MODULE-4

Biomechanics

Anatomy

Physiology

Wage Administration

Incentive schemes

Merit rating

Work system design

Anthropometry

Psychology

Business Process Reengineering

Ergonomics

BVCOENM - Vision & Mission

INSTITUTE

VISION: "Social transformation through dynamic education"

MISSION: To impart quality education to meet the needs of industry, profession and society; and to achieve excellence in teaching, learning and research.

DEPARTMENT

VISION: "To be recognized as leading mechanical engineering discipline by enhancing the knowledge and skills for the sustainable development."

MISSION: *Sociotechnological Skills:* To educate students through various activities including technical education, research and social service.

Centre of Focus: To promote prevailing challenges based projects and activities for socio-economic development.

Competitiveness: To develop competency in graduates for their career development to sustain in challenging environment.

Content

1. Introduction to ergonomics and its scope in relation to work
2. Outline of discipline of anatomy, physiology and psychology, with respect to ergonomics building blocks such as anthropometry and biomechanics
3. Job evaluation, merit rating, incentive schemes, wage administration and business process reengineering

Course Outcome

1. Illustrate the need for optimization of resources and its significance
2. Develop ability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
3. Demonstrate the concept of value analysis and its relevance.
4. Manage and implement different concepts involved in method study and understanding of work content in different situations.
5. ***Describe different aspects of work system design*** and facilities design ***pertinent to manufacturing industries.***
6. Illustrate concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing

Introduction

- Work Systems Design involves:
  - (i) Ergonomics (ii) work measurement and (iii) worker compensation.
- Ergonomics which is relevant in the design of the work system.
- Whenever we are designing a work system, we have to fit, we have to design the work system in such a way that the worker feels comfortable, he/she is not injured or he/she is not feeling unsafe.
- We provide him a safe environment for working.
- We fit the job to the capabilities of the worker.
- This can be achieved through two things:
  - First, We can find out the best method of doing the work using method study,
  - Second, we can find out the time required to do that work using the work measurement or the stop watch time study, we can do work sampling or predetermined motion time system we can use to find out how much time is required for the worker to perform the task.

Ergonomics - Introduction

- Ergonomics is the word derived from Greek which means natural laws of work (**ERGOS** means work and **NOMOS**- means natural law).
- In short it is an economics of work.
- The main aim of this study is to reduce the fatigue and strain of operator and hence, improving his efficiency on the whole
- ***Definition***:- Ergonomics is defined as ***"the study of the relation between man and his occupation, equipment and environment, and particularly the application of anatomical, physiological and psychological knowledge to the problems arising there from".***
- ***"The scientific discipline concerned with understanding of the interaction among the humans and the other elements of a system and the profession that applies theory, principles, methods and data to design in order to optimize the human well-being and overall system performance."***

Ergonomics - Introduction

- Ergonomics brings out the best possible match between the physical and mental demand of work and the capabilities of individual members of the work force so as to optimize, both the productivity of the organization and the health, safety and well being of its people.
- Ergonomics uncovers the new dimension of the relationships between man, machine and the environment to make man-machine systems more efficient and safer.
- Therefore, ergonomics is the application of human biological sciences in conjunction with engineering sciences to the worker and his working environment in order to design the products for worker satisfaction and productivity improvement.

Ergonomics- Objectives

1. To identify basic causes related to human factors by which the efficiency of man-machine is hampered.
2. To provide better working conditions so as to improve productivity of the system.
3. To create adequate facilities to reduce or eliminate the stresses, fatigue and failures in the performance of man-machine system.
4. To provide comforts and make the job easy.
5. To match the requirements of the task with the capabilities of a man and hence eliminate the loss in output.

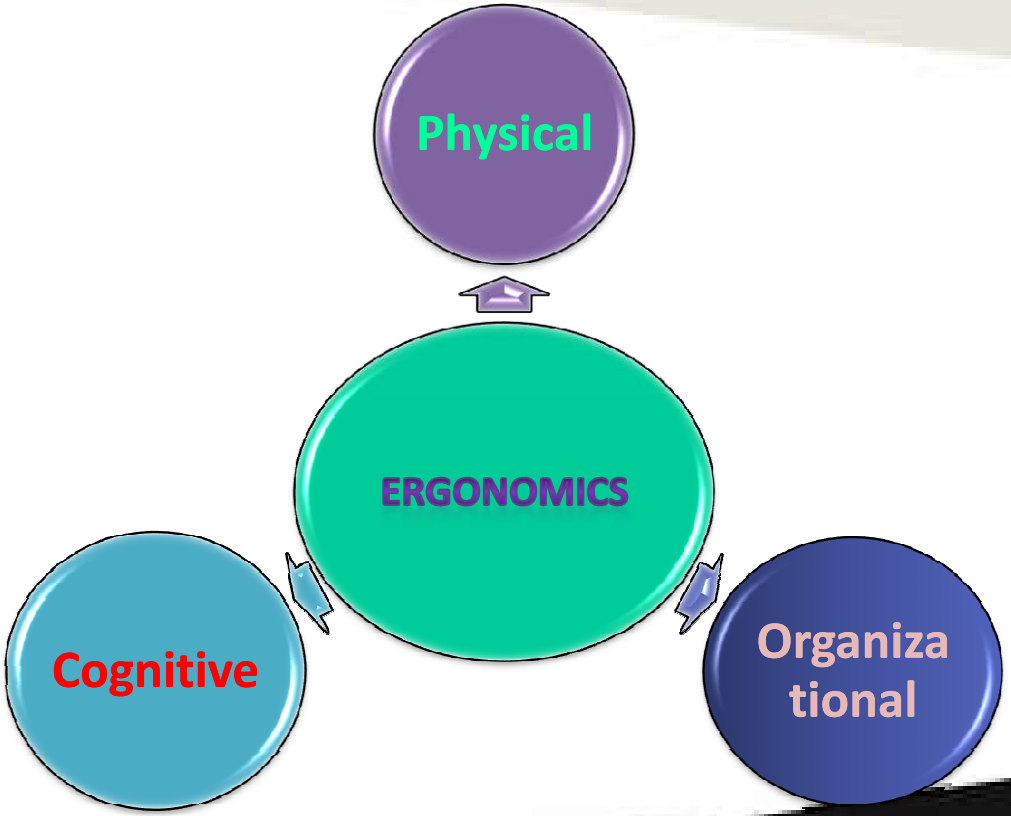
In short,

The objective is to improve the efficiency of operations by taking into account a typical person's height maybe anthropometric data is into picture, in the strength, speed, visual capability and physiological stresses etcetera such as fatigue, speed of decision-making, demand on memory and perception.

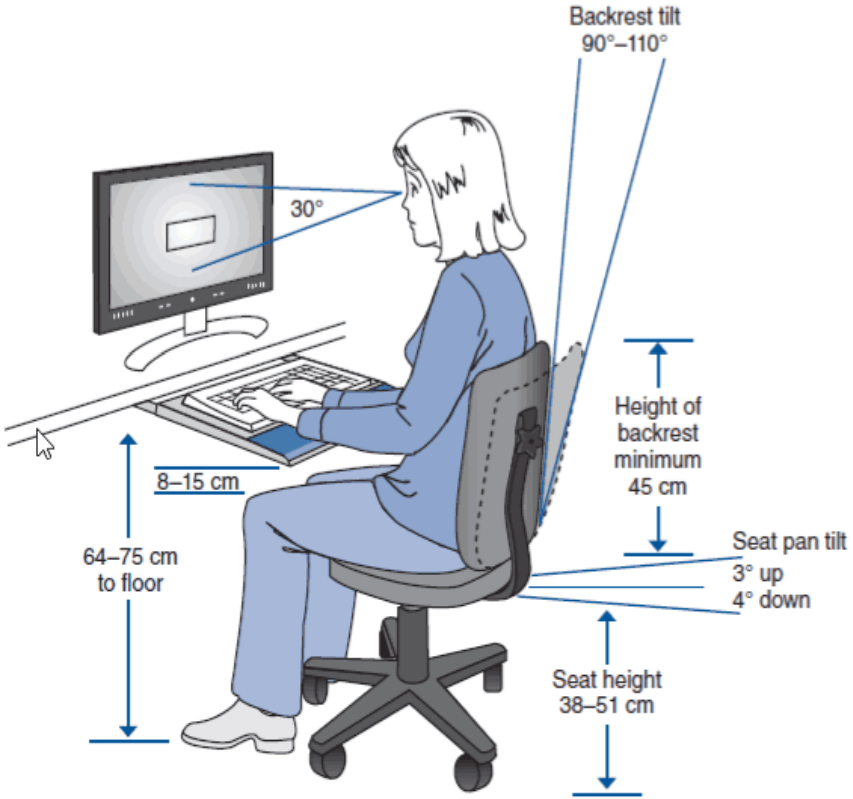
Ergonomics- Advantages

- Higher output.
- Improved productivity.
- Minimum fatigue.
- Greater ease of working.
- Maximum satisfaction to worker.
- Good product design.
- Comfort and convenience.
- Congenial atmosphere.

Type of Ergonomics



Type of Ergonomics



Physical ergonomics is the human body's responses to physical and physiological work load, repetitive strain injuries from repetition, vibration, force and posture fall into this category.

Type of Ergonomics

Organizational Ergonomics deals with organizational structures, policies and processes in the work environment, Such as shift work, scheduling, job satisfaction, motivation, supervision, team work, telecommuting and ethics.

Type of Ergonomics

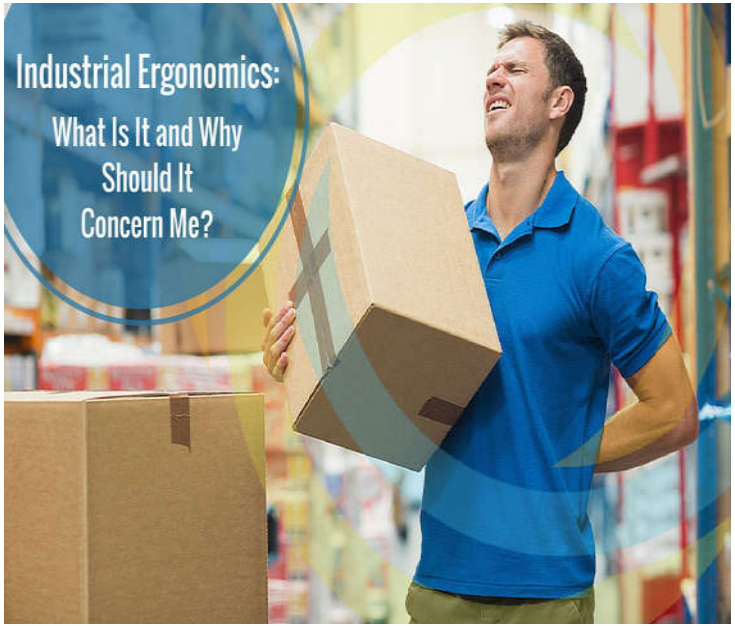
- Diagnosis 01
- Workload 02
- Situation awareness 03
- Decision making 04
- Planning 05

Cognitive Ergonomics is related to the mental processes and the mental capacity of human when at work. Mental strain from workload, decision making, human error and training fall into this category.

