Garment Production Management

Week 6

Work study and Method study

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Recap-previous week

- Quantitative layout analysis
- Systematic layout planning techniques using computers
- Comparison of traditional vs MCDA techniques
- Suitable techniques for garment industry layout planning

Lecture Learning Outcomes

1. Understand work study and method study concepts
2. Identify procedures of method study techniques
3. Analyze the objectives of method study
4. Analyze the principles of method or motion study

Session outline

- Work study concepts
- Method study or motion study concepts
- Procedures in method or motion study
- Benefits of method or motion study
- Motion economy
- Principles of motion economy and work design

Introduction

Work study

- Study of techniques, procedures and work estimation to evaluate human work in the total of its particular circumstances
- Systematically investigates all factors affecting efficiency and economy of work to ensure improvement
- Assessment of the significant number of components which impact the efficiency
- Reduces the Input (Time, Effort, Waste) to produce the same or more Output
- Highly related to productivity

Introduction

- Work study comprises of two concepts:
  - Method study (motion study)
  - Work measurement
- **Industrial engineering department** is responsible to set :
  - Standard methods
  - Standard time for manufacturing garments
- Motion study establish standard methods for the task

Work study

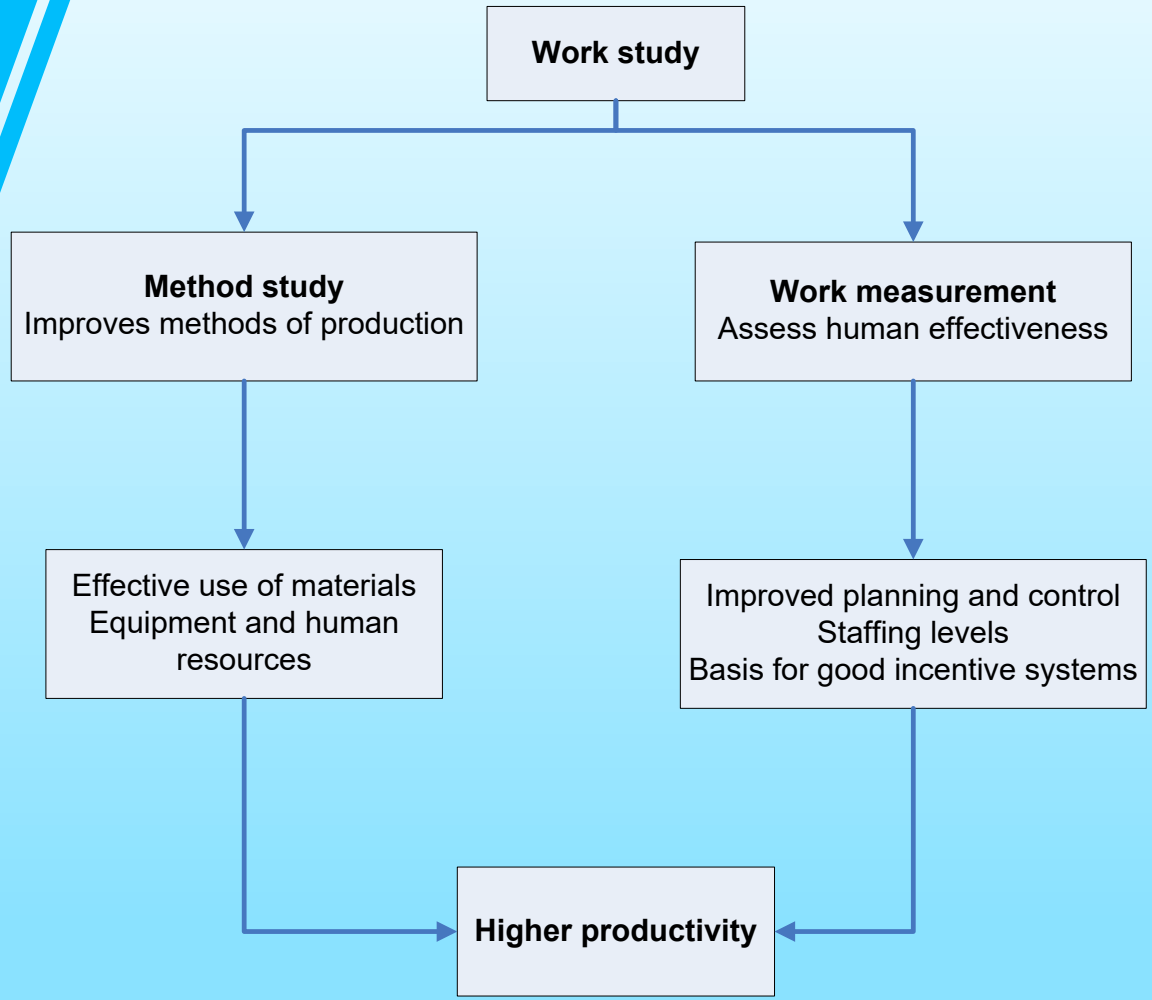

Figure 1: Working procedures in method study

Source: Author source

Objectives

1. **Simplify Work:** Make the job easier and safer for the worker
2. **Standardization:** Set standard methods and times for production planning
3. **Cost Reduction:** Eliminate wasteful activities to lower manufacturing costs
4. **Productivity:** Increase output with the same resources or Improve utilization of the human and material assets

Method study (Motion study)

- Process of systematic and critical examination of work for effective or more efficient outcome
- Improve processes
- Focuses on movement, flow and sequence
- Analysis of the basic hand, arm, and body movements of workers as they perform work
- Systematic recording and critical examination of ways of doing things
- Analysis of body movements to reduce fatigue and waste
- Design set of rules to develop better methods
- The pioneers of Motion Study Frank & Lillian Gilbreth

Benefits of method study

- Analyzes the current way of doing the work
- Find out improvement strategies that productivity increases
- Discovers suitable and easier method of work to complete quickly
- Helps to improve productivity
- Reduce cost in garment manufacturing
- Reduce the work involved in a particular task
  - Eliminate unnecessary movement
  - Replace poor methods with good methods
  - Used to find better ways of doing work

Method study-working procedures

Procedures

1. Select the job or work to be studied
2. Record relevant information by collecting data or direct observation
3. Examine the recorded information by challenging purpose, place, sequence & method of work
4. Develop new method and most economic models
5. Evaluate results of different alternative solutions of doing job
6. Define new method & present it
7. Install new method & train personnel to apply
8. Maintain the new method or new standard practice and set control procedures

