

UNIT-IV

Fundamentals of Management for Engineers

Syllabus

Introduction to Work Analysis, Definition, need and scope of work analysis,

Method Study: Objectives, Step-by-step procedure, Charts and diagrams for recording data, Principles of Motion economy, Therbligs,

Work Measurement: Definition, Various techniques of work measurement such as Work Sampling, Stop Watch Time Study, Analytical Estimating, Predetermined Motion Time System, Need for operator rating, Methods of rating, Allowances and their types, Standard time

Work Study

Definition-

“Work study is a generic term for those techniques, particularly method study and work measurement, which are used in all its context and which lead systematically to the investigation of all the factors, which effect the efficiency and economy of the situation being reviewed in order to effect improvement.”

Role of work-study.

1. To standardize the method of doing a work,
2. To minimize the unit cost of production,
3. To determine the standard time for doing a task,
4. To minimize the material movement, and operators movement,
5. To eliminate unnecessary human movements,
6. To utilize facilities such as man, machine and materials most effectively, and
7. To a systematic investigation of all factors.

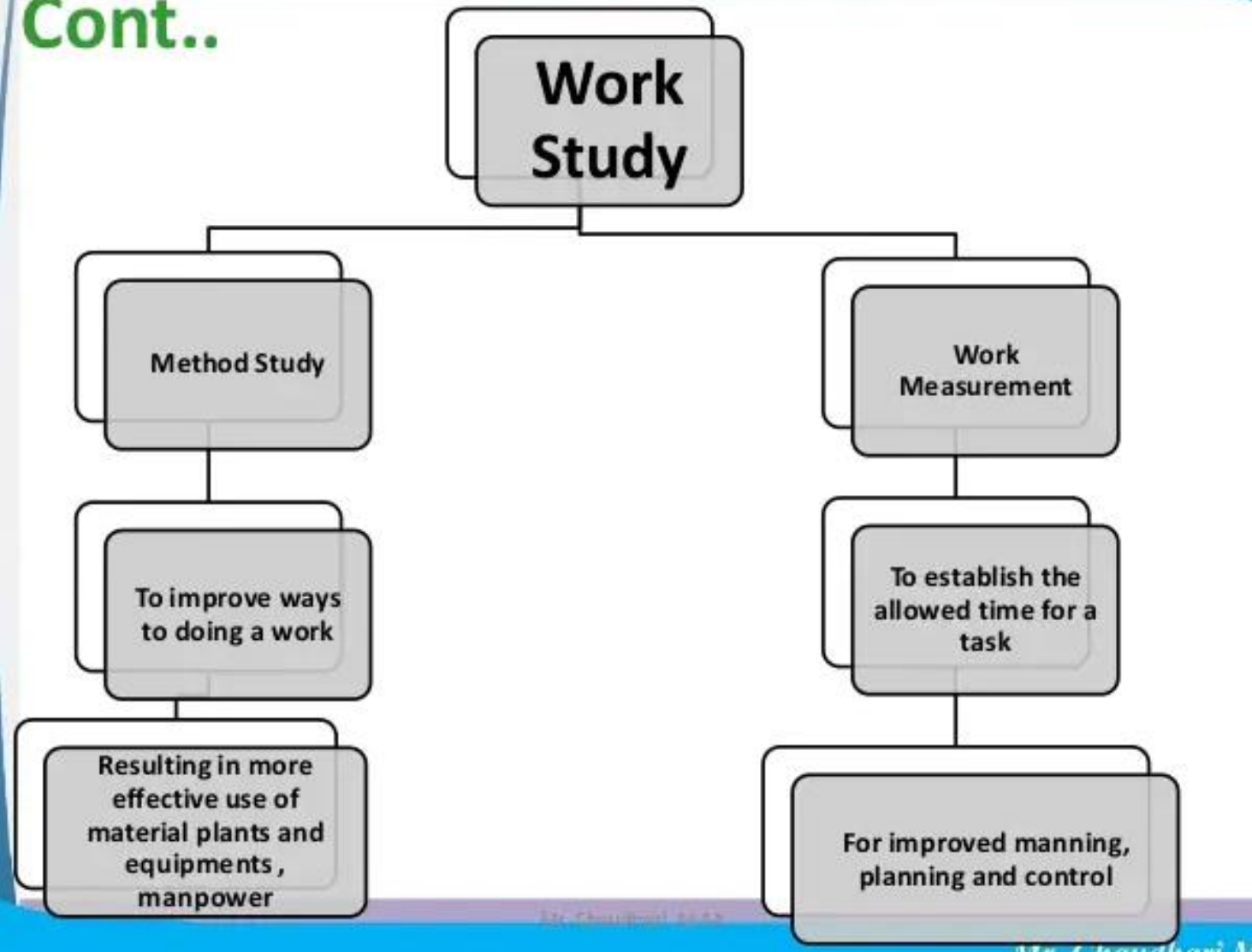
Objective and scope of work-study

1. Increased efficiency,
2. Better product quality,
3. To choose the fastest method to do a job,
4. To improve the working process,
5. Less fatigue to operators and workers,
6. Effective labor control,
7. Effective utilization of resources,
8. To decide equipment requirements,
9. To pay fair wages,
10. To aid in calculating exact delivery,
11. To formulate realistic labor budgeting, and
12. To decide the required manpower to do a job.