Ergonomics- Scope in Work

- ***Engineering :-*** Design of the work system suitable to the worker
- ***Physiology :-*** Study of man and his working environment
- ***Anatomy :-*** Study of body dimension and relations for work design the Anthropometric data,
- ***Psychology :-*** Study of adaptive behavior and skills of the people
- ***Industrial hygiene :-*** Occupational hazards and worker's health

Industrial Ergonomics

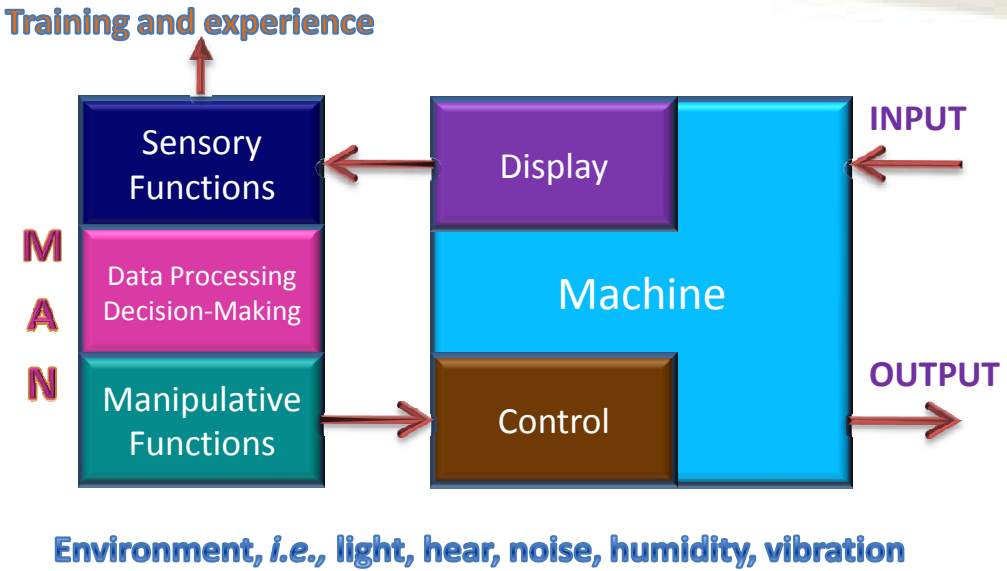


Ergonomics knowledge is derived from the human sciences such as anatomy, physiology and psychology.

A MAN-MACHINE SYSTEM

A man-machine system consists of the following component

1. Design of information displays.
    1. Visual Displays
       (a) Quantitative display
       (b) Qualitative display
       (c) Check display.
    2. Auditory displays
2. Design of controls.
    - **Hand controls, Hand levers, Hand wheels , Push Buttons and Toggle Switches , Cranks, Knobs, Joysticks, Foot pedals**
3. Environmental factors
    - **Illumination, Noise, Vibration, Thermal conditions** (Temperature, Humidity and Air Flow), **Ventilation,**



Anthropometry

- Anthropometry comes from the Greek Anthropos which means human and metron which means measure
- Anthropometry involves the systematic measurement of the physical properties of the human body primarily dimensional descriptors of body size and shape. So body size and shape is an important requirement, ingredient when we are designing the work system.
- Anthropometry plays an important role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of the body dimensions in the population are used to optimize the product.
- Changes in the lifestyle, nutrition and the ethnic composition of the population lead to changes in the distribution of body dimensions and require regular updating of anthropometric data collection.

Anthropometry

- Anthropometry is a science that deals with the measurements of the dimensions and certain other physical characteristics of the body such as volumes, centre of gravity, inertial properties and body segments. There are two primary types of body measurements:
  - Static and dynamic (functional).
- ❖ Static dimensions are measurements taken when the body is in a fixed position. These consist of:
  - Skeletal dimensions (between dimensions of joints).
  - Contour dimensions (skin surface dimensions).
- The body measurements vary as a function of age, sex and for different countries. There are differences in anthropometrics of male and female.
- ❖ The dynamic (functional) dimensions are taken under conditions in which the body is engaged in some physical activity.

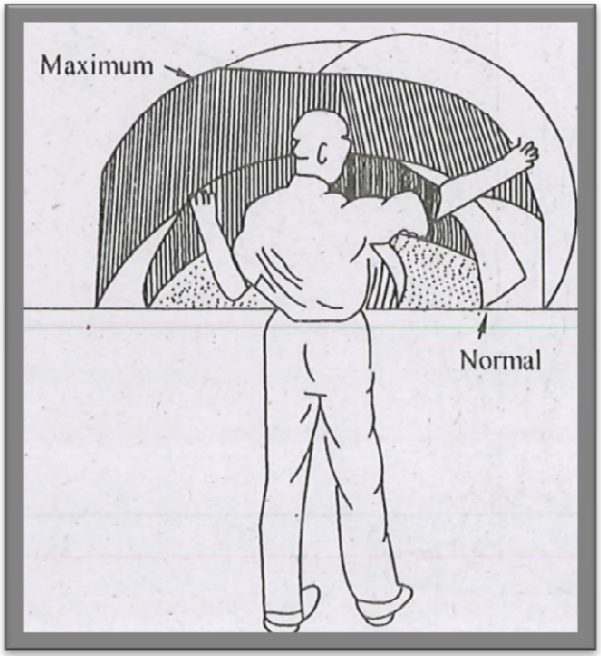
Anthropometry

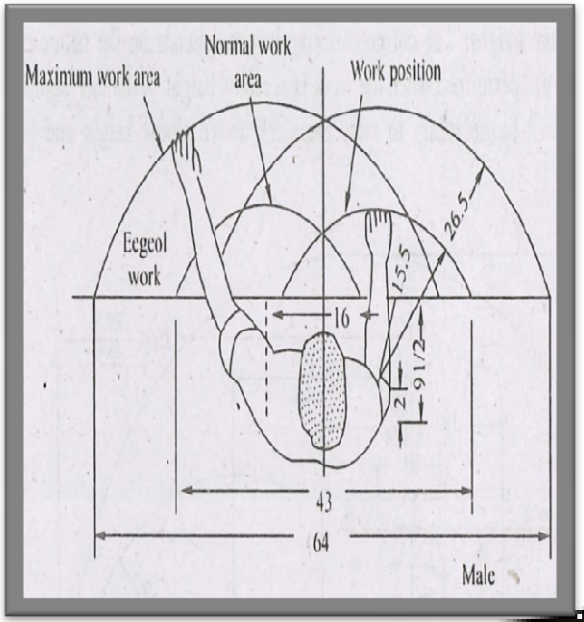
- **Application of Anthropometric ,Data:** It is essential in the design when items are designed for specific groups such as adult males, children, etc., the data used should be specific for such groups in the country or culture in question.
- **Principles in the Application of Anthropometric Data**
  - Design for extreme individuals
  - Designing for adjustable range
  - Designing for average

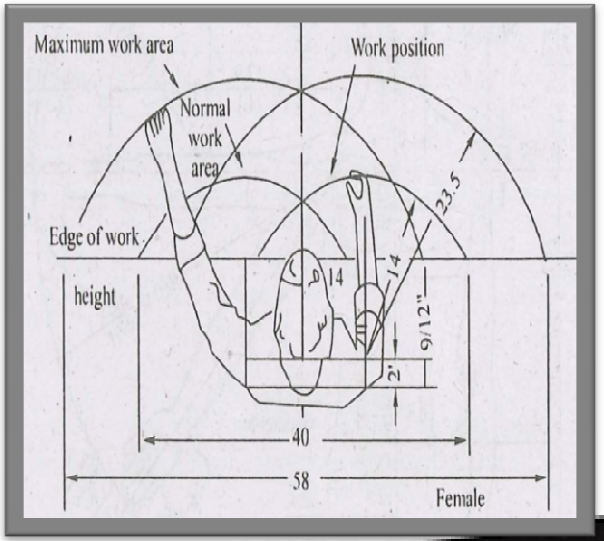
Anthropometry

ANTHROPOMETRY FOR WORKPLACE DESIGN -The design should be in such a way that the operator will have adequate and comfortable posture that he can see what he must an operate his controls in an effective manner.

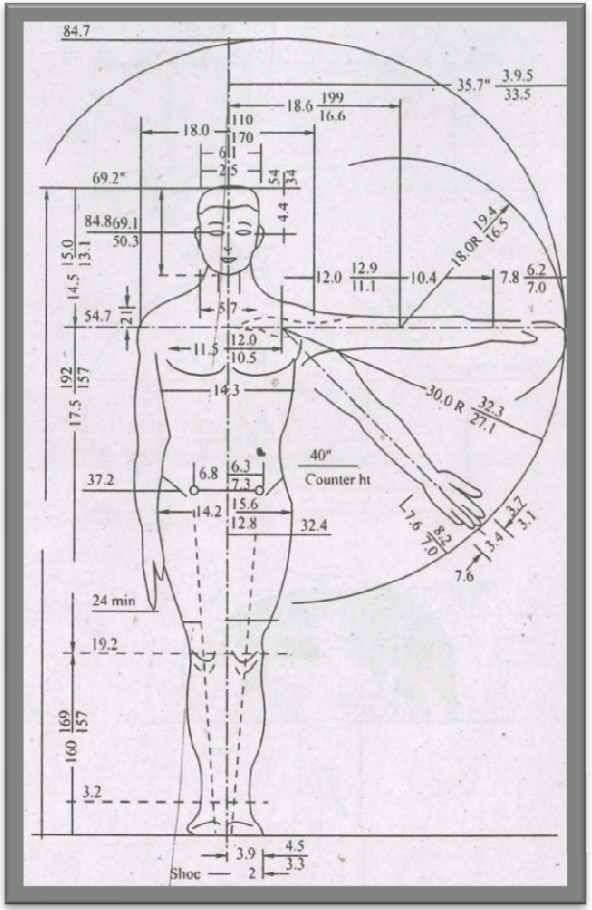
Dimensions of working surface: The normal and maximum working area for an operator is shown in the Figure

