Industrial Engineering and Project Management

- There is one thing in common between
- the modern armed forces, athletes, HR departments, and Silicon Valley tech firms
- – they all use tactics and strategies inspired by Frederick Winslow Taylor, often referred to as the “father of scientific management.”

Industrial Engineering & Project Management: Work Study, Time Study, Project Management (PERT, CPM), Project Crashing **5 hours**

Work Study

- Work study is the way of thinking to get a better way of working
- Work study is the investigation, by means of a consistent system of the work done in an organization in order to attain the best utilization of resources
- Through this module:
  - **Think and explore the ways to make your job easy**
  - **Explain how to improve productivity**

- **History**
- First **industrial revolution**-Sir Richard Arkwright-importance of training
- F.W. Taylor father of modern industrial engineering (Scientific management and work measurement in 1881

- He concentrated his activities in the area of maximum production in minimum time and developed a formula

  - **A definite task** : the best and correct sequence of operation
  - **A definite time** : By stopwatch or from standard data
  - **A definite method**: Developed by a detailed experimentation

Scope and objectives of work study

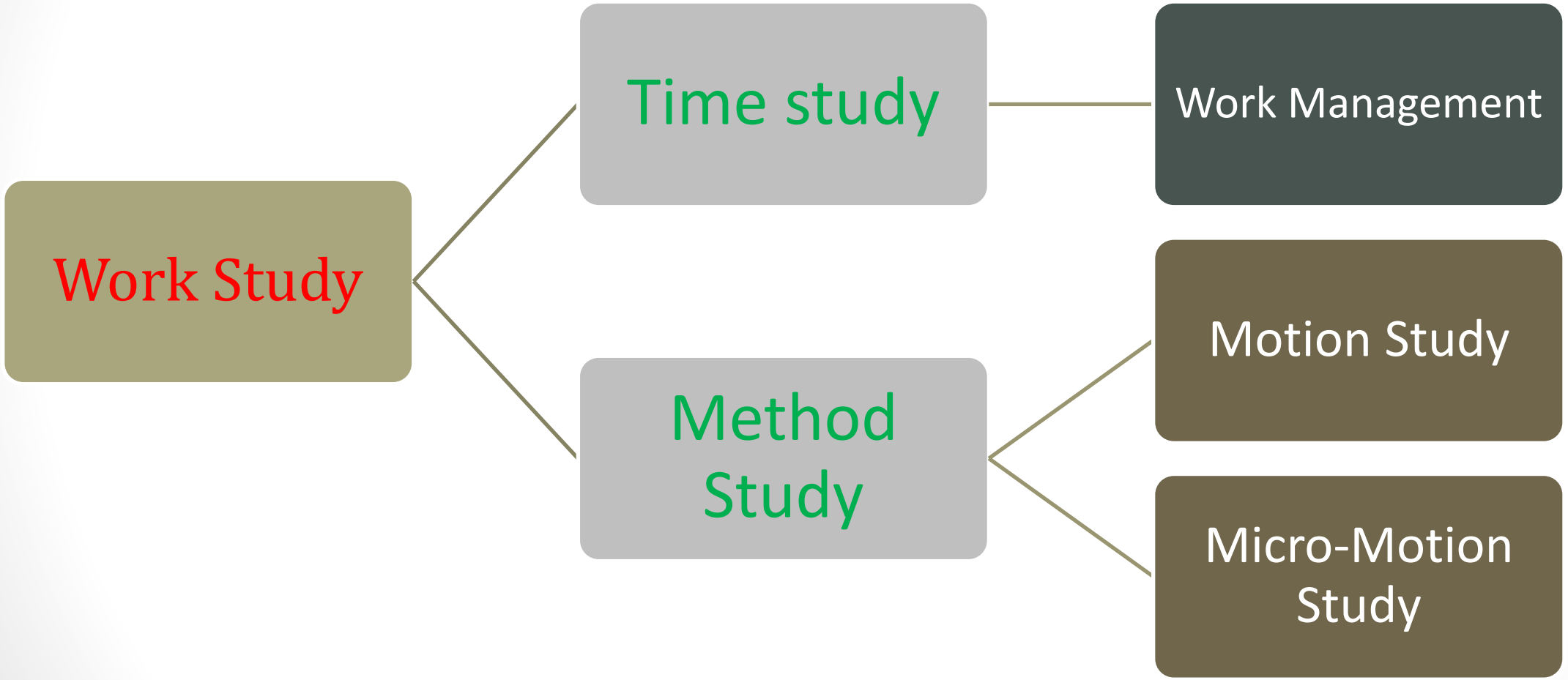
- ***Techniques are widely applicable***
- Basic objectives:
  - Improvement in working process
  - Standardization of procedures
  - Effective utilization of resources
  - Efficient and fast material handling
  - Decision on fare day wages
  - Better work culture, working environment
  - To provide an effective control of system
  - To economies the movement
  - To increase the productivity

Work Study

- Work study is the investigation, by means of consistent system to attain the best possible use of available men, machine, materials, money and time.

