MENG 344
Work Analysis and Design

Productivity

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What is productivity?

Production is the ability to create, furnish, or supply something that has an exchange value. Productivity is the power to produce at a rate that can be anticipated, set, or measured. Workforce productivity is an extension of the power of individuals.

Productivity is (Output/Input) in monetary terms

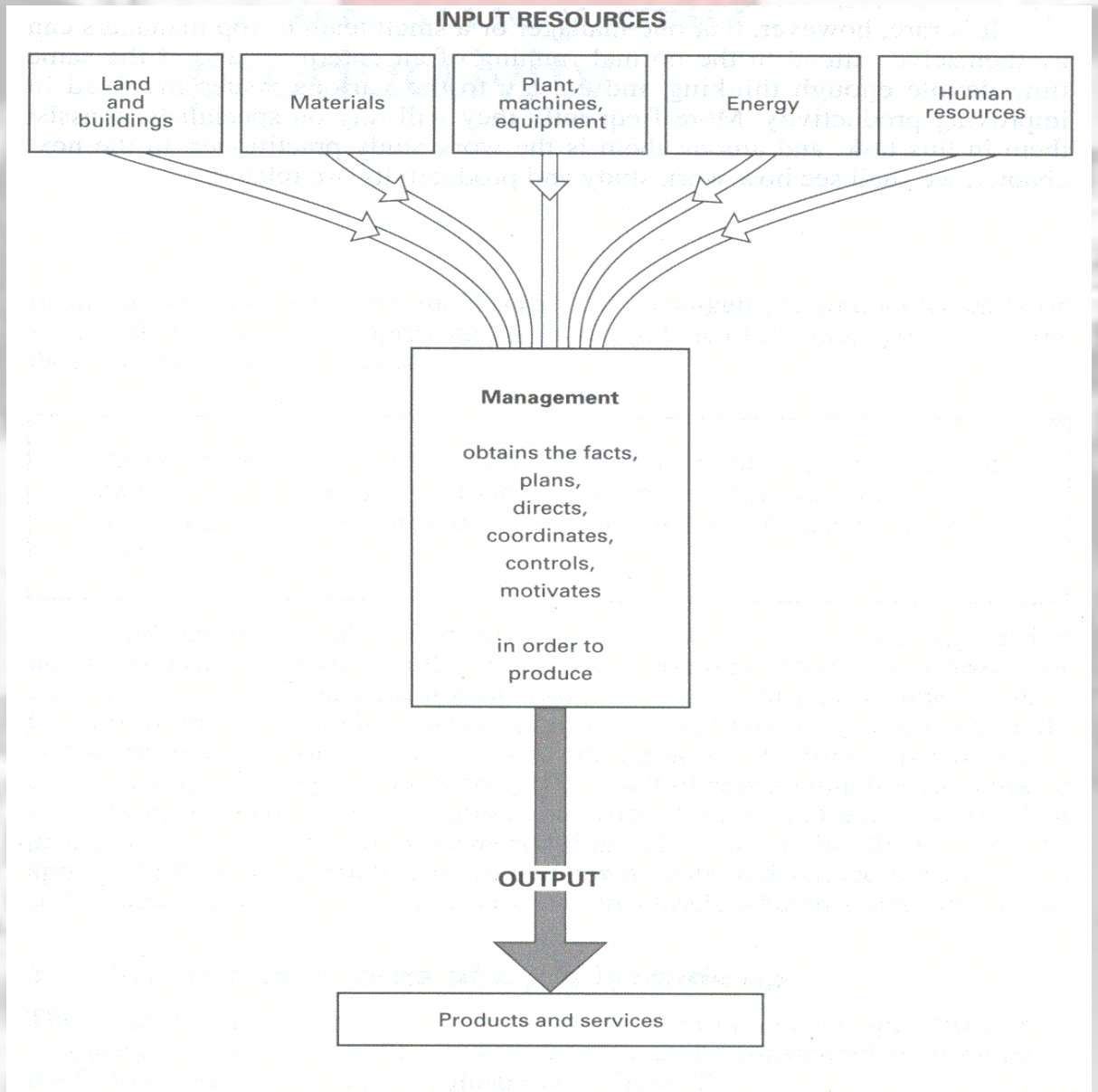
Productivity Inputs

- Land and buildings
- Materials
- Energy
- Machines and equipment
- Human resources

Productivity Outputs

- Products
- Services

Role of management



Increasing Productivity

Basic needs must be satisfied before productivity is expected to increase. On the other side, increasing productivity can go a long way in increasing the standards of living and the quality of their life.