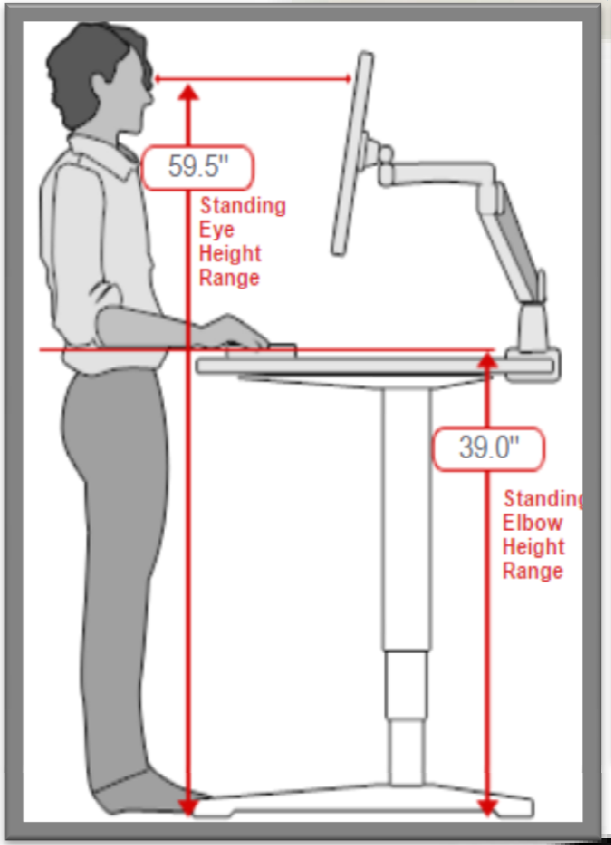


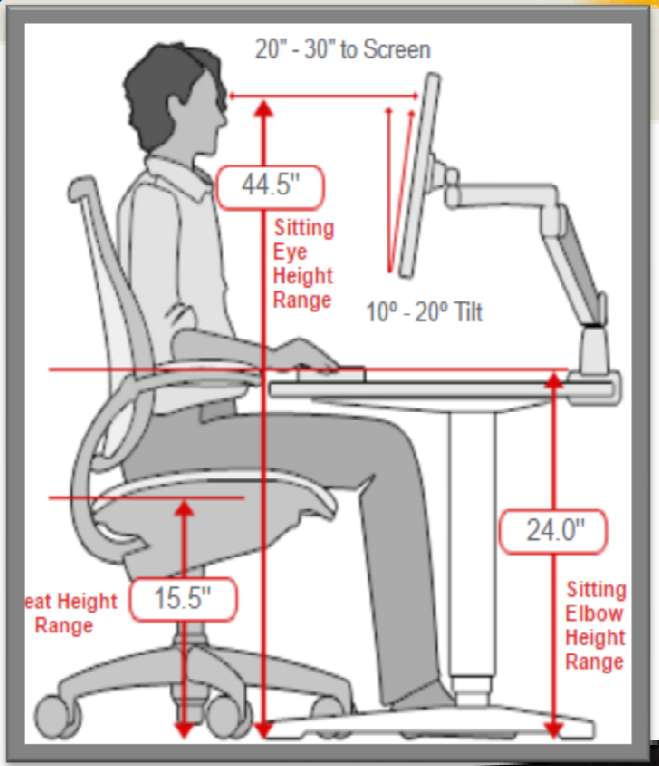




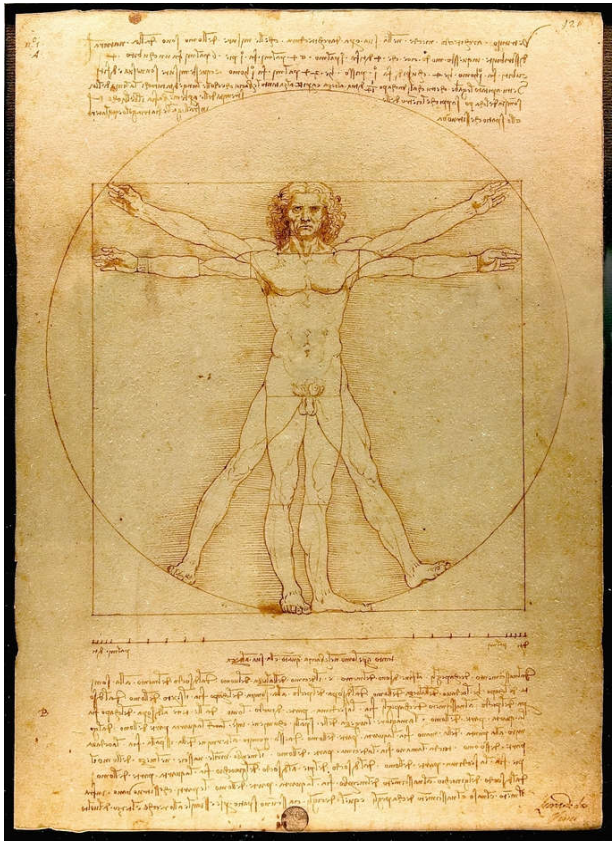
Anthropometry







Anatomy

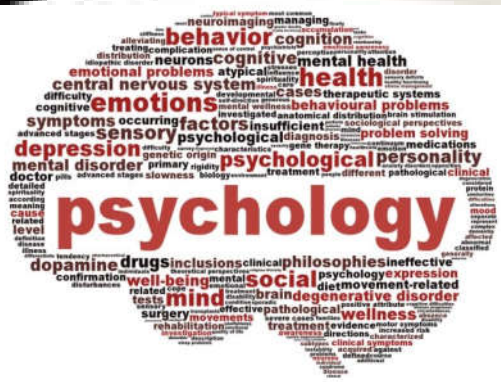


- It is a Greek word (Ana-Tome): meaning cutting up
- Anatomy – the study of the structure of body parts and their relationships to one another
- Vitruvian Man: A drawing created by Leonardo da Vinci. The drawing is based on the correlations of ideal human proportions with geometry described

Physiology

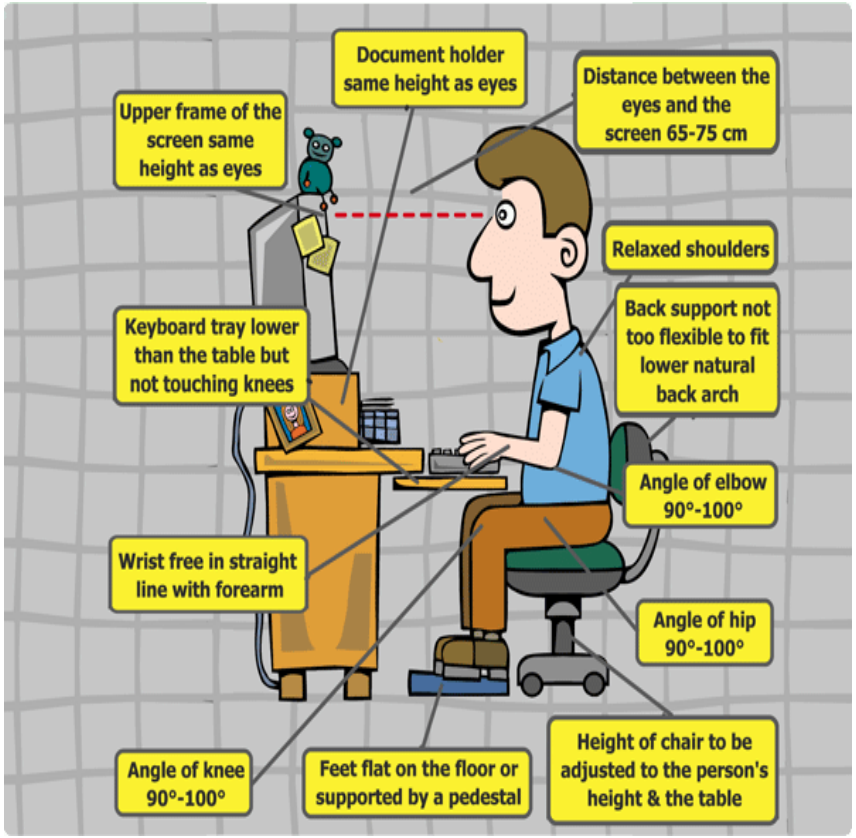
- This area of study is concerned with the determination of
  - The speed, accuracy and force with which body movement can be carried out (max. 4 kcal/min energy can be delivered by human body)
  - The human stamina
  - The influence of working conditions on man
- Factors that Influence Physiology
  - Intrinsic Factors- Nutrients, Metabolism, Heart function
  - Extrinsic Factors -Environmental parameters, Workload

Psychology



- This study is concerned with human behavior and human potentials under various working conditions and under influence of mental stress, strain, fatigue etc.
- It concerns with issues like information processing, decision making capabilities and job satisfaction.

Biomechanics



Definition: "The study of forces acting on and generated within a body and the effects of these forces on the tissues, fluid, or materials used for the diagnosis, treatment, or research purposes."

Job Evaluation

Merit rating

Incentive Schemes

Wage Administration

Business Process Reengineering

Work Compensation (Wages)

- Wages have always been the basic reward for labor
- Because of the difference in wage structure for the same type of jobs, the employee turn over rises
- Employers are also facing the challenges to retain and maintain the skilled workforce and keep wage parity
- For this the first step is job evaluation

Job evaluation

- It is the process to determine in systematic manner and analytically, the worth of each job in the organization based upon the set of carefully selected factors such as skills, effort and responsibility demanded by each job and transferring these worth of jobs into monetary terms.
- For an effective job evaluation, proper description and specification of the job are needed. The main purpose of job evaluation is to decide the basic for wage-payment for different categories of jobs

Job evaluation Objectives

1. The primary objective of Job evaluation is to find out the value of work
2. To formulate an appropriate and uniform wage structures
3. To provide base for recruitment, selection, promotion and transfer of employees
4. To identify training needs
5. To eliminate wage inequalities
6. To establish base for individual performance measurement
7. To clarify authorities and responsibilities
8. To promote good employer-employee relation

Job evaluation Process

Job Analysis
Determine detailed facts about the job

Job Description
Describe clearly the requirements of the job

Job Specification
Specify the attributes possessed by employee to complete the job satisfactorily

Job Classification
Determine the relative worth of job

Wage determination
Compare jobs with predetermined jobs and arrive at suitable wage structure

Evaluate Performance
Evaluate based on job description and specifications

Job Analysis

- ***Job analysis refers to the process of examining a job to identify its component parts and circumstances in which it is to be performed.***
- The job analysis process involves gathering of such information as:
  - What the employee does?
  - How the employee does it?
  - Why the employee does it?
  - The materials, tools and procedures used in the conduct of the work,
  - The physical activities involved in the performance of the work,
  - The conditions under which the work is performed,
  - Typical work incidents and work patterns, etc.

Job Description

Job description answers the following important questions:

1. What tools, materials, and equipment are used to perform the tasks in the job?
2. What methods or processes are used to perform the tasks in the job?
3. What are the specific duties for the position?
4. What are the critical tasks and key result areas (KRAs) of the position?
5. What are the discrete outcomes of the job for which the person appointed will be held accountable and evaluated on?

- Well-written duty statements contain action words which accurately describe what is being done. Duty statements should focus on primary, current, normal, daily duties and responsibilities of the position (not incidental duties, an employee's qualifications or performance, or temporary assignments). Related or similar duties should be combined and written as one statement.
- ***Job description is a broad statement of the purpose, duties and responsibilities of a job or position.***

Job Specification

- What behaviors, skills, knowledge and experience are the most important to the program in achieving the key results and outcomes?

1. Abilities and skills –
   - a) BACKGROUND - Academic and professional qualifications.
   - b) ADVISES, ALLOCATES AND OBSERVES CURRICULUM - Provision, planning and coordination implementation
   - C) ORGANISES, DISCUSSES AND REINFORCES : Pastoral care and personal development, health, safety and welfare, discipline
   - d) FORMULATES, MOTIVATES, REVIEWS - STAFF ORGANIZATION AND DEVELOPMENT – Deployment, empowerment, health, safety and welfare, professional development
   - e) INTERPRETS, TRANSACTS - Relations with other employees & customers, relations with local community.
   - f) DESIGNS, DISCUSSES, ADMINISTERS - management, structure, organizational climate, monitoring and evaluation procedures, administration

Job Specification

2. Relations with others

- a) SUPERVISION (Given) - Coordinating and directing the activities of one or more subordinates.
- b) SUPERVISION (received) - Independence of actions; authority to determine methods of operation.
- c) NEGOTUTING - Exchanging ideas, information, and opinions with others to formulate policies and programs and/or jointly arrive at decisions, conclusions, solutions, or solve disputes.
- d) COMMUNICATING - Talking with and/or listening to and/or signaling people to convey or exchange information; includes giving/receiving assignments and/or directions , feedback.
- e) INSTRUCTING - training colleagues through explanation, demonstration, and supervised practice; or making recommendations on the basis of technical disciplines.
- f) INTERPERSONAL SKILLS/BEHAVIORS

Job Specification

3. Physical demands (movement)
   - CLIMBING - Ascending or descending using feet and legs and/or hands 1 and arms. Body agility is emphasized.
   - BALANCING - Maintaining body equilibrium to prevent falling on surfaces
   - STOOPING - Bending body downward and forward
   - KNEELING - Bending legs at knees
   - CROUCHING - Bending body downward and forward by bending legs and spine
   - CRAWLING - Moving about on hands and knees or hands and feet.
   - REACHING - Extending hand(s) and arm(s) in any direction.
   - HANDLING - Seizing, holding, grasping, turning, or otherwise working with hand or hands.
4. Physical demands (auditory)
   - TALKING - expressing or exchanging ideas by means of the spoken word
   - HEARING - perceiving the nature of sounds

Job Evaluation Systems (Methods)

- Four basic methods have traditionally been mentioned.
- These are:
  - Ranking method
  - Job Classification System
  - Factor comparison method
  - Point Rating methods
- These four basic methods are pure types.
- In practice there are numerous combinations.
- Also, there are many ready-made plans as well as numerous adaptations of these plans to specific organisation needs.