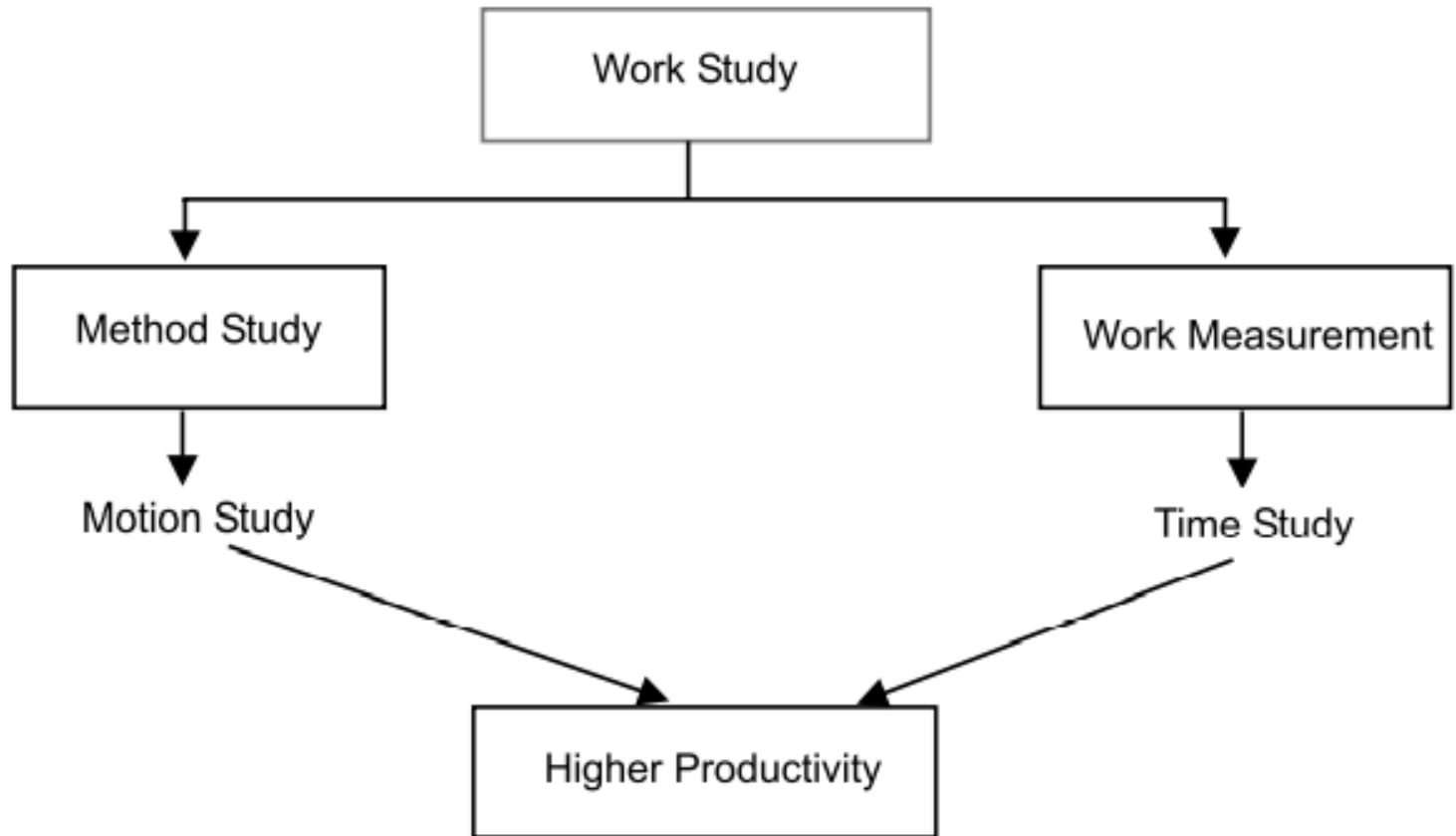
Human factors in work-study

1. Physical factors
2. Biological factors
3. Psychological factors
4. Work factors
5. Organizational factors

Cont..



Method study and work measurement is part of work study.
Part of method study is motion study, work measurement is also called by the name 'Time study



Advantages of work study

1. Work study ensures higher productivity,
2. Better working conditions with less fatigue,
3. Higher wages to workers,
4. Uniform production flow,
5. Job satisfaction and job security to workers,
6. Reduction in unit cost of production,
7. Quality products to consumers,
8. Fast delivery schedule,
9. Harmonious employer-employee relation, and
10. Better service to customers. Cont..

What do you mean by work analysis?

Work analysis is a **process used to understand what the important tasks of the job are**, how they are performed, and what human attributes are necessary to carry them out successfully. Work analysis is an attempt to develop a theory of human behavior about the job in question to support management decisions.

Work Analysis

Work analysis—a systematic process of gathering information about work, jobs, and the relationship between jobs.

Chronological steps in conducting effective work analysis

- what are the required outcomes/measures for assessing strategy execution (e.g., customer requirements for products/services derived from the strategic plan)?
- what are necessary, critical, essential tasks, activities, behaviors, required to meet or exceed the requirements established in step 1? What are the relative importance, frequency, and essentiality of these tasks for achieving measures at step 1?
- what are the necessary knowledge, skills, abilities and other characteristics or competencies required to perform the activities at step 2?