Method study-working procedures

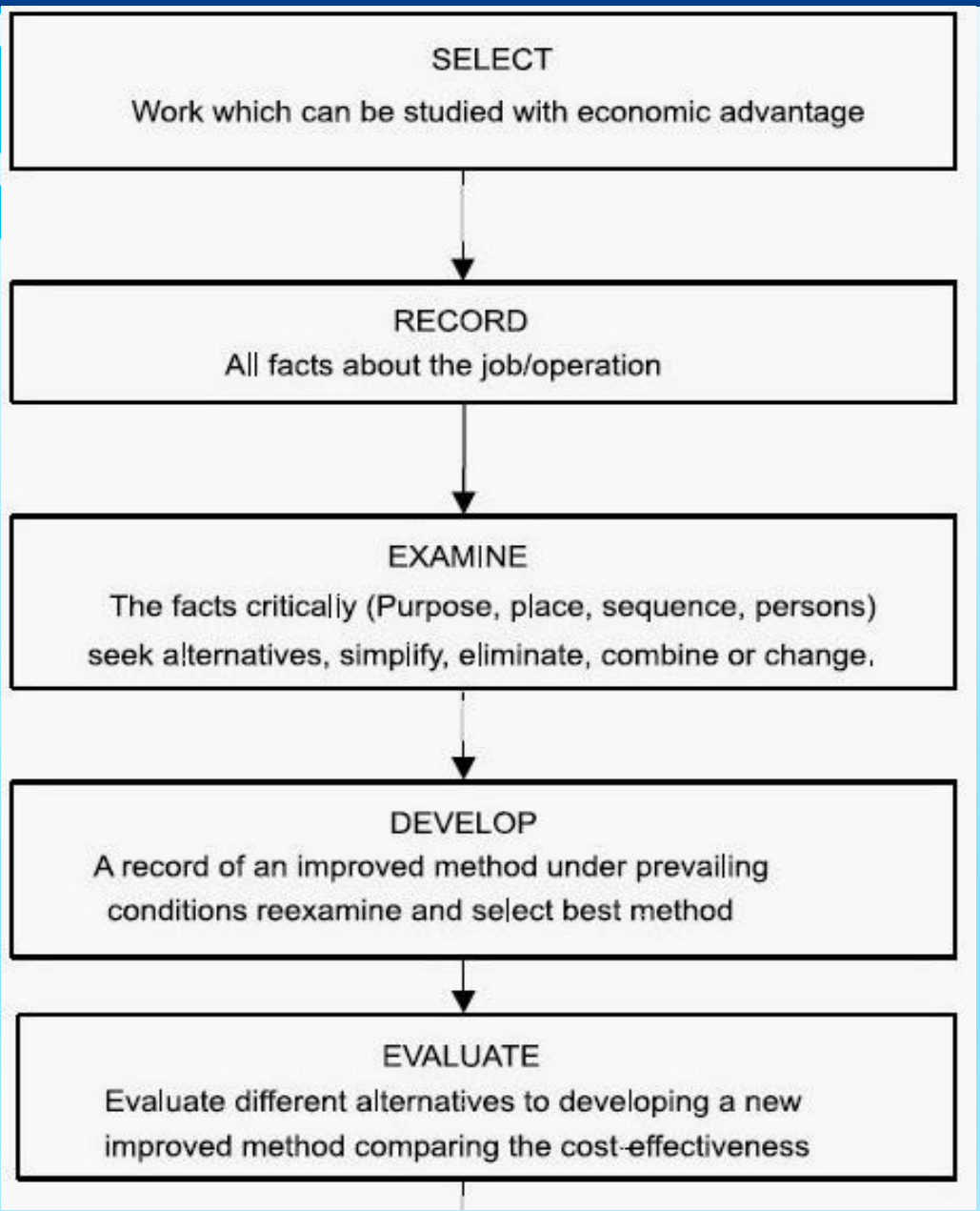

Figure 2: Working procedures in method study

Source: Mazharul Islam Kiron, “Working Procedure of Method Study in Garment Industry” Textile learner, 2013, url: https://textilelearner.net/method-study-in-garment-industry/

Recording techniques-Process charts

To analyze a method, visual recording is needed

Symbols used (Circle=Operation, Square=Inspection, Arrow=Transport, D=Delay, Triangle=Storage)

Types of Charts:

- **Operation Process Chart:** Shows only the main operations and inspections
- **Flow Process Chart records:**
    - **Man Type:** what the *worker* does
    - **Material Type:** what happens to the *material*
    - **Equipment Type:** how the *equipment* is used
- **Flow Diagram:** A scale drawing of the work area showing the path of movement
- It helps spot long distances and backtracking

Objectives of method study

Method or motion study aims to improve:

- Processes and procedures
- Design of manufacturing plant and equipment
- Plant or manufacturing workplace layout
- Utilization of men, materials and machines
- Economy in human effort or motion to reduce unnecessary fatigue
- Safety standards
- Development of better working environment

Method analysis

- Conducted for both existing and new jobs
- For a new job it is needed to establish a method
- For an existing job the procedure is to observe the current job and existingmethod
- Analyse and design improved method
- For a new job, the analyst must rely on a job description and an ability to visualize the operation

Method analysis

Selecting an operation

- Foreman or supervisor will request operation to be studied