Ranking Method

- The simplest and least formal of all job evaluation systems is known as the Ranking Methods.
- Under this method no effort is made to break a job down into its elements or factors, but the aim is rather to judge the job as a whole and determine the relative values by ranking one whole job against whole job.
- This is usually done by using a narrative position description

Ranking Method Steps

1. The first step in job evaluation is job analysis. Job descriptions are prepared, or secured if already available.
2. Raters who will attempt to make unbiased judgments are selected and trained in the rating procedure.
3. Although ranking is referred to as a "whole-job" approach, different raters may use different attributes to rank jobs. If judgments are to be comparable, compensable factors must be selected and defined.

Ranking Method Steps

4. Although straight ranking is feasible for a limited number of jobs (20 or less), alternate Ranking or paired comparison tends to produce more consistent results.
   - **Straight ranking** involves ordering cards (one for each job) on which job titles or short job briefs have been written.
   - **Alternate ranking** provides raters with a form on which a list of job titles to be ranked are recorded at the left and an equal number of blank spaces appear at the right.
   - The raters are asked to record at the top of the right-hand column the job title they adjudge the highest, and cross out that title in the list to the left.
   - Then they record the lowest job in the bottom blank and the remaining jobs in between, crossing out the job titles from the left-hand list along the way.
5. It is advisable to have several raters rank the jobs independently. Their rankings are then averaged; yielding a composite ranking that is sufficiently accurate.

Ranking Method

Advantages

- Easily understood and easy to administer.
- Sets a better rate than the arbitrary rate based purely on judgment and experience.

Disadvantages

- The classification is in general terms and only an overall assessment is possible.
- In a complex industrial organisation, it is not possible to be familiar with all the jobs and thus general descriptions will not enable correct assessment of the relative importance of all the jobs.
- The grading is very much influenced by the existing wage rates.
- It does not indicate the degree of difference between jobs, but only indicates that one job is more or Less important than another one.

Job classification System

- This method is similar to ranking in that in both methods neither points nor money values are used to classify jobs. No complicated procedures are involved; once the structure and definition of grades are fixed, the evaluation process is comparatively quick and simple.
- However, classification differs from ranking in that the order of operations is reversed.
- First of all, the grades are determined and then the jobs are graded by reference to their content.
- Figuratively, the method may be described as a series of carefully labeled shelves in a bookcase. The primary risk is to describe each of the classes so that no difficulty is experienced in fitting each job into its proper niche. Jobs are then classified by comparing each job to the descriptions provided

Job classification System

- In this method the most difficult and important operation is defining the grades; it should be done so as to bring out perceptible differences between levels of skill, responsibility etc. Before defining the requirements of the various grades it is usual to select those factors, which constitute essential aspects of jobs.
- Skills, knowledge, experience and responsibility required are generally used as basic factors, but the choice and number of factors depend on the nature of the organization's activities. The factors are used to provide general guidance for the decisions but are unweighted and unscored.
- The classification method has historically been the one most widely used for salaried jobs, particularly in government and service occupations, although there is also some evidence of its use in industry.

Job classification Steps

1. ***Obtain Job Information:*** Classification must start with job analysis. Key jobs are analyzed first and their descriptions used in developing grade descriptions; then the other jobs are analyzed and graded.
2. ***Select Compensable Factors:*** This is done by selecting key jobs and other jobs at various levels of the organisation, ranking them, and seeking the factors that distinguish them.
3. ***Determine the Number of Classes:*** The number of classes selected depends upon tradition, job diversity, and the promotion policies of the organisation.
4. ***Develop Class Descriptions:*** This refers to defining classes in sufficient detail to permit raters to readily slot jobs. Usually this is done by describing levels of compensable factors that apply to the jobs in a class.
5. ***Classify Jobs:*** This involves comparing job descriptions with class descriptions. The result is a series of classes, each containing a number of jobs that are similar to one another. The jobs in each class are considered to be sufficiently similar to have the same pay. Jobs in other classes are considered dissimilar enough to have different pay.

Job classification

Advantages

- Comparatively simple and easily administered;
- Since written job descriptions are used evaluation of jobs tend to be in more accurate than under ranking system.

Disadvantages

- Classification is in general terms and only an overall assessment is possible,
- It is very difficult to make comprehensive class specifications for a complex organisation. The specifications tend to overlap and it is difficult to decide which class a particular job belongs, and
- Placing jobs in classes is very much influenced by the existing wage rates.

Factor Comparison Method

- It compares jobs on several factors to obtain a numerical value for each job and to arrive at a job structure. Thus it may be classified as a quantitative method.
- Factor comparison involves judging which jobs contain more of certain compensable factors. Jobs are compared with each other, but on one factor at a time. The judgments permit construction of a comparison scale of key jobs against which other jobs may be compared. The compensable factors used are usually
  - Mental requirements, Physical requirements, Skill requirements, Responsibility, and Working conditions.
- These are considered to be universal factors found in all jobs. This means that single job-comparison scale for all jobs in the organisation may be constructed.

Factor Comparison Method steps

1. ***Selecting bench-mark jobs:*** The jobs selected as benchmark jobs must satisfy a number of conditions. Firstly, they should be capable of clear descriptions and analysis in terms of factors used; secondly, they must be representative of the hierarchy and thirdly, when the rates for the benchmark jobs are to be used as the standard for fixing the wages, these rates should be regarded as appropriate by all concerned.
2. ***Ranking benchmark jobs by factors:*** Once a number of benchmark jobs are chosen, they are ranked successively by reference to each of the factors chosen.
3. **Allocating *money values to each factor:*** The factors comparison method may also be used in fixing up wages in money units by ranking the jobs.
4. ***Ranking other jobs:*** On the basis of job descriptions, each job is analyzed and compared with the benchmark job in terms of each of the factors separately.

Factor Comparison Method steps

Advantages

1. Factor Comparison method permits a more systematic comparison of jobs than the non-analytical methods.
2. Evaluation is easier than by the point method, as a set of similar jobs are compared and ranked against each other,
3. Analysis of benchmark jobs is very comprehensive.
4. In a scheme that incorporates money values, the determination of wage rates is automatic.
5. Reliance of the method on guarantees that the scheme is tailor-made and that the ranking necessarily reflects the actual wage structure while eliminating anomalies.

Disadvantages

- This method is comparatively complicated to apply and difficult to explain to workers.
- The wage rates for the benchmark jobs are presumed to be correct and definitive and all other rates are determined by reference to them.
- It goes against the common belief that the procedures of evaluating jobs and fixing their wages should be kept separate.

Point rating Method

- The point-factor method, or point plan, involves rating each job on several compensable factors and adding the scores on each factor to obtain total points for a job.
- A carefully worded rating scale is constructed for each compensable factor.
- This rating scale includes a definition of the factor, several divisions called degrees (also carefully defined), and a point score for each degree.
- The rating scales may be thought of as a set of rulers used to measure jobs.
- Designing a point plan is complex, but once designed the plan is relatively simple to understand and use.
- While numerous ready-made plans developed by consultant; and associations exist, existing plans are often modified to fit the organisation.

Point rating Method

1. ***Analyze Jobs:*** All jobs may be analyzed at this point, or merely a sample of benchmark jobs to be used to design the plan. A job description is written for each job analyzed.
2. ***Select Cornpensable Factors:*** When job information is available, compensable factors are selected. Although the yardsticks on which jobs are to be compared are important in all job evaluation methods, they are especially important in the point-factor method. Because a number of factors are used, they must be the ones for which the organisation is paying.
3. ***Define Cornpensable Factors :*** Factors must be defined in sufficient detail to permit raters to use them as yardsticks to evaluate jobs.
4. ***Determine and Define Factor Degrees:*** The rating scale for each factor consists of divisions called degrees. The number of degrees depends on the actual range of the factors in the jobs. Decision rules such as the following are useful in determining degree:
    1. Limit degrees to the number necessary to distinguish between the jobs.
    2. Use terminology that is easy to understand.
    3. Use standard job titles as part of degree definitions.
    4. Make sure that the applicability of the degree to the job is apparent.

Point rating Method

5. ***Determine Points for Factors and Degrees:*** Compensable factors are rarely assigned equal weights because some factors are more important than others and should bear more weight. Factor weights may be assigned by committee judgment or statistically. In the committee approach, the procedure is to have committee members.
    1. Carefully study factor and degree definitions,
    2. Individually rank the factors in order of importance,
    3. Agree on a ranking,
    4. Individually distribute 100 percent among the factors.
    5. Reach agreement.
6. ***Write a Job Evaluation Manual:*** A job evaluation manual conveniently consolidates the factor and degree definitions and the point values (the yardsticks .. to be used by raters in evaluating jobs). It should also include a review procedure for cases where employees or managers question evaluations of certain jobs.
7. ***Rate tire jobs:*** When the manual is complete, job rating can begin. Raters use the scales to evaluate jobs. Key jobs have usually been rated previously in the development of the plan. The others are rated at this point..

Point rating Method

Advantages

- The graphic and descriptive types of rating scales used have been accepted as most reliable and valid. Agreement among rates is usually quite close
- Compensable factors are not limited to any particular number. These factors, which the parties decide as important can be used.
- Job classes, which are the aim of all job evaluation systems, are easily set up. Job classes are simply determined in terms of arbitrary point ranges or on agreed point ranges.

Point rating Method

Disadvantages

- It is difficult to develop a point rating scheme. Defining factors and their degrees in such a fashion that all the raters will have the same meaning needs {considerable amount of skill}.
- Assigning proper weightages to each factor and then assigning point values to each degree without being unfair to either easy or difficult jobs, requires careful and detailed study.
- The point factor system is difficult to explain. The concept of factors, degrees relative to weights and points and relating points to money value. cannot be easily interpreted to employees. If the workers do not understand the system clearly, it may have adverse effect.
- Point rating scheme is certainly a time consuming process. Collecting job descriptions, defining degrees and factors, allocating degrees to each factor of each job, co-relating them with points and then ultimately with money value unanimously by evaluation committee is a long process.

Merit Rating (Performance Appraisal)

- Job evaluation evaluates the job and merit rating assess the worth of a person performing the job.
- Merit rating is also called as performance appraisal
- "Performance appraisal is the systematic evaluation of individual with respect to his/her performance on the record of his/her potential for development."
- It evaluate, controls and reviews the performance
- Both job evaluation and performance appraisal are aimed at systematically determining the wage rate paid to the employees

Merit Rating (Performance Appraisal)

Objectives

- The performance appraisal process can be used effectively to govern employee behavior in order to deliver quality product/services.
- It can also be use the performance appraisal process to govern corporate direction in selecting, training, and rewarding personnel, in addition to use it for promotion, termination and compensation. Performance monitoring has been found to be more employee effective.
- It is managerial tool that can facilitate performance level to achieve the organizations' mission and objectives.
- Appraisal systems also have an objective to meet legal requirements, including those for standardized forms and procedures, and clear and relevant job analysis.
- Another objective of performance appraisal is to motivate employees for better performance of task. An effective appraisal generates understanding and commitment leading to increased productivity. The ultimate objective of the performance appraisal is to enhance accountability and improve standard of practice.