- how should jobs/work be defined? Where does the work get done to maximize efficiency/effectiveness? Do we use individual jobs, work teams, independent contractors, full-time/part-time? Do we outsource?

What Are the Major Goals for Work Analysis?

- The objective of work analysis should be the description of observables – behavior or trait often not observable but products, outcomes, kinds of materials, and people included in decision process are
- work analysis consists of a description of work behavior independent of the personal characteristics of particular people who perform the job – focus is on the position, not on the person in the position
- work analysis data must be verifiable and reliable – organization must maintain records of the work analysis data, and be able to justify job analysis judgments

Products of Work Analysis

Major products of work analysis:

- job description
- job classification
- job evaluation
- job design/restructuring
- job specifications
- performance appraisal
- worker training
- worker mobility/succession planning
- Efficiency
- Safety
- human resource planning
- legal/quasi-legal requirements

Dimensions on Which Work Analysis May Vary

❖ Types of Information

- task- or job-oriented
- person- or worker-oriented
- trait-oriented

❖ Form of the job information

- qualitative or quantitative

❖ Level of standardization of information

- quantitative information
- content similar for group of jobs

❖ Sources of job information

- recording devices, diaries, job incumbents

Collection Methods Major collection methods of work analysis

Observation—direct observation of job duties, work sampling or observation of segments of job performance, and indirect recording of activities

Performing the job —actual performance of job duties by the analyst interviews—individual and group interviews with job incumbents, supervisors, subordinates, clients, or other knowledgeable sources