Basic needs include:

- **Food.**
- **Clothing.**
- **Shelter.**
- **Security.**
- **Health and essential services.**

Productivity: Example I

- A potter working 8 hrs a day produces 400 pots/month using wood-fired Kiln. The cost per pot is $1.5 and the selling price is $2.
- If the potter worker decided to produce 500 pots, he will increase his output by 25%. However, without a change in production cost or the selling price, productivity will be the same.
- If the potter worker decided to lower price from $2 to $1.8, he will decrease productivity by 10%.
- If cost is reduced to $1.25, for the same output and selling price, productivity increases by 20%.
- Productivity is not related to labor costs only.

Productivity: Example II

- Determine the productivity of a production line that yields 700 switches per day. The production line operates 30 days a month, 12 hours a day, and 8 workers are required with an average cost of $600/month. The material cost is $0.2/piece. The energy, rent, and machine cost is $500/month. The switch sells for $0.9. [about 2.0]

- Describe 2 different ways to increase the productivity of this line by 20%. Justify your numbers. [Increase output to 1000 using the same number of workers or get the same output using 5 workers]

- How is the productivity affected if 8 part time workers were hired for two extra hours every day at an extra cost of $3 per worker per hour to increase the output by 100 switches per day? [Drops to 1.87]

Productivity: Example III

A certain product is produced independently by two workers (A and B). Worker A produced 200 pieces per month while worker B produces 150 pieces per month. Material cost is $1 per piece. Workers are on a fixed month salary, and monthly expenses related to this product are estimated at $525.

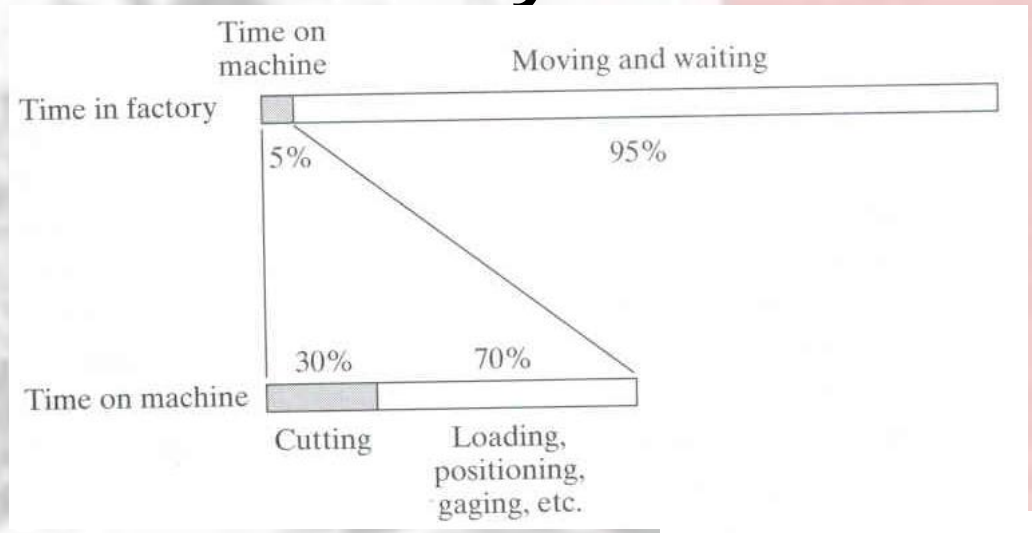
a. What is the selling price per unit if the productivity is 1.2? [$3.0]
b. Determine the percentage change in productivity if worker B is trained (at no cost) to match the production rate of Worker A. Price does not change. [+8.1%]
c. Determine the percentage change in productivity if the worker rates are the same as in part 'a', but the material cost is cut by 20%. [+8.7%]