- The concept of work study:
  - *Q1: How should a job be done?*
  - *Q2: How much time a job should take for completion?*

- A: Method study and time study


Work Study
Time study
Work Management
Method Study
Motion Study
Micro-Motion Study

Time Study

- F.W Taylor and his students
- Scientific method to any human problem can be attained by selecting a worker for each particular task and then training him soundly

a. Split up the work into small activities called element
b. Eliminate all necessary elements
c. Assign time to each elements
d. Add an allowance to actual time to cover the time delays
e. Standardizes the tools and working conditions

- **Time study is a work measurement technique for recording the times and rate of working for the elements of a specified job carried out under specified conditions and for analyzing the data so as to obtain defined level of the performance.**

- Time study has also given rise to a firm scientific and calculative opinion on remuneration system
- Stick on the following:
  i. Assign each worker a clearly definite task with definite time
  ii. Provide standard condition and appliances
  iii. Remunerate each worker with large pay when he accomplish his task
  iv. He is the loser when he fails

Method study

- Method study is a **systematic and scientific** evaluation of existing and proposed plans and performance of a work and evaluation of improvement through analytical process of critical examination
- To find out one best method-
- No rule of thump
- All methods should be tried in the organization –select the one which gives maximum benefits with the minimum cost.
- Can be achieved through standardization of equipment, method and working condition, and training the operators

- To determine the best way there are certain parameters right from the procurement of raw materials till the final product is delivered
- Objective is to minimize the cost of production and maximize the quality and customer satisfaction

- Procedure: **SREDIM**

1. **Select**: the job or operation that needs improvement
2. **Record**: all facts, how work is done by chart method
3. **Examine**: every aspects of the job;(what, why, where, when, who, and how)
4. **Develop**: Review ideas, eliminate, simply, combine, re arrange, make new methods, chart new method, submit for approval
5. **Install**: consider best time to introduce, convince all, train users
6. **Maintain**: check frequently, match results, correct deviations.

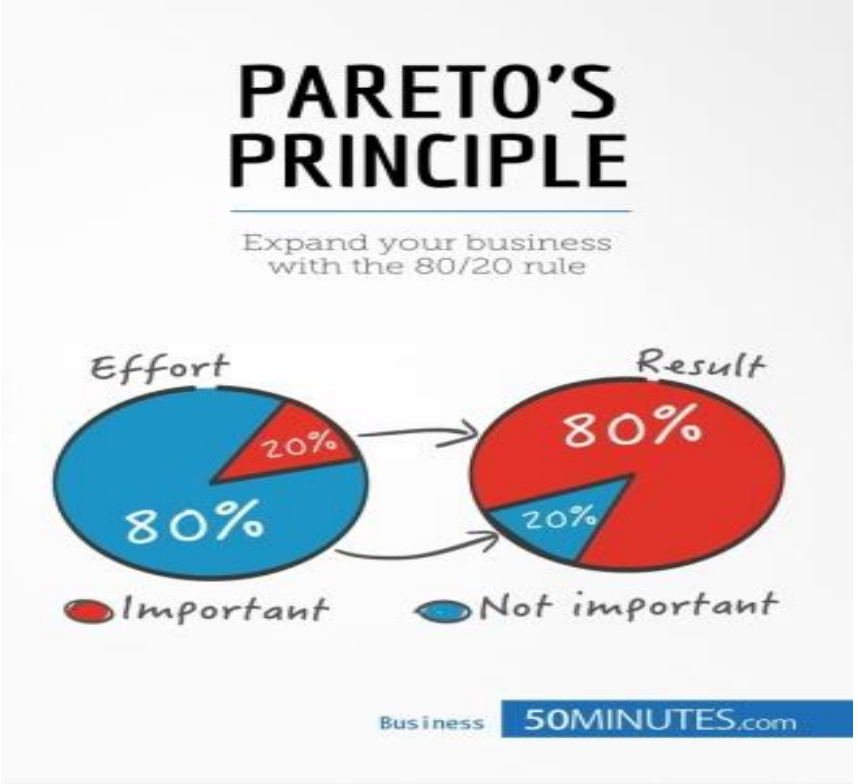
Method Study Tools

- **Explanatory Tools**
  - Pareto Analysis
  - Fish & Bone Diagram
  - PERT charts