Merit Rating

Advantages

1. Useful in rewarding the person and the reward can be linked to the performance
2. Helps in identifying the person's potential to perform assigned job and to decide the future position he/she can take up
3. To identify the training needs of employees
4. Helps in counseling the employees regarding their strength and weaknesses
5. It motivates employee to perform better

Ranking Method

- This is conventional and easy method
- In this, the superior ranks his/her subordinates in the order of their merit, starting from the best to the worst.
- Every employee is judged as a whole without distinguishing the rates from his performance. All that the HR department knows is that A is better than B. The ‘how’ and ‘why’ are not questioned nor answered.
- No attempt is made to fractionalize what is being appraised into component elements. Its advantages include ease of administration and explanation.
- This is applicable to the organization where number of employees are few

Paired Comparison Method

- The paired comparison method is almost similar to ranking method.
- When variations are made in the ranking method so that it can easily be used in large groups, it becomes paired comparison method.
- In paired comparison method, every person is compared trait wise with the other persons one at a time in the group. The number of times one person is compared with others is tallied on a piece of paper. With the help of these numbers, ranks are allotted to the employees.
- Rater is provided with the bunch of slips, each containing a pair of names. The rater puts a tick mark against the person whom he considers better of the two, and the final ranking is determined by taking the total of number of times an employee is ranked better than another employee.
- The performance is the only parameter for comparison

Check List Method

- Under this method, a checklist of statements on the traits of the employees and his or her job is prepared in two columns – viz. a ‘Yes’ column and a ‘No’ column.
- It is a list of statements that indicate the performance of the employees on the job.
- All that the rater has to do is to tick ‘Yes’ column if the answer to the statement is positive and column ‘No’ if the answer is negative.
- The performance of the employee is rated on the basis of the number of positive checks.

Check List Method

These checklists are of three types:

1. **Simple Checklist:**
   - In this method, the printed forms containing descriptive questions about the performance of the employees are provided to the supervisors. The supervisor has two options ‘Yes’ and ‘No’. He ticks the one according to the behavior of the employee and sends the filled form to the personnel department for the final rating.
2. **Weighted Checklist:**
   - In this method, the weights are allotted to the different statements to indicate their importance over the other statements. This method is used particularly with the objective of avoiding scope of personal prejudices.
3. **Forced Choice Checklist:**
   - Five statements for each trait are given in this checklist. These five statements include two most descriptive, two least descriptive, and one neutral statement. The rater has to tick on one statement. This checklist has greater objectivity as compared to the other methods.

Forced Choice Method

- This method requires the rater to choose from statements, often in pairs, that appear equally favorable or equally unfavorable. The statements, however, are designed to distinguish between successful and unsuccessful performance. The rater selects one statement from the pair without knowing which statement correctly describes successful job behavior.

Forced Choice pairs might include the following:

  - (i) (a) Works Hard – (b) Works Quickly
  - (ii) (a) Shows Initiative – (b) Is less responsive to customers
  - (iii) (a) Produces Poor Quality – (b) Lacks good working habits

- This approach is known as forced choice method because the rater is forced to select statements which are readymade. The advantage of this method is the absence of personal bias in rating. The disadvantage is that the statements may not be descriptive of the ratee's trait.

Rating Scales

- In this method, each trait or characteristic to be rated is represented by the scale on which a rater indicates the degree to which an employee possesses that trait or characteristic. This is the simplest and most popular technique for appraising employee performance.
- The typical rating scale system consists of several numerical scales, each representing a job-related performance criterion such as dependability, initiative, attendance, output, attitude and cooperation. Each scale ranges from excellent to poor. The rater checks the appropriate performance level on each criterion, and then computes the employee's total numerical score.
- Subjectivity bias is reduced somewhat when the dimensions on the scale and the scale points are defined as precisely as possible. This can be achieved by training raters and by including descriptive appraisal guidelines in a performance appraisal reference packet.

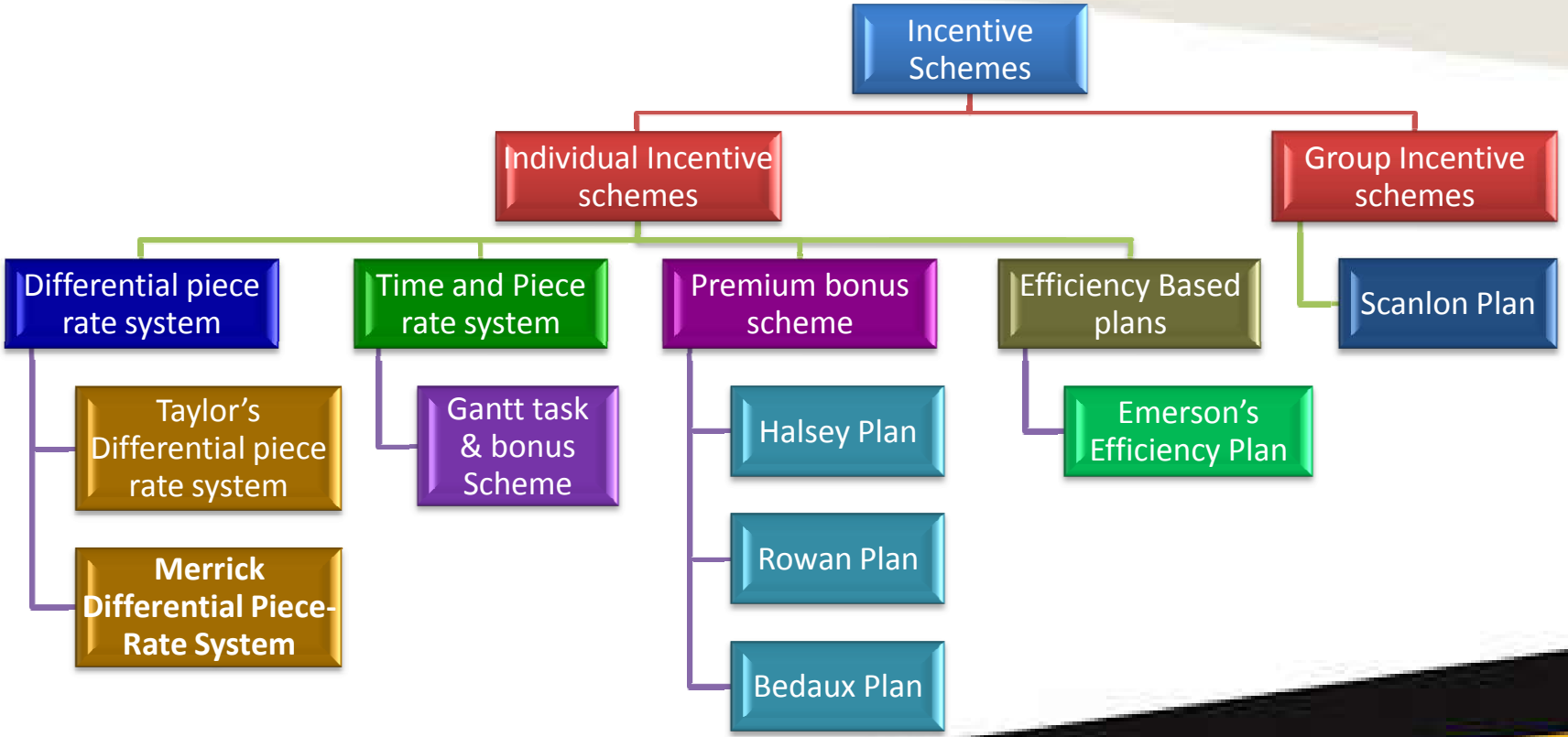
Incentive Schemes

- An incentive scheme is a plan or program to motivate individual or group performance. Incentive program is most frequently built on monetary rewards (incentive pay or monetary bonus), but may also include a variety of non-monetary rewards or prizes.

Features :

- An incentive plan may consist of both `monetary' and 'non-monetary' elements. Mixed elements can provide the diversity needed to match the needs of individual employees.
- The timing, accuracy and frequency of incentives are the very basis of a successful incentive plans.
- The plan required that it should be properly communicated to the employees to encourage individual performance, provide feedback and encourage redirection.

Incentive Schemes



Incentive Schemes

- **There are two types of Incentive Plans:**
  - 1. Individual Incentive Plans and
  - 2. Group Incentive Plans.

1. Individual Incentive Plans:

- Individual incentive plans may be either time-based or production-based. In time-based plans, worker is rewarded for better performance on the basis of time saved in completing a minimum standard of work in standard time. Halsey or Rowan plans are best examples of such plans. Standard time for an operation or for a certain quantum of production is fixed in the first instance.
- Under production based plans, a worker is allowed a standard work to be performed in standard time, and bonus is paid only if he completes the standard work within the given time otherwise no bonus will be paid to him.
- Taylor's and Gantt's plans are best examples of this type. Incentive plans provide that for producing units of work beyond the standard expected of an average worker, an individual receives remuneration increments proportional to increases in output. The worker may be paid on a direct proportion basis or the worker and the company may share the amounts saved by worker's increased output by varying proportions.

Incentive Schemes

Simple Incentive Plan:

- The piece -work method is perhaps one of the oldest and simplest of the incentive plans. Calculations are based on rate per piece multiplied by the number of pieces produced. “Regardless of the approach to standard setting, the base hourly rate for the job is divided by the standard number of pieces per hour set for piece.”

Example:

- Base Rate= Rs. 2 per hr
- Standard number of pieces per hr = 10
- Piece rate = base rate / Standard number of pieces per hr = 20 paisa
- Number of pieces produced by worker = 13
- Piece rate earning = 13 pieces X 20 paisa per hr= Rs. 2.60 per worker per hr

1. Differential piece rate system(Taylor)

Taylor's Differential Piece Rate Plan:

- This system was developed by F.W. Taylor in 1880. Under this plan, there are two piece rates, namely high rate and low rate for each job or task. For each job, standard output and task time are established. If the output of workers is equal to or exceeds the standard, he or she receives wages at the higher rate to enable them to get the bonus.
- On the other hand, if the output of the worker is less than the standard, then he or she receives wages at the lower rate. Then standard is determined on the basis of time and motion studies. This plan is basically designed to encourage the especially efficient worker with a higher rate of payment and to penalize the inefficient worker by a lower rate of payment. However, this plan is rarely used now.
- Under this plan, a "standard of output" is first fixed or determined per hour or per day using time and motion study and then two piece wage rates are prescribed – a relatively high piece rate is applied above the fixed standard and the rate below the standard is very low.

1. Differential piece rate system(Taylor)

- In other words, workers who attain or exceed the standard are paid at the higher rate and those whose output is less, receive the lower rate.
- Since the system does not prescribe any basic guaranteed time wage, it aims of encouraging the best class of workers as against inducing workers of a lower caliber to improve themselves or quit, if they consistently fail to make standard. Thus this system penalizes the slow worker and rewards workers giving high output.
- **Illustration:**
- Standard output = 10 units
- Rate – (i) High rate = Rs. 5 per unit
- (ii) Low rate = Rs. 2 per unit
- Case (i) actual output = 10 units
- In case actual output equal or exceeds standard output, Wages = 10 × 5 = Rs. 50
- Case (ii) in case actual output is below the standard output (actual output = 8 units)
- Wages = 8 × 2 = Rs. 16

1. Differential piece rate system(Merrick)

- This system was developed by D.V. Merrick. This system is the modification of Taylor's system. Merrick realized that it was unreasonable and unrealistic to classify all the employees into two broad categories only, i.e., workers of high efficiency and workers of lower efficiency because there are various degrees of efficiency and there are many workers who actually put their efforts to produce more.
- These kind of persons need to be encouraged. This system introduces three piece rates and made the lowest piece rate equal to the ordinary rate which becomes the base piece rates.
- **The rates introduced by Merrick are the following: Output (Percentage of Task) – Piece Rate Wage:**
- Less than 83% – Basic piece rate, From 83 % to 100% – 110% of basic piece rate
- Over 100% – 120% of basic piece rate
- For the potentially high producer, this plan is a good incentive system. This plan pays a production bonus at 10 per cent of the basic rate to the workers when they reach 83 per cent task and further 10 per cent bonus on reaching over 100 per cent.