- Methods analysis can be initiated as part of the program to increase productivity and reduce costs
- Some general guidelines followed while selecting a job to study:
  - Have a high labour content
  - Frequently performed
  - Unsafe, tiring, unpleasant, and/or noisy for workers
  - Designated as problems (e.g., quality problems, processing bottlenecks)

Documenting the current method

Use charts, graphs, and verbal descriptions of the way the job is now being performed

Helps to understand the job and serve as a basis of comparison against the revised one

Method analysis

Analyze the Job and Propose New Methods:

Job analysis requires careful thought about

- What
- Why
- When
- Where
- Who of the job

Analyzing and improving methods is facilitated by the use of various charts

- Flow process charts
- Worker-machine charts

Flow process charts:

Are used to review and critically examine the overall sequence of an operation

Focus on the movements of the operator or the flow of materials

Help to identify non productive parts of the process (e.g., delays, temporary storages, distances travelled)

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How we select the work to be studied?

The main considerations while selecting the job:

- Economic or cost-effectiveness
  - Key profit generating or costly operations, or one with the largest scrap/waste rates
  - Bottlenecks operations, or lengthy operations
  - Operations involving a repetitive operations
  - Long distances movements of materials between workstations
- Technical issues
  - The desire by the management to acquire more advanced technology, whether in equipment or in processes
- Human aspects
  - The operation should help improve workers satisfaction

How we select the work to be studied?