- **Recording and Analysis Tools**
  - Outline process chart
  - Flow charts
  - Flow diagrams
  - Worker and Machine Process charts

Pareto Principle

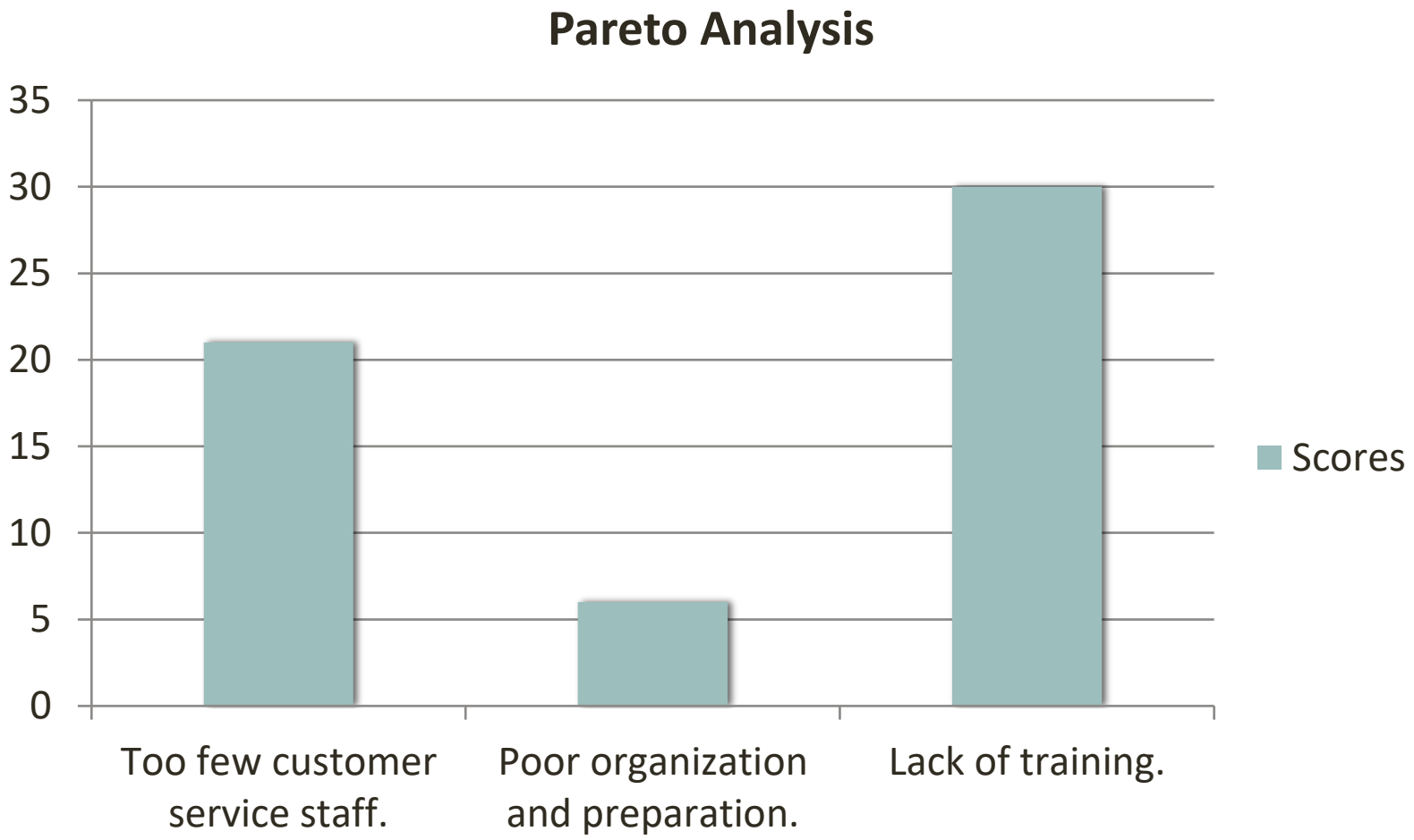
- States that 80 % of results will come from 20 % of your efforts
- It can help us to focus on activities that will have the biggest impact in our business and personal lives



