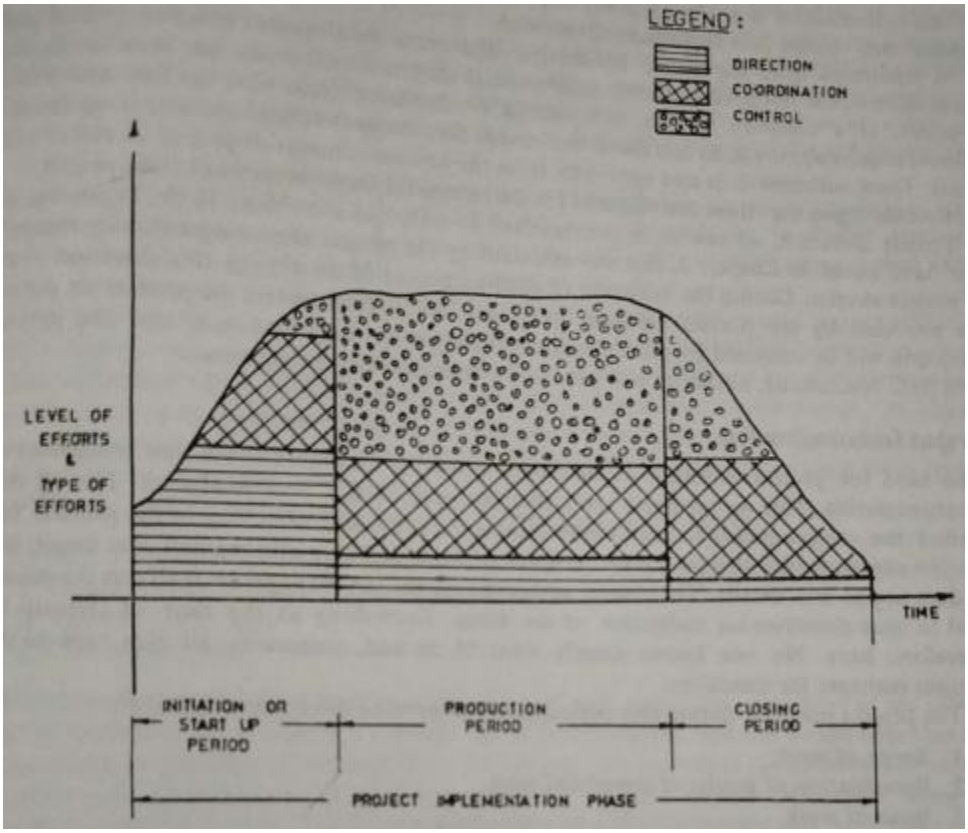


Figure 3.7 Implementation phase of the project

Physical Coordination

The work breakdown structures provide the basic framework for both physical and time coordination. Physical coordination, like time coordination, is also done at several leve1: work package level and individual work-item level. At system level the coordination is provided by the project manager, at work package level by the package coordinator /project coordinator but at work-item level it is normally the functional co-coordinator who provides the coordination. Normally, the responsibility for time coordination also rests with one who provides physical coordination; the scheduling coordinator may provide only staff service at each level.

A coordination procedure, as we have discussed before, does no ensure coordination. It is the job of the coordinator to ensure coordination and he can succeed provided the stage in the first instance is set for coordination.

Preparation of work breakdown structure, structuring the organization as a mirror-image of work breakdown structure, establishing a project procedure manual, housing people under one roof wherever possible, sets the stage for effective physical coordination. Similarly,

development of project schedules coordinated with work breakdown structure and organization chart sets the stage for the time coordination. Figure 3.8 explains this. Once the stages are so set, day-to-day coordination in a project is ensured through

