

# Resource Allocation

- In project management, resource allocation is the scheduling of activities and the resources required by those activities while taking into consideration both the resource availability and the project time.

# Resource Leveling

- A project requires resources to execute the activities.
  - Man
  - Material
  - Money (equipment)

*In the ideal world, resources are unlimited and available as required. Yet, resources are generally not unlimited and the project team needs to “level” out the use and consumption of resources.*

# Resource Leveling

- Resource Leveling is a project management technique used to examine unbalanced use of resources (usually people or equipment) over time, and for resolving over-allocations or conflicts.

# Ways to Avoid Time and Cost Overruns

- Detailed planning and implementation schedule
- Sound monitoring
- Resource-planning based on time schedules and anticipated progress
- Ensuring safety measures while preparing contracts
- Reward and incentive schemes for the project staff
- Selection of appropriate, feasible technology
- Listing engineering parameters and designs
- Mobilising community participation in planning and implementation
- Decentralised decision-making for fast implementation

- Continuity of the project manager, at least till the start of the plant
- Adequate training of the workers, supervisors involved
- Anticipating omissions, mistakes and preparing the organisation to face crisis
- Minimising managerial lapses
- Identifying transport bottlenecks by proper liaison
- Communication, and following-up with vendors and subcontractors to know the latest status and location of project material
- Regular follow-up with local, national and international financial agencies

- Innovative attitude and skills of the project team
- Adequate project information system
- Maintaining ecological balance and avoiding environmental pollution
- Clarity of scope on project objectives
- Lucid description of team and sub-team tasks
- Lucid financial cost estimates
- Milestone charts and project audit reports, and
- Minutes of the co-ordination committees' meetings with contractors and government agencies

## **Scheduling**

Scheduling may be defined as the assignment of work to the facility with the specification of time, and the sequence in which the work is to be done. Ex-time Table scheduling is actually time phasing of loading. the facility may be man power, machines or both. scheduling deals with orders and machines. it determines which order will be taken up on which machine in which department at what time and by which operator.

### **Objectives Loading and Scheduling**

1. Scheduling aims to achieve the required rate of o/p with a minimum delay and disruption in processing.
2. To provide adequate quarters of goods necessary to maintain finished product at levels predetermined to meet the delivery commitment.
3. The aim of loading and scheduling is to have maximum utilization of men, machines and materials by maintaining a free flow of materials along the production line.
4. To prevent unbalanced allocation of time among production departments.
5. To keep the production cost minimum.

### **Factors Affecting Scheduling**

#### **(A) External Factors**

1. Customers demand
2. Customers delivery dates
3. Stock of goods already lying with the dealers & retailers.

#### **(B) Internal Factors**

1. Stock of finished good with firm
2. Time interval to manufacture each component, subassembly and then assembly.
3. Availability of equipments & machinery their capacity & specification.