2. Time and Piece rate system (Gantt Task)

The Gantt Task and Bonus Plan:

- This is a modified variety of Taylor Plan which guarantees to the worker the payment of ordinary time wages for all output below the standard established by time and motion study. The worker, whose performance is above the standard, is paid a large premium bonus – a bonus percentage multiplied by the value of standard time.
- Under this system, fixed time-rates are guaranteed. Output standard and time standards are prescribed for the performance of each job. Workers completing the job within the standard time or in less time receive wages for the standard time plus a bonus which ranges from 20% to 50% of the time allowed and not time saved. When a worker fails to turn out the required^ quantity of a product, he simply gets his time rate without any bonus.
- **Thus, there are three stages of payment:**

1. Below the standard performance – only the minimum guaranteed wage is to be paid.
2. At the standard performance – this wage plus 20% of time rate will be paid as a bonus.
3. When the standard is exceeded – a higher piece-rate is paid but there is no bonus.

- This system is most profitable for workers whose efficiency is very high. The basic wages rise proportionately as under ordinary piece wage system, and the bonus is allowed on the increased wage. In addition to this, workers with low efficiency are not penalized, as they are in Taylor's Differential Piece Rate.

3. Premium bonus scheme (Halsey)

1. Halsey Premium Plan:

- This plan was developed by F.A. Halsey. This plan attempts to combine the merits of the time and piece rates and eliminate their limitations. Under this plan, certain quantity of work as a "standard output" is fixed on the basis of an average worker's result of past efforts which is to be completed within a prescribed time. A worker who completes the work before that time, receives a reward according to the time saved in the form of a portion of wages in addition to his usual wages.
- An employee taking standard or more time is paid for the time taken by him. An employee completing his or her job in less than the standard time is paid for some of the time saved.
- In other words, if the worker completes the job in less than the standard time, he will receive a bonus payment at his time rate for a specific percentage of the time saved. This percentage may vary anywhere from 30 per cent to70 per cent, but usually it is fixed at 50 per cent (the rest 50 per cent goes to the employer).
- Wages = $(T \times R) + [(S - T)/2] \times R$ Where S = Standard time, T = Time taken
- R = Hourly rate

3. Premium bonus scheme (Halsey)

- For instance, if the time prescribed for a standard work output is 10 hours and this quantity of work is completed in 8 hours, the individual under this plan would receive in addition to hours at time rate, a portion (say 50%) of the two hours saved. Suppose the time-rate is Rs. 1 per hour, the premium bonus under this plan would be-

$$\frac{1}{2}\,(\text{Rate} \times \text{Time saved})$$

$$\frac{1}{2}\,(1 \times 2) = \text{Rs. } 1$$

In total, the worker would receive

$$1 \times 8 + 1 = \text{Rs. } 9$$

Example:

- Standard time =12 hours
- Rate per hour = Rs. 1
- 1st Case –
- Time taken = 12 hours
- Wages = 12 × 1 = Rs. 12
- 2nd Case –
- Time taken =13 hours
- Wages = 13 × 1 = Rs. 13
- 3rd Case –
- Time taken = 10 hours
- Wages = (10 x 1) + [(12 – 10)/2] × 1 = Rs. 11

3. Premium bonus scheme (Halsey)

Merits:

- (a) Halsey plan guarantees minimum wage to all workers, which creates a sense of security.
- (b) The wages of time saved are divided between the employer and employee. Thus, this plan benefits the employer also.
- (c) This plan is simple to introduce and easily understood by the workers. They can easily make their calculations.
- (d) Workers can utilize their saved time in doing other jobs and earn more.

Demerits:

- (a) Difficulty arises in fixing standard time for completing a job.
- (b) Quality of goods may suffer as workers may try to finish the work in the shortest possible time.
- (c) More supervision is required to ensure that workers in their eagerness to complete the work fast do not waste materials unduly or damage the machines and tools.
- (d) Workers do not receive full benefits for their efforts as usually they are paid for half of the time saved, the other half goes to the employer.

3. Premium bonus scheme (Rowan)

Rowan Premium Plan:

- This plan differs from Halsey Plan only in regard to the determination of bonus. In every other respect, both are the same. The worker is guaranteed a minimum wage on the time basis and then a “standard time” is fixed for the completion of every work and if the worker completes the work in less time, he is given a premium bonus of the time actually saved in proportion to the total time.
- **The premium bonus under this plan would be thus equal to** Time Saved divided by Standard Time multiplied by (Time Taken x Rate)
- Suppose the “Time Rate” is 1 per hour, the “Standard Time” is 10 hours, “Time Taken” to complete the work is 8 hours and thus “Time saved” is 2 hours, the premium bonus under this plan would be
- (2 + 10) x (8×1) = (2x8x1)/10 = Rs.1.60
- Thus the bonus would receive in all
- Rs. 8×1 = Rs. 8 + Rs.1.60 = Rs. 9.60

3. Premium bonus scheme (Rowan)

Rowan Premium Plan:

- The plan aims at ensuring the performance of the premium rate, which is often cut by the employer when the worker's efficiency increases beyond a certain limit. It is advocated that the low rates of premium bonus under the Halsey and Rowan Plans provide a really effective guarantee against any rate-cutting by employer and, therefore, the adjustment of remuneration to output on the whole is closer under these systems than it would be under price wages.
- ***Advantages***
- Checks over-speeding, overstrain by worker.
- Assured minimum base-wage.
- Efficiency is rewarded.
- ***Disadvantages***
- Discourages workers to over-achieve.
- Difficulty in ascertaining wages as it requires large data processing.
- Sharing of profit for over-achievement may not be liked by workers.

3. Premium bonus scheme (Bedeaux)

- This plan was developed by Charles E. Bedeaux in 1911. In this plan, each minute of the allowed time is called a Bedeaux point or ‘B’ in short. There are 60 B’s in one hour. Each job has a standard number of B’s and the hourly rate is also determined. In addition to hourly rate, a worker receives a bonus calculated at 75 per cent of the points earned in excess of 60 per hour, multiplied by one-sixtieth of the worker’s hourly rate.
- **For example:**
- Standard time = 12 hours
- Rate per hour = Rs. 1
- Time taken =10 hours
- Standard B’s = 60 × 12 = 720 B’s
- Actual B’s = 60 × 10 = 600 B’s
- Saving in terms of B’s = 120 B’s
- Wages = 10 × 1 = Rs. 10.00
- Bonus = (75/100) × [(120 × 1)/60] = Rs. 1.50
- Total wages = 10 + 1.50 = Rs. 11.50.

3. Premium bonus scheme (Bedeaux)

Advantages

- Minimum base wage is' guaranteed.
- For time saved as compared to standard time, 75% of the compensation is given to worker. Rest 25% may be given to his supervisor.
- Bedeaux point may be added up for a worker even if his job requires different assignments in a day.

4. Efficiency Based plans

Emersion Efficiency Plan:

- Under this system, the worker's daily wage is guaranteed. A standard time is established for a standard task. There is no sudden rise in wages on achieving the standard of performance. The remuneration based on efficiency rises, gradually. Efficiency is determined by the ratio between standard time fixed for performance and the actual time taken by the worker.
- Thus, if the standard time is 8 hours and the actual time is 16 hours, his efficiency is 50%. He who finishes the task in 8 hours has 100% efficiency. No bonus is paid to a worker unless he attains 67% efficiency, at which stage he receives a nominal bonus. This bonus goes on increasing till, when he achieves 100% efficiency, the bonus comes to 20% of the guaranteed wage. At 120% efficiency, worker receives a bonus of 40% and at 140 efficiency the bonus is 60% of day wage.

4. Efficiency Based plans

Merits:

- This plan is simple and easily understood by workers.
- Minimum wages are guaranteed.
- In this plan, whenever the efficiency of a worker reaches 67 per cent he or she will get bonus. In addition, the rate of bonus increases progressively. Thus, it provides a stimulus to employees for increasing their efficiency.

Demerits:

- Employees may not be encouraged to increase their output beyond the standard level, as rewards may be nominal.
- Wage calculations require careful attention.

Group Incentive Plans

- As against individual incentive plans, there are group incentive plans which induce the whole group of workers. Under this system, each member of the group is rewarded on the basis of performance of his group. This system is very useful where output of individual workers cannot be measured although output as a group of workers can be easily measured. The accent in group plans is primarily upon cooperation toward a mutual objective.
- The focus in the group incentive plan is on the group achieving a certain standard of output and thus qualifying for the incentive wage. A team approach is called for, with all the members doing their share to achieve and maintain the output. Such group efforts can be offered group incentives on the basis of the piece work or its variation, as well as the standard hour plan. Some group incentive plans are plant-wide systems from which Scanlon Plan is the most well-known one.

Group Incentive Plans

Scanlon Plan:

- This plan operates at the plant level as a means of achieving union management cooperation towards the goal of increased productivity. The incentive feature of the plan is a bonus that is paid monthly to gain the benefits of prompt reward and which is calculated from savings in labour cost.
- This approach requires the compensation of a normal labour cost per unit of product produced. If through more cooperation and greater efficiency labour costs can be reduced, the entire amount saved, or some fraction, is distributed among the workers in the form of a bonus. For example- it may be determined from past records that labour costs constitute 30% of sales.
- If through cooperative efforts these costs can be reduced to 28%, then 2% of sales is divided among employees on the basis of seniority and/or salary levels. Usually 80% goes into direct bonus and 20% is kept by management for covering deficit periods. Scanlon claimed that individual incentive plans stimulated cut-throat competition to the detriment of the group, whereas group incentives effected constructive cooperation.
- Essential features of the plan are an attitude of labour-management cooperation and a system of processing suggestions for increased efficiency which are evaluated by a complex committee structure giving the union and management equal representation.

Group Incentive Plans

- The plan thus emphasizes participative management and joint planning between the company and the union. Scanlon plan has been adopted with varying degrees of sources in several U.S. organizations; however there are also instances where it has been tried and failed. “It is a difficult plan to put into effect and to maintain because it involves complex changes in the social structure and organization plant and union relationships”.
- There are certain difficulties and problems in the operation of wage incentive plans. In many cases incentive schemes have been abandoned mainly due to the frequent disputes which cause considerable damage to the industrial relations climate at the plant level. There are many instances in which full motivation potential of the incentive is not obtained largely as a result of a quite conscious restriction of output by workers themselves.

Group Incentive Plans

- Group output restriction is not the only problem, there are several other difficulties like the reaction to changes in methods, equipment, and materials; difficulty to set truly appropriate standards. Moreover, deterioration in the quality of the product in order to maintain high output is yet another problem. The setting of timings and base rates is a continuous source of friction, and re-adjustments are difficult to implement.
- There is also a danger that safety regulations would be disregarded by workers and this may result in higher accidents. Workers may tend to over work and undermine their health. Several times, differences in earnings could cause jealousies and misunderstandings among the workers. Many schemes work against those who are willing or disabled or advanced in age. Workers develop a tendency to regard their highest earnings as their expected normal wage and consequently try to push up the base rate.
- Most of these problems revolve around employee fear of management and a desire for security.