1. Squad check
2. Coordination meetings and
3. Communication

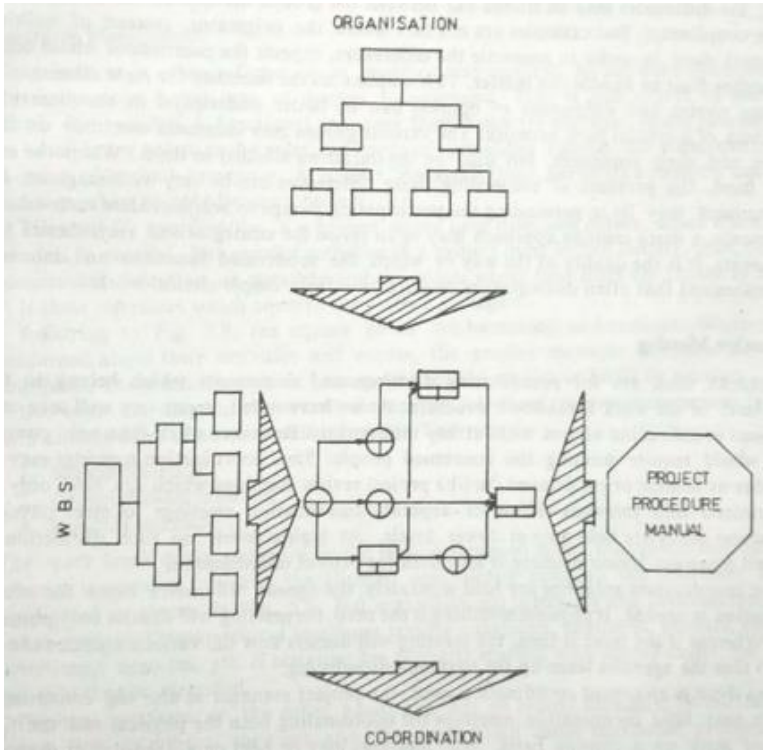


Figure 3.8 Setting stage for project coordination

Squad check :A squad check is an exercise where a small group of people check a document or any work plan prepared by a peer group with a view to safeguard their interests before the same can taken up for implementation.

A project is a group effort and in a group there will always be differences of opinion. But coordination is not merely smoothing out differences; it is reintegration of the parts into a whole taking into account the subdivided functions and their interests. Where the climate is right, the differences may be ironed out between the groups themselves without intervention of a coordinator. But examples are not rare where the originator, instead of walking to the next door in order to reconcile the differences, expects the coordinator whose office is on another floor to handle the matter. This emphasizes the necessity for right climate.

The various groups may comment not only on the activities and their sequences, but also on the durations allotted to them. Where the end date is fixed, the problem of reconciling these differences can be very well imagined. An easy approach may lie in persuading the participating groups to accommodate each others, requirements; a more creative approach may be to revise the strategies and re-synthesize the requirements. It is the quality of the way in which the subdivided functions and interests are re-synthesized that often distinguishes coordination from simple clerical work.

Coordination Meeting

Squad checks, thus, are for coordinating drawings and documents which belong to the lowest level of the work breakdown structure. As we have noted, it can very welt take care of physical coordination almost without any intervention. But more often than not, coordination would require meeting the concerned people. Such coordination meetings may he held either as routine or on demand, unlike project review meetings which are held only at predetermined time intervals. However, separate coordination meetings to meet physical coordination needs are held only at lower levels. At higher levels no such distinction is made and a project review meeting is also used for project coordination

Where coordination meetings are held separately, the agenda will cover items for which coordination is needed, if physical matching is the need, the meetings will discuss only physical issues. Whereas if the issue is time, the meeting will discuss how the various agencies should work so that the agencies team up for harmonious working

Unless there is an urgent coordination need, the project manager as also the construction manager may hold coordination meetings for coordinating both the physical and the time aspect of work on a routine basis. Such meetings may be held on a fixed day of the week and called weekly coordination meetings which would normally discuss

1.Problems of inputs;

2. Development of work front, where work front represents the extent of work which can be completed without further input; and

3. Programme for next week.

All the interacting groups should be present during the coordination meeting. But the size must not be unwieldy and, therefore, only those who have close interactions should be called at a time.

The look-ahead schedule could form (he basis for discussion in these meetings. That means discussion should centre around activities to be carried out during the next 2—3 months or any other agreed time interval. Though schedule is used as the basis, the discussion. However, should not limit itself to the time aspects of coordination only. The thrust is on work front development and not mere observance of time schedule. The work- front can be developed only when both the physical and the time aspect of work are coordinated.

Interface Management

Coordination is often referred to as interface management. This is the main thrust area of project management. This is one aspect of management which distinguishes a functional manager from a general manager, and a general manager as we all know balances the roles and needs of specialties against the requirements of the mission of a total enterprise. A project manager, thus, performs a superior management function when he coordinates a project. The need for coordination in a project arises when activities proceed in parallel. But parallel activities in a project meet before infinity, thus, defying the geometrical definition of parallels and the points where they meet are known as interfaces. It is these interfaces which concern the project managers.

Project management has to deal with at least three other classes of interfaces. They are:

1. System interface
2. Organizational interface
3. Personal interface

The work break down structure is the ideal diagram to reflect the system interfaces, if the network is prepared following the physical equivalency rule, all the interfaces would et highlighted .But organizational interfaces and personal Interfaces aren't as obvious. Organizational interfaces involve customers, engineers, vendors, contractors, government agencies, etc. If activities are properly marked with agency codes, the interfaces can only then be identified.

Personal interfaces, on the other hand, cannot be clearly identified. While they are the lowest level interfaces, they are also the ones which cause maximum problems. This is because people invariably bring their egos to work, whereas a hardware system simply does not have one. Luckily, organizations are also not affected with the egos of their operating level personnel,

and to that extent organizations pose lesser problems for coordination than their staff. Once the interfaces have been identified, the project manager can ensure coordination by reviewing the situation and taking necessary action at each review meeting according to the demands of the situation.