Critical incidents—descriptions of behavioral examples of exceptionally poor or good performance, and context and consequences in which they occur

Diaries—descriptions of daily work activities by incumbents

Background records —review of relevant materials including organization chars, Dictionary of Occupational Titles (DOT), company training manuals, organizational policies and procedures manuals, or existing job descriptions

Questionnaires—structured forms and activity checklist

Method study

Definition

- The systematic recording and critical examination of existing and proposed ways of doing work as a means of developing and applying easier and more effective methods, and reducing costs.
- Method study is a systematic method of analyzing the method of doing a job including human movements involved in it.
- Method study is basically conducted to simplify the work or working methods and must go towards higher productivity.
- It is always desirable to perform the requisite function with desired goal minimum consumption of resources

Fundamentally method study involves the breakdown of an operation or procedure into its component elements and their systematic analysis. In carrying out the method study, the right attitude of mind is important. The method study man should have:

1. The desire and determination to produce results.
2. Ability to achieve results.
3. An understanding of the human factors involved.

Method study scope lies in improving work methods through process and operation analysis, such as:

1. Manufacturing operations and their sequence.
2. Workmen.
3. Materials, tools and gauges.
4. Layout of physical facilities and work station design.
5. Movement of men and material handling.
6. Work environment

There are three aspects of its application:

- *Method study proper is concerned with broad investigation and improvement of a shop/section, the layout of equipment and machines and the movement of men and materials.*

- 1) **Motion study** is a more detailed investigation of the individual worker/ operator, layout of his machines, tools, jigs and fixtures and movement of his limbs when he performs his job.
- 2) **The ergonomics aspect** i.e. study of environment, body postures, noise level and surroundings temperature also form part of investigation.
- 3) **Micro motion study** i.e. much more detailed investigation of very rapid movements of the various limbs of the worker.

Objectives of method study

Method study is essentially concerned with finding better ways of doing things. It adds value and increases the efficiency by eliminating unnecessary operations, avoidable delays and other forms of waste.

The improvement in efficiency is achieved through:

1. Improved layout and design of workplace.
2. Improved and efficient work procedures.
3. Effective utilisation of men, machines and materials.
4. Improved design or specification of the final product.

The objectives of method study techniques are:

1. Present and analyse true facts concerning the situation.
2. To examine those facts critically.
3. To develop the best answer possible under given circumstances based on critical examination of facts.