Exploratory tools

- Pareto analysis (80/20 rule)
- Fish bone diagrams (Cause and Effect Diagram)
- Gantt Chart
- PERT (Program Evaluation and Review Techniques) and critical path method (CPM)
- Job/Worksite Analysis Guide

Motion economy

- It is part of method Study
- Study of human motion in relation to productivity and fatigue
  - Developing guidelines to reduce fatigue
  - Eliminate unnecessary movements
- Ensure the human body is used in the most efficient way possible
- Focuses on optimizing human energy/effort in performing tasks
  - Ergonomics and physical efficiency

Motion economy

- Helps to maximize productivity and minimize fatigue
- Reducing wasted motion directly impacts cycle time and unit cost
- Garment operations are repetitive, labor-intensive, and involve precise manual dexterity (e.g. fingers)
- Improve efficiency, quality, and worker well-being in garment industry

Analytical tools in motion study

- Process Mapping:
  - Using Flow Process Charts and String Diagrams
- The Two-Handed process chart
  - Analyzing the balance of activity between the left and right hands
- Micromotion analysis
  - Using high-speed video recording to break down high-frequency repetitive tasks

Benefits of motion economy in garment industry

- Reduction of non-value-adding time
  - Reduced pickup and disposal time
  - Elimination of search and select
- Enhanced sewing efficiency (Machine utilization)
  - Simultaneous movements
  - Foot-operated controls
- Lowering physical fatigue and injury
  - The normal work area
  - Ergonomic seating
- Improved quality consistency
  - Standardized work:
  - Reduced handling damage

Principles of motion economy

- Use of the human body
  - Consider the movement of the operators
- Arrangement of the workplace
  - The layout of the workstation
- Design of tools and equipment
  - Tools and equipment are used to facilitate work
- Material handling
  - Material transport should be easy
  - Less time consuming or less expensive
- Time saving
  - Reduce non-productive time by removing nonvalue adding activities

Principles of motion economy

Use of the human body:

- Design work to fully utilize both hands
- Two hands should begin and end their motions at the same time
- Hand and arm motions should be symmetrical and simultaneous
- Design work to favor preferred hand

Principles of motion economy

Use of the human body:

- Worker's two hands should not be idle at the same time
- Method should consist of smooth continuous curved motions rather than straight motions with abrupt changes in direction
- Use momentum (mass $*$ velocity) to facilitate task
- Place tools within reach of finger/wrist to avoid shoulder strain
- Take advantage of gravity (less time & energy requirement)

Principles of motion economy

Use of the human body:

- Method should achieve a natural rhythm (regular recurrence and flow) of the motions
- Use lowest classification of hand and arm motion (Finger only; Finger and wrist; Finger, wrist, and forearm; Finger, wrist, forearm, and upper arm; Finger, wrist, forearm, upper arm, and shoulder)
- Minimize eye focus and travel (by reducing distances between objects)
- Design method to utilize feet and legs where appropriate

Principles of motion economy

Workplace arrangement

- Locate tools and materials in fixed positions within the work area
- Locate tools and materials close to where they are used
- Locate tools and materials to be consistent with sequence of work elements
- Use gravity feed bins to deliver small parts and fasteners
- Use gravity drop chutes for completed work units
- Provide adequate illumination
- Ergonomic chair should be provided for the worker

Principles of motion economy

Design of Tools and Equipment

- Tools and devices should be designed to support the task
- Hands should be rested if the work element can be performed by the feet using foot pedals (hand relieving)
- Combine multiple functions into one tool where possible
- Perform multiple operations simultaneously rather than sequentially

Principles of motion economy

Design of Tools and Equipment

- Perform operations on multiple parts simultaneously
- Design equipment controls for operator convenience and avoid error
- Hand tools and portable power tools should be comfortable and convenient to workers
- Mechanize or automate manual operations if economically and technically feasible

Principles of motion economy

Time saving

- Minimize idle time
- Pre-positioning (The "Two-Handed" process): Use a paper separator to grab both with one smooth motion
- Continuous vs. Single-Piece Flow: Stitch multiple panels without stopping; cut threads later

Principles of motion economy

Rules of time saving

- No man or m/c should stop work even temporarily
- Machine should not run idle as it leads to loss of production and power
- Two or more jobs and operations should be done simultaneously
- Minimum number of motions involved in completing a job
- Loading and unloading of the job and the cycle time should be synchronized

Summary

- Work study is the scientific approach to perform work faster, economically and easily
- Method study current working practices and improve the way the job should be done
- Job analysis requires careful investigation of the “What”, “Why”, “When”, “Where”, “Who” questions of the job
- Use of the human body, workplace arrangement, design of tools and equipment and time saving are the main groups of motion economy principles
- Work study and method study intends to improve performance of the workers and improve productivity

References

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Thank You !

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