PROJECT CONTROL

With proper direction and coordination the project reaches a stage when it is ready to show results. This period can be termed as production period. The production period follows the period of planning and direction. Consequently, there is no ambiguity in the production period regarding what is to be achieved. All that is needed is to produce as directed. And as has been shown in the same figure, this is to be achieved through coordination and control. The term control, however, has a restrictive connotation. It may be restrictive only in the sense that it aims to enforce the implementation of plans and directions. We have noted earlier that in an open system if things are left to themselves, every agency may work on its own strategies and tend to deflect from the desired course. By establishing control and controlling the on-going operations it is possible to keep them on the pre-determined course which is in the best interest of the project.

Two terms are used here —control; and controlling. To understand these terms and the control process itself, let us take the example of a motor car. A car has an accelerator, steering, gear changer, brake, several dashboard instruments, front windscreen glass, rear- view mirror, etc. These are its controls—the designer has provided them for controlling the car. Some control speed, others direction, torque, etc. But there are some, e.g. speedometer, rear-view mirror, etc. which do not control anything but merely provide information for control. The actual control, however, is exercised by the driver who uses these controls:

1. To keep the car in alignment with the road
2. To cope with the varying traffic conditions
3. To reach the destination
4. To reach the destination on the desired time
5. To economise on cost of operation of the car
6. To ensure safety to self, car and third party

By looking at the example a little more closely. A car goes on the road to reach a specific destination. This is the primary objective, and this is what we have referred to as the production item. The relevant stipulations to this are that a specific distance should be covered within a certain time and as economically as possible. These are the secondary objectives. What the

driver does in items 4 and 5 listed above refer to these secondary objectives. But the driver also has to face the environment. The designer who has knowledge of the total system could foresee the requirement of the controls and, therefore, provided the same as an integral part of the machine. This is what we refer to as Planning and direct (on. But it is only the driver who would know the extent of control required at a given point of time and exercise the same.

The designer, thus, provides us the control and the driver does the controlling. In other words, when one learns automobile engineering, one learns controls; controlling, on the other hand, is what one learns at a motor driving school. If a driver does not use the controls, for example, if he upturns the rear-view mirror or does not care to repair the speedometer would risk achievement of all the six items listed earlier which are essential for any road travel.

Controlling a Project during the Production Period

Project control, therefore, can he viewed to consist of two parts:

1. Establishment of controls; and
2. On-going controlling activities using above controls.

The first part is done by establishing WBS organization, contracts, schedules, budgets, systems and procedures, etc, and authorizing their implementation. What we now need to discuss is how one should be controlling a project when it enters the production period using the controls established during the initiation period.

Schedule and cost/routine control during the production period involves four steps. These are:

1. Setting targets for what should be achieved
2. Measurement of what is happening including anticipation of what may happen
3. Comparison between what should happen and what is happening or likely to happen
4. Taking corrective actions to make things happen as they should

SCOPE/PROGRESS CONTROL

The completion of work, as we have mentioned, is the primary objective. A project must be completed 100 percent; no lapse in this regard is acceptable. Whereas if the project is not completed on time, within budget or even if it does not perform exactly as specified, the lapses may still be acceptable as long as the variations are within certain limits. Regarding time, cost and performance which can be considered as attributes of work, we need to control the variances; but the work has to be controlled and directed for 100 per cent completion. The basis for progress control should be the control of the tasks which occur at the last level of

the work breakdown structure. By ensuring completion of the tasks, the completion of the project itself can be ensured.

Task Lists

Progress control starts with the establishment of a task list. Every agency would be asked to in terms of percent progress for Completion of a milestone have got to be agreed before the task list can be used as the basis for progress measurement and control.

Progress Measurement

Unfortunately not all the tasks can be ‘measured by the same unit of measure neither would the tasks have the same milestone of advancement This creates complexity for measuring how much should be done and how much has been done. Individually for each task or for tasks of the same type there is no problem; the problem arises when one attempts to aggregate progress of tasks of variety.

Quality Assurance Plans

Performance ultimately has to be built into a product during its manufacturing stage. It is all very well to specify the good things and take guarantees from vendors against non performance but, as mentioned before, the liquidated damages that the vendors may pay for non-performance are a poor compensation for the damage that may be done to a project. Besides guarantee, therefore, vendors will be asked at the building stage itself to submit a detailed quality assurance plan. Such a plan will list all the activities to be examined by the quality control group of the vendor and others and documentation to be maintained for review by the owner’s inspectors or third-party inspection agencies.

Cost Status Reports

Cost always shows a tendency to go up, therefore, cost reduction efforts have to be pursued throughout the project life to keep cost under control. But the effort must be rationalized: one must dig where there is gold. Where rationalization is not possible, one may try to cut down even the essential things to reduce the cost of the project. This must be avoided at all costs.

What is being suggested for cost control is a value engineering approach and not indiscriminate cost cutting. If an item adds only to cost and not to value, it should he eliminated; but if the

item is essential and has value, it must not be trimmed to reduce cost of the project. What we must eliminate is wasteful expenditure arid not useful expenditure. This is where budgets and MIS have their roles to perform.