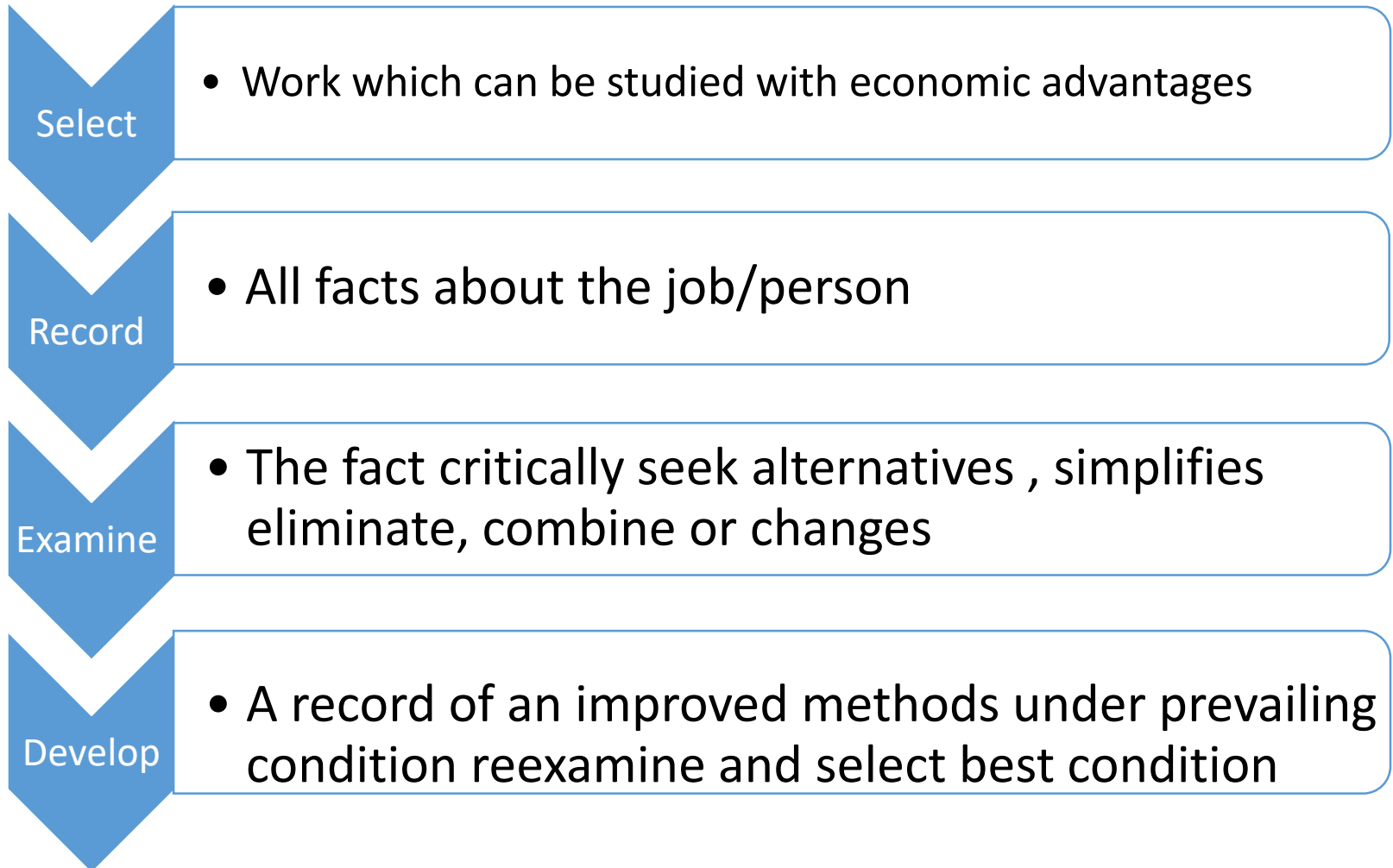
Scope of Method Study

The scope of method study is not restricted to only manufacturing industries. Method study techniques can be applied effectively in service sector as well. It can be applied in offices, hospitals, banks and other service organizations.

The areas to which method study can be applied successfully in manufacturing are:

1. To improve work methods and procedures.
2. To determine the best sequence of doing work.
3. To smoothen material flow with minimum of back tracking and to improve layout.
4. To improve the working conditions and hence to improve labour efficiency.
5. To reduce monotony in the work.
6. To improve plant utilization and material utilization.
7. Elimination of waste and unproductive operations.
8. To reduce the manufacturing costs through reducing cycle time of operations

Procedure of method study



Evaluate

- Evaluate different alternative to developing anew improved method comparing the cost-effectiveness

Define

- Method, procedure, layout, equipment working condition, quality instruction

Install

- The improve method plan arrange and implement

Maintain

- Verify at regular interval that the improved is in use

Selection of the Job for Method Study

Cost is the main criteria for selection of a job, process and department for methods analysis. To carry out the method study, a job is selected such that the proposed method achieves one or more of the following results:

- (a) Improvement in quality with lesser scrap.
- (b) Increased production through better utilization of resources.
- (c) Elimination of unnecessary operations and movements.
- (d) Improved layout leading to smooth flow of material and a balanced production line.
- (e) Improved working conditions.

CONSIDERATIONS FOR SELECTION OF METHOD STUDY

The job should be selected for the method study based upon the following considerations:

1. Economic aspect
2. Technical aspect, and
3. Human aspect.

1. Economic Aspects

The method study involves cost and time. If sufficient returns are not attained, the whole exercise will go waste. Thus, the money spent should be justified by the savings from it. The following guidelines can be used for selecting a job:

- (a) Bottleneck operations which are holding up other production operations.
- (b) Operations involving excessive labour.
- (c) Operations producing lot of scrap or defectives.
- (d) Operations having poor utilization of resources.
- (e) Backtracking of materials and excessive movement of materials.