4. Availability of materials
5. Availability of manpower

### Scheduling Procedure

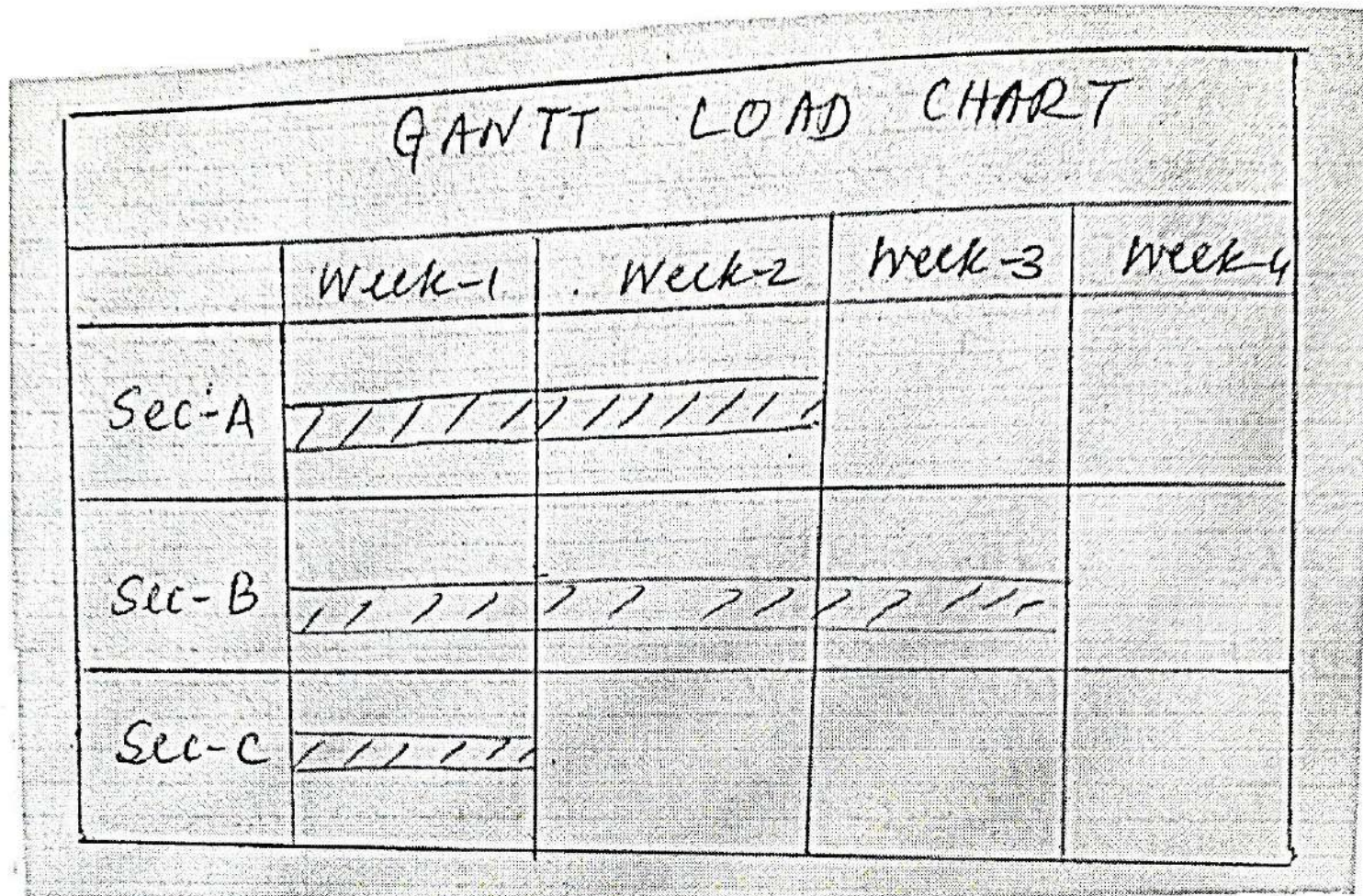
Scheduling normally starts with mater schedule. The following table shows master schedule for a foundry shop.

MASTER SCHEDULING FOR FOUNDRY SHOP.					
Maximum production capability/week = 100					
Order no.	Week-1	Week-2	Week-3	Week-4	Week-5
1.	15	18	20	15	18
2.	25	25	20	25	20

After master production schedule is made, the detailed schedules are thought of and made for each component, subassemblies, assemblies. The Gantt chart is a popular method commonly used in scheduling technique.

An example of Gantt chart is shown below. The hatched zone indicates actual work load against each section.





Instead of section, it may be m/c / other facilities. now a days computers are used to do this chart for different components/ m/c etc through readily available production software.

## **FORECAST VERSUS PREDICTION**

- Forecast is an estimate of future events and trends and is arrived at by systematically combining past data and projecting it forward in a predetermine a manner.
- Prediction is an. estimate of future events and trends in a subjective manner without taking into account the past data. The subjective considerations may not emerge from any predetermined analysis or approach.