Group Incentive Plans

Advantages of group incentive plans:

1. It creates cooperation and team spirit among workers.
2. There is less need of inspection and supervision.
3. The calculation of wages requires less clerical work.
4. It raises production and reduces wastage.
5. It reduces absenteeism.
6. It guarantees time wages and thus it creates a sense of security in the workers' mind.

Disadvantages of group incentive plans:

1. It does not distinguish between efficient and inefficient workers in a group for the purpose of proper distribution of bonus.
2. The incentive may be insignificant to motivate the workers.
3. Difficulty arises in the determination of the basis of distribution of bonus.
4. Jealousy and rivalry among workers defeats the very purpose of teamwork and cooperation.

Group Incentive Plans(Profit-Sharing)

Types of Group Incentive Plan:

1. Profit-Sharing Plan:

- Employee profit-sharing plans constitute one of the more glamorous forms of monetary compensation used in business. In 1897, the International Cooperative Congress defined employee profit sharing as an agreement freely entered into, by which the employees receive a share, fixed in advance of the profits. The employee profit-sharing plans are mainly of two types.
- These are- (i) cash or current distribution and (ii) trust or deferred distribution. In the cash or current arrangement, the benefits are distributed among participants in cash at least once each year. The deferred type involves a trust fund, the benefits from which are distributed in the event of death, retirement or disability. Some managers prefer to place a part the profit share in trust and distribute the remaining part in the form of cash each year.

Group Incentive Plans(Profit-Sharing)

Features of Profit-Sharing:

- **The main features of profit-sharing are the following:**
- The profit-sharing arrangement is voluntary but based on an agreement between the employer and the employee.
- **In it, there is following arrangement:**

1. The amount to be distributed amongst the participants depend upon the profits earned by the enterprise, and
2. The proportion of the profits to be distributed is determined well in advance.

Objectives of Profit-Sharing:

1. To secure employee cooperation and to maintain industrial harmony.
2. To promote employee loyalty towards organization by supplementing his or her earning.
3. To promote increased employee effort.
4. To strengthen unity of interest between the employer and the employees.

Group Incentive Plans(Profit-Sharing)

Advantages of Profit-Sharing:

1. It effects an increase in productive efficiency through reducing costs and increasing output.
2. This scheme is relatively easy and less expensive to adopt.
3. It improves employee morale.
4. It results in cordial relations between the employees and the employer.
5. It reduces labour turnover.
6. It provides security for the employee in the event of disability, death and retirement.
7. It provides additional earning to the employees.
8. It constitutes a mechanism for employees, economic education.
9. It enhances team spirit among employees.

Group Incentive Plans(Profit-Sharing)

Disadvantages of Profit-Sharing:

1. This scheme does not distinguish among individuals on the basis of effort and contribution. In other words, it does not differentiate between efficient and inefficient workers.
2. Besides labour there are many other factors that affect profits. For example, economic and social factors, government policies, demand of the product, etc.
3. The employer may indulge in the manipulation of accounts.
4. Under this scheme, the extra compensation is not paid immediately after the employee effort is made.
5. The main disadvantage of this scheme is its high discontinuance rate. These discontinuances are caused by such factors as employee apathy to profit-sharing appraisal, lack of profits, insufficient share, union opposition and unintelligent plan administration.

Group Incentive Plans(Employee Stock Ownership)

2. Employee Stock Ownership Plans (ESOPs):

- ESOPs reward employees with company stock; either as an outright grant or at a favorable price that may be below market value. These plans are more common among major insurance companies, commercial banks, gas and electric companies and those with over half billion dollars in sales.
- The main objective of ESOPs is to promote a mutuality of interests. Other possible values are the promotion of thrift and security, the creation of an added incentive to work productively and cooperatively and the creation of an additional source of investment capital.

Some salient features of ESOPs are as follows:

1. Generally, a mechanism is adopted through which certain eligible employees may purchase the stock of the company at a reduced rate.
2. Usually, the eligibility is determined by the salary level or years of continuous service or both.
3. There is a provision for installment buying. The employee authorizes a payroll deduction, and stock is periodically purchased for him in the market by the company.
4. Sometimes, there is also a provision of the right to purchase a certain amount of stock in future at a stated price.
5. ESOPs are most widely used in executive compensation plans rather than with the rank and file workers

Wage Administration

- Study of work measurement leads to wage payment.
- Theoretically the wage that worker gets is proportional to the amount of work he does.
- It is a tool to increase effective motivation to work hard and better.
- It constitutes the principal source of income for the workers for the service rendered

Objectives

- Determination of wage structure/level for different positions in the organization
- Determination of wage for each individual employee occupying the position
- Determination of method of wage payment

Wage Administration

Salary

- Paid to white collared employees.
- Paid monthly, or bimonthly
- Contribution of work can not be easily measured.

Wage

- Paid to blue collared employees
- Daily, weekly or monthly work paid
- For jobs which can be measured in terms of money.

Compensation

- It is a comparative term
- It includes wage and all other allowances and benefits like allowances, leave facilities, housing, travel, and non cost such as recognition, privileges and symbols of status.

Wage Administration

Definitions :

- ***Wage:*** These are the payments made by the employer to the efforts put in by the workers towards production. It determines the standard of living and it should represents a fair return for the effort of the workers and also wage should be able to satisfy the primary and secondary needs of workers.
- ***Nominal wage :*** It is the amount if money paid to the worker in cash for the effort of the workers towards production and no other benefits are given to the worker. It is also called as money wage. The rate of this wage may vary from one place to another depending upon the demand and supply of labour and the necessities of life.
- ***Real wage:*** It represents the amount of necessities, comforts, luxuries and cash payment a worker gets in return for his efforts. Some organisation provide their employees certain essential commodities, housing with free electricity and water charges, uniforms and other such facilities in addition to the money in cash. If all these amounts are considered as wage, then it is called as real wage.

Wage Administration

- ***Living wage:*** When the wage rates are such that they are going to fulfill some of the requirements of family like foods, cloths, education and insurance against misfortune along with other basic necessities , they are referred as living wage.
- ***Fair wage:*** It is a wage which is to be considered as a fair amount of return for the efforts of the employees and should be able to cover the other necessities of life, apart from basic necessities like food, cloths and shelter for his family. The rate for the fair wage lies between real wage and minimum wage.
- ***Minimum wage:*** It may be defined as the wage which not only provides for basic subsistence but something more than this. It should be able to keep the employees motivated and it should provide for some measure of education, medical facilities and other essential requirements. It should also consider the cost of living.

Wage Administration

Factors influencing Wage System

It is very difficult to arrive at a wage which may be considered satisfactory for both worker and management. The various factors that determines the wage level are:

1. Labour market, i.e demand and supply of labour
2. Legal and statutory restrictions. (Minimum Wage Act, Payment of Bonus Act, 1965, Employee Provident Fund, Family Pension Fund Act, 1952, Factory Act 1948, Employee State Insurance Act 1948, Payment of Gratuity Act 1992).
3. Organization's ability and willingness to pay.
4. Bargaining capacity of employee and employers
5. Prevailing wage structure in specific sector or industry.
6. Workers skill, knowledge and experience.
7. Wage levels in the specific sector or industry
8. Cost of living

Wage Administration

Characteristics of good Wage System

1. A good wage system should be acceptable to both employees and employers
2. It should guarantee a minimum wage to the employee
3. It should be able to keep worker motivated
4. It should provide a scope for employees to get reward for their additional or extra efforts (Incentives).
5. It should be consistent and should not altered frequently
6. It should believe in equal work and equal pay
7. The system should be simple and easy to understood by all concerned
8. Proper encouragement should be given to utilize the full potential of employees.
9. It should make the work challenging and interesting.

Types of Wage Payments

1. Wage payment on Time basis
2. Wage payment on output basis

Wage payment on Time basis

- Laborers get wage on the basis of time which is utilized in organization irrespective of the quality of work done. These wages may be charged on per hour, per day, per month or per year basis. It is also called as day wages system or time work system where the laborer/ employee is paid on the basis of production hours.
- W=T*R. 20

Suitability of Time Rate System:

- The system may prove to be quite ideal is the following cases:
- Where quality of production is relatively more important than quantity, e.g., tool room, testing and inspection, etc.
- Where it is difficult to measure the performance precisely, e.g., the performance of indirect workers, night watchman, gate-keepers, maintenance and repair work, etc.
- Where output of the worker is beyond his control, e.g., where his speed of work is restricted by the speed of machines or conveyor belts, or where his work is dependent upon the work done by other workers.
- Where close supervision of work is possible.
- Where the nature of work is such that there is no basis for incentive plan, e.g., night watchman.
- Where production is intermittent on account of delays, power shut-down, etc.

Wage payment on Time basis

Advantages Of Time Rate System:

The following are some of the important advantages of time rate system of wage payment:

1. Time rate system is simple to understand and easy to calculate.
2. Time rate system is quite useful for organizations that use costly inputs for quality outputs.
3. Time rate system is beneficial for average and unskilled workers.
4. Time rate system assures regular income and creates the feeling of economic security among the workers.
5. Time rate system does not discriminate the workers and is preferred by trade unions.

Wage payment on Time basis

Disadvantages Of Time Rate System:

The following are some notable disadvantages of time rate system of wage payment:

1. Time rate system does not help in increasing output and improving efficiency as there is no correlation between effort and reward.
2. Time rate system is not justifiable between efficient and inefficient workers and skilled and unskilled workers.
3. Time rate system pays for idle time, which increases the cost of production.
4. Time rate system encourages a slow tendency among workers during working hours and encourages them to work overtime.
5. It is difficult to estimate exact labor cost in advance.
6. It requires strict supervision to get the required quantity of output.

Wage payment on output basis

- Laborers get the wages on the basis of their work done. No time element will be used for calculation of wages. Under this method, laborer tries his best for producing the products faster for getting more wages. This method is also called payment by result. In simple words the employee is paid on the basis of the work done.
- W=U*R.

Suitability of Piece Rate System:

- Where production quantity is more important than the quality of the product.
- When the work is of repetitive nature.
- When the mass manufacturing system of production is followed and the work is standardized suitable for continuous manufacturing.
- When it is possible to measure the production output of worker separately.
- When strict supervision is not required and difficult.
- When the production is dependent on human efforts.

Wage payment on output basis

Advantages Of Piece Rate System:

The following are some important advantages of piece rate system of wage payment:

1. Piece rate system pays wages according to the output produced by the workers. It encourages efficient workers.
2. Piece rate system helps to reduce idle time.
3. Piece rate system gives incentives to the workers to adopt a better method of production for increasing their production and earning.
4. Piece rate system helps the management to determine the exact labor cost per unit for submitting quotation.
5. Piece rate system reduces per unit cost of production due to increased volume of production.
6. Piece rate system requires less supervision cost.

Wage payment on output basis

Disadvantages Of Piece Rate System:

The following are the notable disadvantages of piece rate system:

1. Piece rate system does not help in producing quality output as the workers are concentrated more on quantity instead of quality.
2. Piece rate system does not help for a uniform flow of production and makes difficult to regulate the production schedule.
3. It is very difficult to fix an acceptable and reasonable piece rate for each item of output or job.
4. Piece rate system adversely affect the workers' health as well.
5. It requires extra supervision cost for quality output and effective use of materials, tools and equipment.