3. Human Considerations

Method study means a change as it is going to affect the way in which the job is done presently and is not fully accepted by workman and the union. Human considerations play a vital role in method study. These are some of the situations where human aspect should be given due importance:

1. Workers complaining about unnecessary and tiring work.
2. More frequency of accidents.
3. Inconsistent earning.

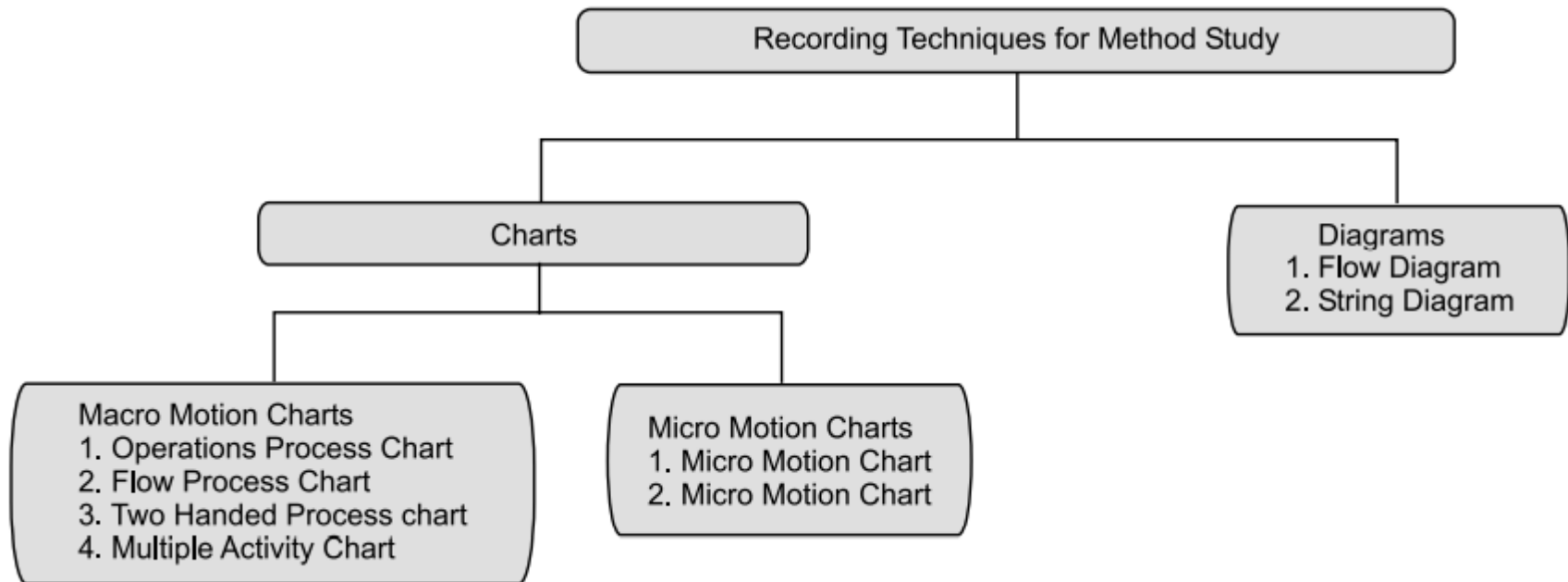
2. Technical Aspects

The method study man should be careful enough to select a job in which he has the technical knowledge and expertise. A person selecting a job in his area of expertise is going to do full justice.

Other factors which favour selection in technical aspect are:

1. Job having in consistent quality.
2. Operations generating lot of scraps.
3. Frequent complaints from workers regarding the job

Recording Techniques for Method Study



Recording techniques for method study

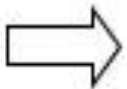
Flow Process Chart Symbols



Operation



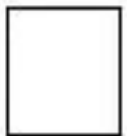
Delay



Transportation



Hold



Inspection

Thanks