## **NEED FOR DEMAND FORECASTING**

- All business planning starts with forecasting Capital investment, like procurement of raw materials and production planning, has to relate to demand forecasting.
- High volume high technology mass production systems have further high-lighted the importance of accurate demand forecasts.
- Even in a batch type production, any major mismatch between forecast and manufacture will lead to higher capital tied up in finished products which are slow in selling

## **UNCERTAINTIES IN DEMAND FORECASTING**

- Demand forecasting is the estimate of future demand. As the future is always uncertain, forecasting cannot be completely fool proof and correct.
- However, the very process of forecasting demand in future involves evaluating various forces and factors which influence demand.
- This exercise is very rewarding in itself as it enables the personnel to know about various market forces, currents, cross-currents and under-currents relevant to the demand behavior.

## Budgeting and cost estimation

### Common Sources of Project Cost

- Labor
- Materials
- Subcontractors
- Equipment & facilities
- Travel
- ...

## Cost estimation

- Clear definition of project costs at the beginning decreases the possibility of estimation errors.
- With greater initial accuracy the likelihood of completing within budget estimates is greater.
- To be able to create good estimations the project must be broken down by deliverables, work packages and tasks.

## Learning Curve

- A learning curve is the representation in graph form of the rate of learning something over time or repeated experiences.
- A learning curve is a concept that graphically depicts the relationship between the cost and output over a defined period of time, normally to represent the repetitive task of an employee or worker.

*Way to measure production efficiency and to forecast costs*

## Problems with Cost Estimation

- ✓ Low initial estimates
- ✓ Unexpected technical difficulties
- ✓ Lack of definition
- ✓ Specification changes
- ✓ External factors

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## Budgeting

- **Budgeting** is the process of creating a **plan to spend your money**. This spending plan is called a **budget**.
- Creating this spending plan allows you to determine in advance whether you will have enough money to do the things you need to do or would like to do.

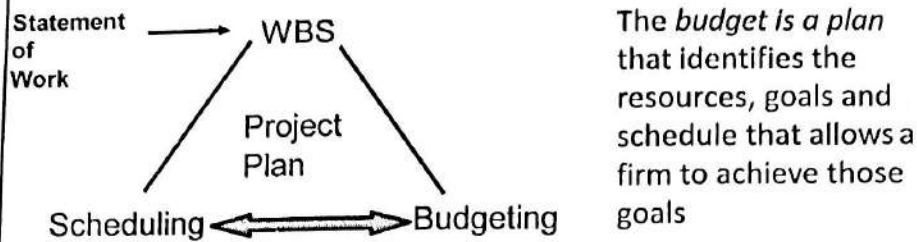
## Project Budget

- A project budget is the total sum of money allocated for the particular purpose of the project for a specific period of time. The goal of budget management is to control project costs within the approved budget and deliver the expected project goals.
- Large commercial projects can have project budgets that are several pages long. Such projects often have a large number of costs associated with them, such as labor costs, material procurement costs, and operating costs.

## Budgeting

- Budget management consists of a series of tasks and steps designed to help manage the costs of the project, the steps are:
  - Defining the Budget
  - Executing the Budget
  - Controlling the Budget
  - Updating the Budget

## Creating a Project Budget



The *budget* is a plan that identifies the resources, goals and schedule that allows a firm to achieve those goals

- **Top-down:** from overall project costs to major wp-s
- **Bottom-up:** from work packages to overall project cost
- **Activity-based costing (ABC)**

## Top-Down Budgeting

- This strategy is based on collecting the judgments and experiences of top and middle managers, and available past data concerning similar activities.
- These managers estimate overall project cost as well as the costs of the major subprojects that comprise it.
- These cost estimates are then given to lower-level managers, who are expected to continue the breakdown into budget estimates for the specific tasks and work packages that comprise the subprojects.
- This process continues to the lowest level



## Bottom-Up Budgeting

- **Bottom-up budgeting** starts at the bottom of an organization. A budget is decided by lower-level management and then presented to top management for approval.
- Top management will either approve the proposed budget or send it back down to lower management for review and modification.