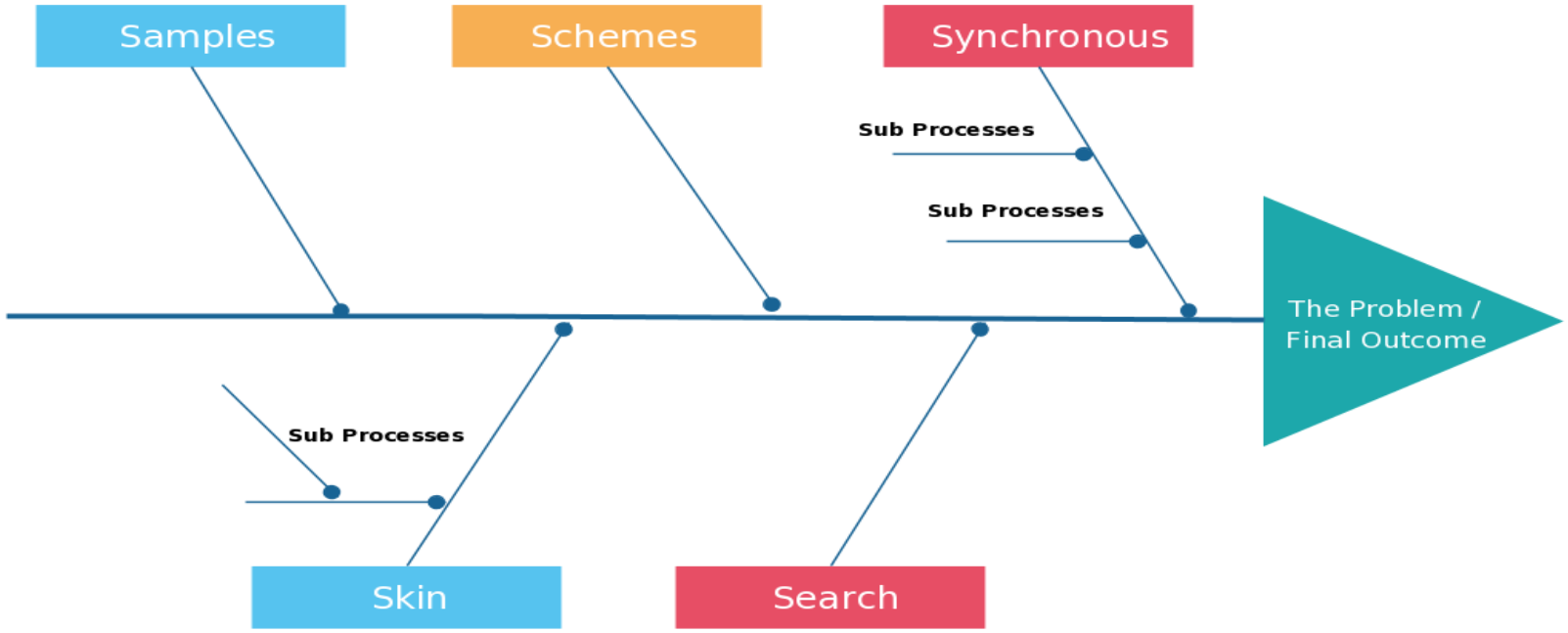
Pareto Analysis example

- Taken over a failing service (Business)- host of problems needs to resolve- objective is to increase overall customer satisfaction