Business Process Reengineering

- Michael Hammer and Champy, the management experts, who initiated the reengineering movement, defines reengineering as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed."
- Generally the topic of BPR involves discovering how business processes currently operate, how to redesign these processes to eliminate the wasted or redundant effort and improve efficiency, and how to implement the process changes in order to gain competitiveness. The aim of BPR, according to Sherwood-Smith (1994), is "seeking to devise new ways of organizing tasks, organizing people and redesigning IT systems so that the processes support the organisation to realize its goals".
- BPR seeks to break from current processes and to devise new ways of organizing tasks, organizing people and making use of IT systems so that the resulting processes will better support the goals of the organisation. This activity is done by identifying the critical business processes, analyzing these processes and redesigning them for efficient improvement and benefit.

Business Process Reengineering

According to (Carr 1993) for successful implementation of Business reengineering process the following conditions are desirable:

- Leadership and guidance from top management
- External focus through customer research, competitive and economic analysis and benchmarking
- Top level strategy to guide change and leaders who can implement change
- Methods for redesigning processes to meet performance targets
- Use of advance information technology
- Effective change management and ability to develop organizational culture

Business Process Reengineering

BPR tends to change the operation in a dramatic way and some of the core focus areas for BPR implementation are listed below:

- Customer orientation
- Process orientation
- Focus on core business
- Rule breaking –
- Devotion for simplification
- Creative use of information technology
- Rapid payback

Business Process Reengineering

Principles of Reengineering

Reengineering is about achieving a significant improvement in processes so that contemporary customer requirements of quality, speed, innovation, customization, and service are met. Hammer has proposed seven principles or rules for reengineering and integration.

- **Rule-1 Organize around outcomes, not Tasks** : Several specialized tasks previously performed by different people should be combined into a single job. The new job created should involve all the steps in a process that creates a well-defined outcome.
- **Rule 2** Have those who use the output of the process perform the process: Work should be carried out where it makes the most sense to do it. This results in people closest to the process actually performing the work, which shifts work across traditional infra - and inter organizational boundaries.

Business Process Reengineering

- **Rule 3**. Merge Information: Processing work into the real work that produces the information: This means that people who collect information should be responsible for processing it, it minimizes the need for another group for reconcile and process that information, and greatly reduces errors by cutting the number of external contact point for a process.
- **Rule 4**. Treat Geographically Dispersed Resources as Though they were Centralized: Information technology now makes the concept of hybrid centralized/decentralized operations a reality. It facilitates the parallel processing of work by separate organizational units that perform the same job, while improving the company's overall control.

Business Process Reengineering

- **Rule 5** Link Parallel Activities Instead of Integrating Their Results: The concept of integrating only the outcomes of parallel activities that must eventually come together is the primary cause for rework, high costs, and delays in the final outcome of the overall process. Such parallel activities should be linked continually and coordinated during the process.
- **Rule 6.** Put the Decision Point where the work is performed and Build Control into Process: Decision making should be made part of the work performed. This is possible today with a more educated and knowledgeable workforce plus decision-aiding technology. Controls are now made part of the process. The vertical compression that results produces flatter, more responsive organizations.
- **Rule 7**. Capture Information Once- at the Source: Information should be collected and captured in the company's on-line information system only once - at the source where it was created. This approach avoids erroneous data entries and costly reentries.

Business Process Reengineering

Organizational Changes by implementing BPR

Hammer and Champy (1993) emphasize that the following changes occur within the organization by application of BPR in the organization.

- Work unit changes from functional departments to process team. It is a team that naturally falls together to complete a whole piece of work - a process. According to Drucker (1992) the team 'performs' and the members only 'contribute'. Task flexibility is a central aspect of lean production system (Womack et.al., 1990),
- Job changes from simple tasks to multidimensional work. Decentralization of planning, control and several support activities, implies job enrichment for members of process team, but also requires employees to succeed. Elimination of non value adding activities is a primary task resulting in cost reduction due to which resources are freed to reinforce value adding activities.

Business Process Reengineering

Organizational Changes by implementing BPR

- Job preparation changes from training to education. After BPR the jobs are not structured and employees who are members of process team will have to perform multi dimensional jobs.
- To empower the team member, transfer of knowledge is a must which will help team members in making judgment and taking decisions.
- Focus of performance measurement shifts from activity to result
- Advancement criteria changes from performance to ability
- Values change from protective to productive which is measured by customer satisfaction.
- Organization structure changes from hierarchical to flat.
- Managers change from scorekeeper to leaders.

Business Process Reengineering

Characteristics Of Reengineering

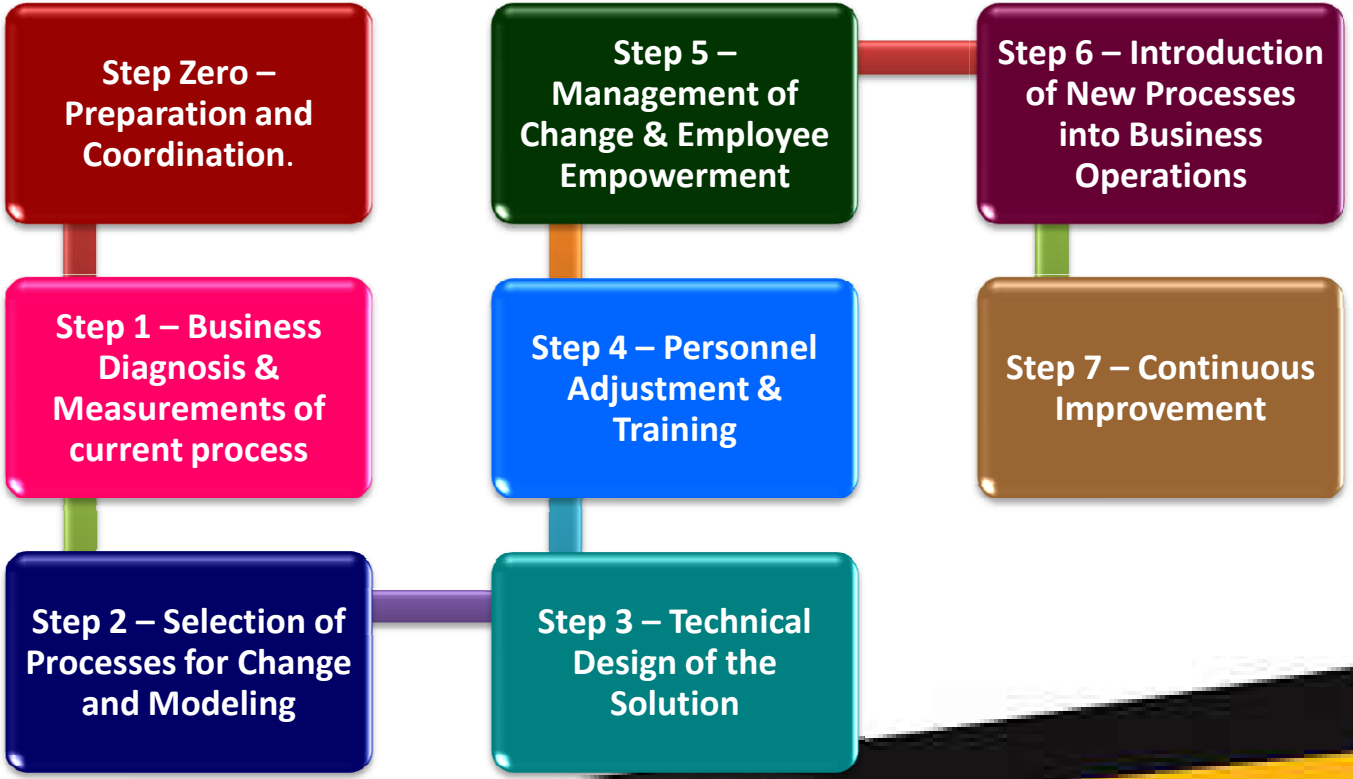
- ***Several jobs are combined into one*** :- In this case one person will be doing all the tasks. Such a person will be known as a case worker. In some cases it is not possible to compress all the steps of a lengthy process into one integrated job performed by a single person. In those situations, the company may require more persons, each managing parts of a process. Such a team will be known as a process team. In both the cases, the worker involved should be multi-skilled as his work becomes multidimensional.
- ***Processes have multiple versions :-*** This refers to the end of standardization. To meet the demands of today's environment, we need multiple versions of the same process, each one tuned to the requirements of different market situations or inputs. Traditional one-size-fits-all processes are usually very complex, since they must incorporate special procedures and expectations to handle a wide range of situations. A multi-version process, by contrast, is clean and simple because each version needs to handle only the case for which it is appropriate.

Business Process Reengineering

- ***Work is performed where it is directly needed :-*** This means that work should be shifted across the organizational boundaries, i.e. the work should be done at the place where it is required most. Hammer cited the example of purchasing stationery items. When done by a central purchasing department, there is an inevitable delay. So, purchasing has to be done by the user department which requires the stationary items.
- ***Non-value adding activities are reduced :-*** For effective reengineering, checks and controls should be minimized. Reengineering processes use controls only to the extent they make economic sense. In the reengineering environment a larger number of people are empowered, so people become responsible for the end product. Engineering company may look like a centralized as well as decentralized system Companies which have reengineered their processes have the privilege to get the advantages of centralization and decentralization in the same process mostly on account of availability of modern IT facilities. In fact, the above mentioned six characteristic from the basic design principles for BPR.

Business Process Reengineering

Methodology



Business Process Reengineering

A BPR program will fail due to the following:

- **Lack of recognition of the extent of the problem**: If there is no clear willingness to put all existing processes to the test, there is no chance of success
- **Lack of training**: Without training, BPR will fail. This is because it will be seen as a one-time, cost-cutting exercise. But in reality, cost reductions are byproducts of the activity and not the primary concern.
- **Inadequate infrastructure**: There is need for adequate infrastructure and support from the management and employees. Many BPR initiatives never take off because effort is not put into securing support.
- **Optimizing one department at the expense of another**: There needs to be an openness in evaluating every single process in detail. Likewise, there should be a willingness to change whatever is needed to achieve overall efficiency.
- **Lack of time to focus on improving business process**: There is too much internal focus and not enough of an eye on the industry and what competitor best practices can be used as benchmarks.

Business Process Reengineering

Companies That Have Used BPR

Many public and private sector organizations and SMEs world-wide have undergone major Business process reengineering efforts. These top tier have applied BPR and seen positive results. Some of them include:

- IBM
- AT&T
- Sony
- General Electric
- Walmart
- Hewlett-Packard
- DEC
- Kraft Foods
- Citibank
- Northwestern Bank
- Bank of America

University Questions

1. Classify the different types of displays and controls with respect to work system design.
2. Importance of Anatomy in Ergonomics
3. Define Ergonomics and discuss its scope. Explain ergonomics design considerations in relation to work.
4. ‘An effective job evaluation program can help in improving productivity’, Explain the statement by using any one method of job evaluation.
5. What are the characteristics of good wage systems
6. What are the different methods of merit rating?
7. What is anthropometry? How is anthropometry data used in design?
8. Importance of ergonomics in work process layout.
9. Short note- Job evaluation

University Questions

10. What is job evaluation? What objectives are achieved from scientific job evaluation?
11. Define ergonomics. Explain the importance of anatomy, physiology and psychology w.r.t ergonomic discipline
12. Define ergonomics and discuss its scope. Explain ergonomic design consideration in relation to work.
13. Define the term ergonomics? What are it's objectives?
14. What are incentive schemes? What are the characteristics of good incentive schemes?
15. What do you understand by Job Evaluation? What are it's objectives?