## Zero-Based Budgeting

- Zero-based budgeting starts at a zero balance, and expenses are added as they are deemed necessary and are justified.
- This type of budget does not rely on a previous year's performance or actual results.
- Expenses are added on a per-item basis. Each item is analyzed for alternatives that cost less.
- It is also not compared to a prior year's budget.
- It does not matter if the new budget exceeds the spending in a prior year as long as the expenses are justified and have been compared for alternatives.

## Activity-Based Costing

*Projects use activities & activities use resources*

1. Assign costs to activities that use resources
2. Identify cost drivers associated with this activity
3. Compute a cost rate per cost driver unit or transaction
4. Multiply the cost driver rate times the volume of cost driver units used by the project

## Cost Categories

- **Direct (or Variable) Cost** These costs vary with output; e.g., labor costs, material costs, and sometimes the cost of capital equipment such as machinery that performs a specific function on each unit of output.
- **Indirect (or Fixed) Cost** These costs are associated with output, but do not vary with each unit of output; e.g., the cost of capital equipment not charged per piece of output, advertising, distribution, or sales. Costs are charged as a lump sum or as a fixed percent of some direct cost such as labor

- **Overhead Cost** Costs incurred by the firm, but not associated with any specific product or class of products; e.g., cost of building and ground maintenance, utilities, cost of plant security, cost of health insurance and pension plans. Typically charged as a fixed percent of some direct cost such as labor.
- **General & Administrative Cost (G&A)** The cost of administration; e.g., Accounting, Human Resources, and Legal not charged as an Indirect Cost and not included in Overhead Cost. Sometimes the G&A is not reported as a separate item but is included in overhead cost. G&A is usually charged as a fixed percent of a direct cost such as labor
- ***Variiances*** *The pattern of deviations in costs and usage used for exception reporting to management.*

## Planned and actual costs

- **Planned cost – Committed cost = Costvariance**
- Variance can be positive or negative
- Negative variance is always bad, but the positive is not necessarily good.

## Examples

- What is the variance if the budgeted cost is 200 and the actual cost is 250?

$$200 - 150 = \text{variance} \quad \text{thus} \\ \text{Variance} = -50$$

- What is the actual cost if the budgeted cost is 2000 and the variance is 500?

$$2000 - \text{actual cost} = 500 \quad \text{thus} \\ \text{Actual cost} = 1500$$

- What is the planned cost, if the actual cost is 120 and the variance is -30?

$$\text{Planned cost} - 120 = -30 \quad \text{thus} \\ \text{Planned cost} = 90$$

## Shadow price

- **Shadow price**, or **shadow pricing**, is the estimated economic price of projects, activities, goods, and services that have no market price. It also includes projects, etc. for which prices are difficult to estimate.
- The shadow price is the proxy value of a good or project. We often define it by what somebody has to give up to gain an extra unit of that good.

## Example

- A company is considering paying one of its delivery workers overtime to transport a shipment to a customer early.
- If it does this, it has a good chance of getting much more business from the customer.
- The company assigns a shadow price of Rs.10,000. In other words, that is the benefit of having an improved business relationship with the buyer.
- Therefore, management will pay up to Rs.10,000 to the dispatcher to make the delivery.

## Social discount rate

- Social discount rates (SDRs) are used to put a present value on costs and benefits that will occur at a later date.

## Example

- In the context of climate change policymaking, they are considered very important for working out how much today's society should invest in trying to limit the impacts of climate change in the future. In other words, they calculate how much guarding against future carbon emissions is worth to us now, weighing up the benefits future generations would experience against the costs that today's society would have to bear.