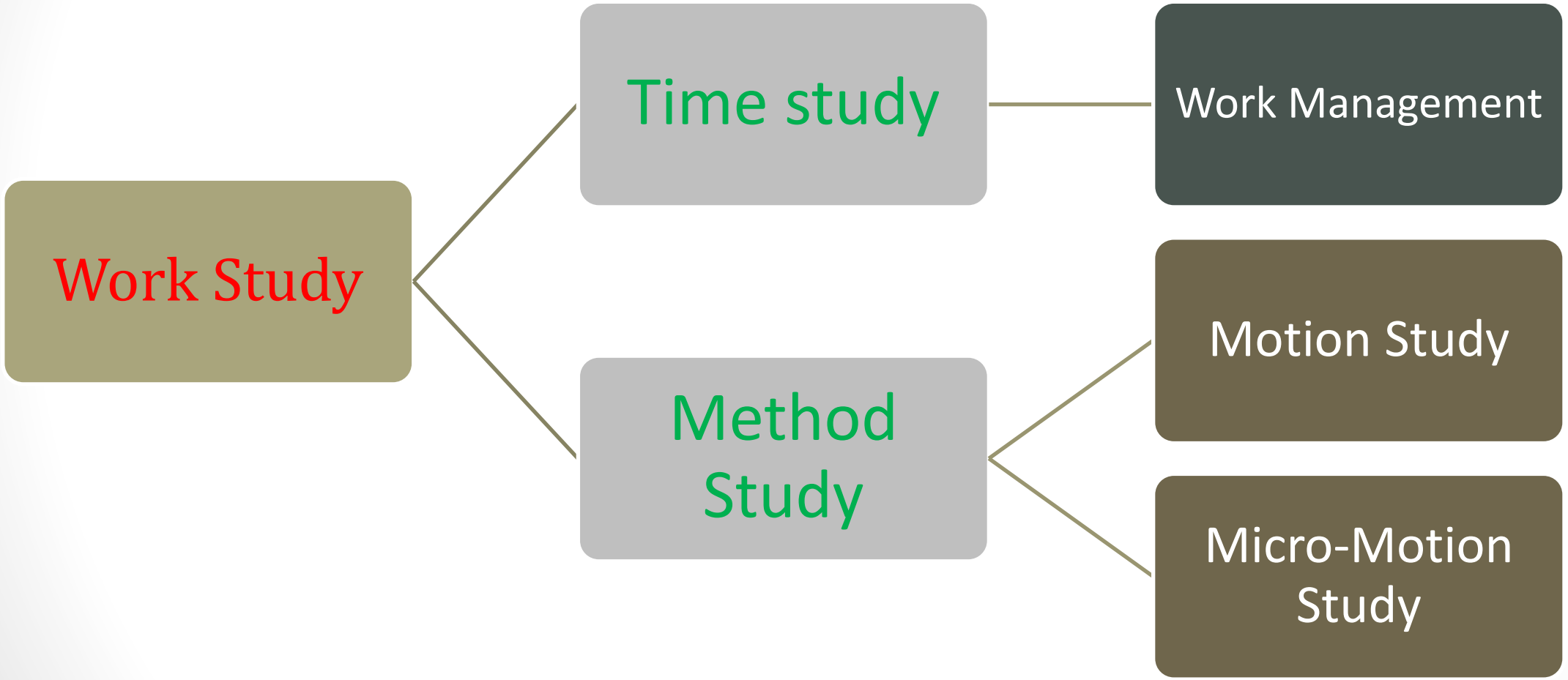
Items	Problems	Cause	Score
1	Phones aren't answered quickly enough.	Too few customer service staff.	15
2	Staff seem distracted and under pressure.	Too few customer service staff.	6
3	Engineers aren't well organized and often need to book second visits to bring extra parts.	Poor organization and preparation.	4
4	Engineers don't know what time they'll arrive.	Poor organization and preparation.	2
5	Customer service staff don't always seem to know what they're doing.	Lack of training.	30


Pareto Analysis
35
30
25
20
15
10
5
0
Too few customer service staff.
Poor organization and preparation.
Lack of training.
Scores

The fish and Bone Diagram



- Benefits:
  - Work simplification
  - Improved working method
  - Better product quality
  - Improved equipment design
  - Better material handing and lesser material handling cost
  - Optimum utilization of all resources
  - Shorter production cycle time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Motion study and micro-motion study

- **Motion study**: To find out total movement of employees while they perform a task
- Time Study: to find out standard time while performing a task
- More detailed investigation of individual operation or operator and layout of materials, parts or tools around a working bench or machine, use of jigs, fixtures and consumables to perform the job effectively
- To eliminate wasteful and unproductive movements of workers – to increase their efficiency level
- to be conducted with the help of a movie camera

- **Micro-motion study**: This is the most detailed investigation of the movements of hands, arms, limbs, legs, head, etc. while performing the job.

- **Principles**
- Principle relating to movement of human body
- Principle relating to work station
- Principle relating to tool and equipment
- Principles of good transportation
- Principles of time saving