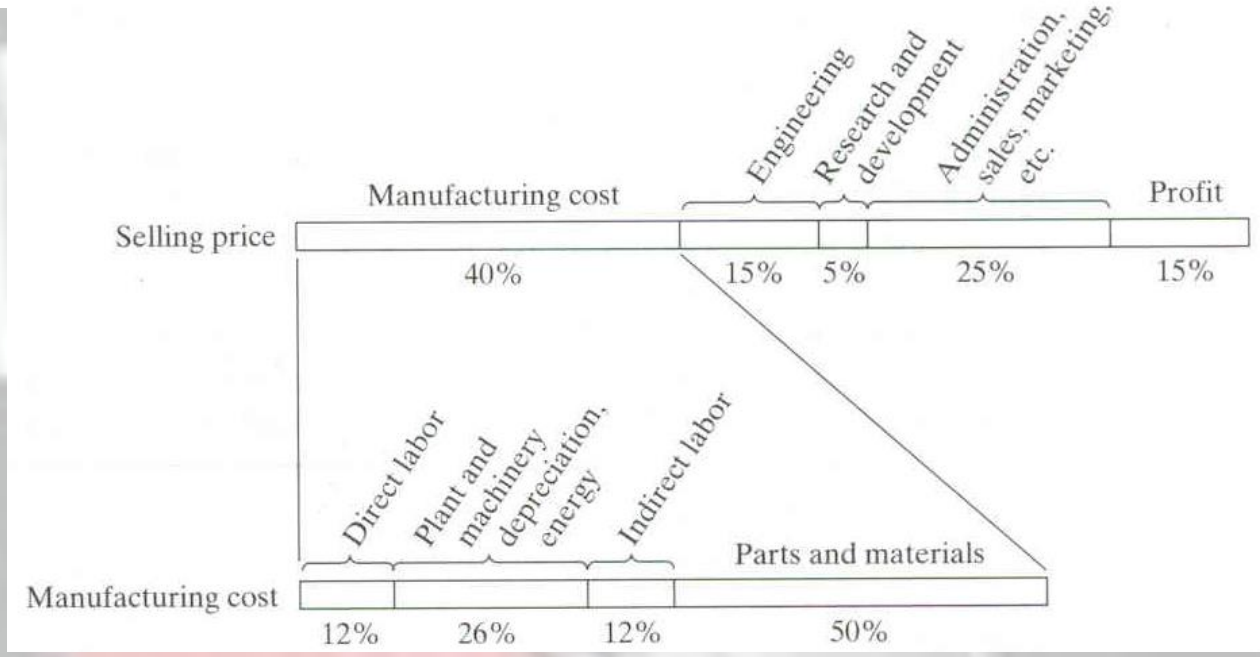
Productivity in individual enterprise

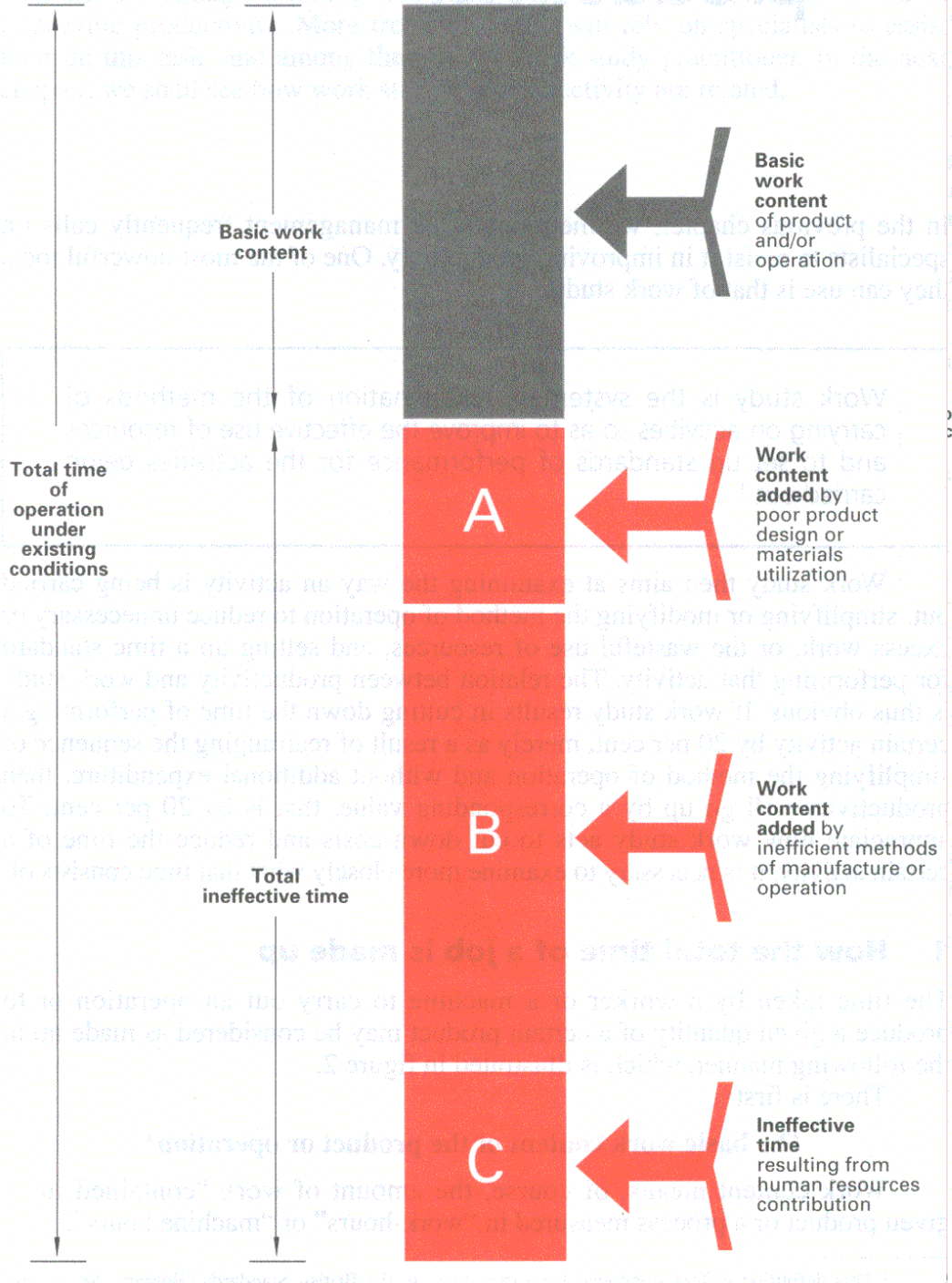
Productivity in individual enterprise is affected by many external factors like:

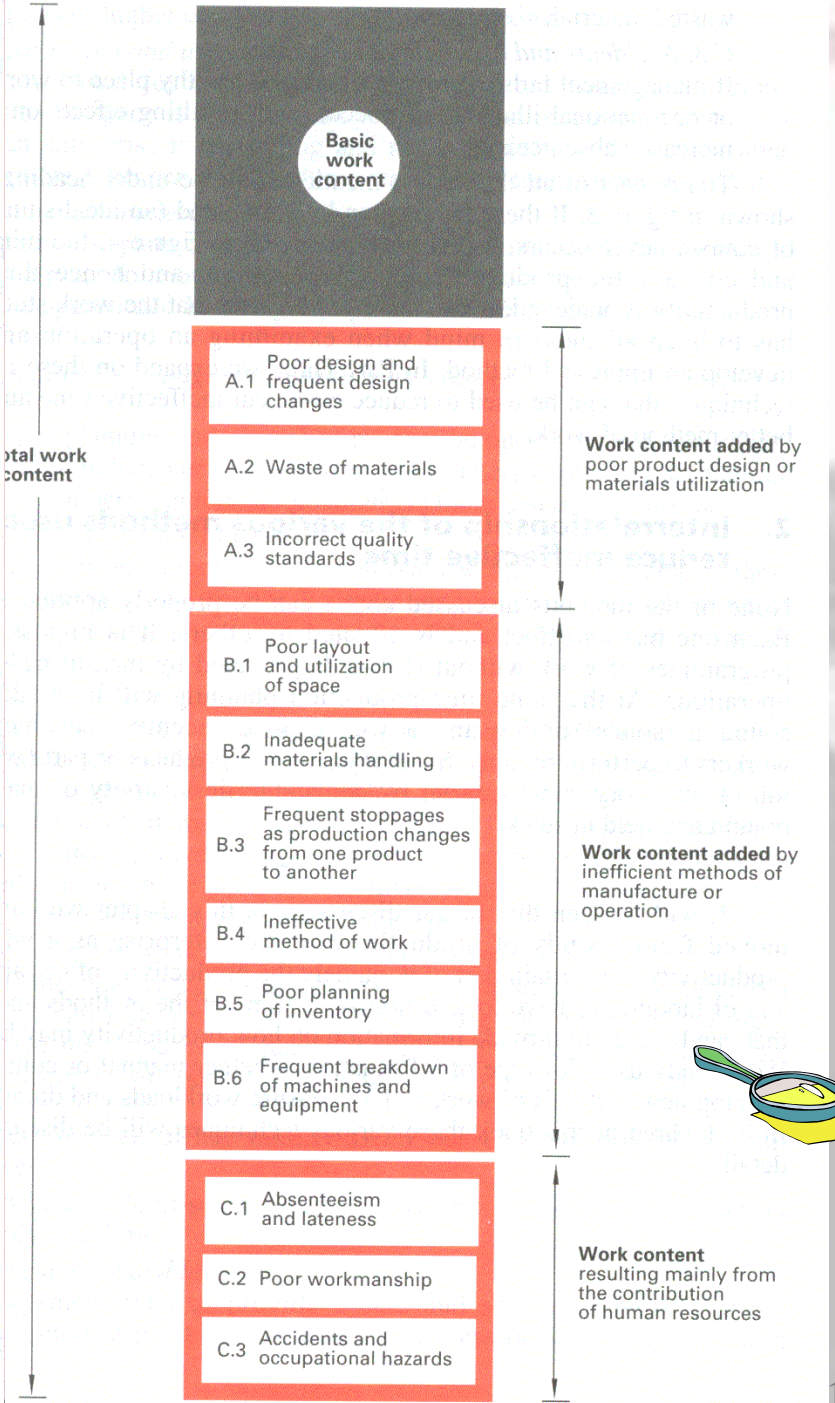
- Availability of raw materials and skilled workers.
- Taxes and tariffs.
- Interest rates.
- Capital availability.

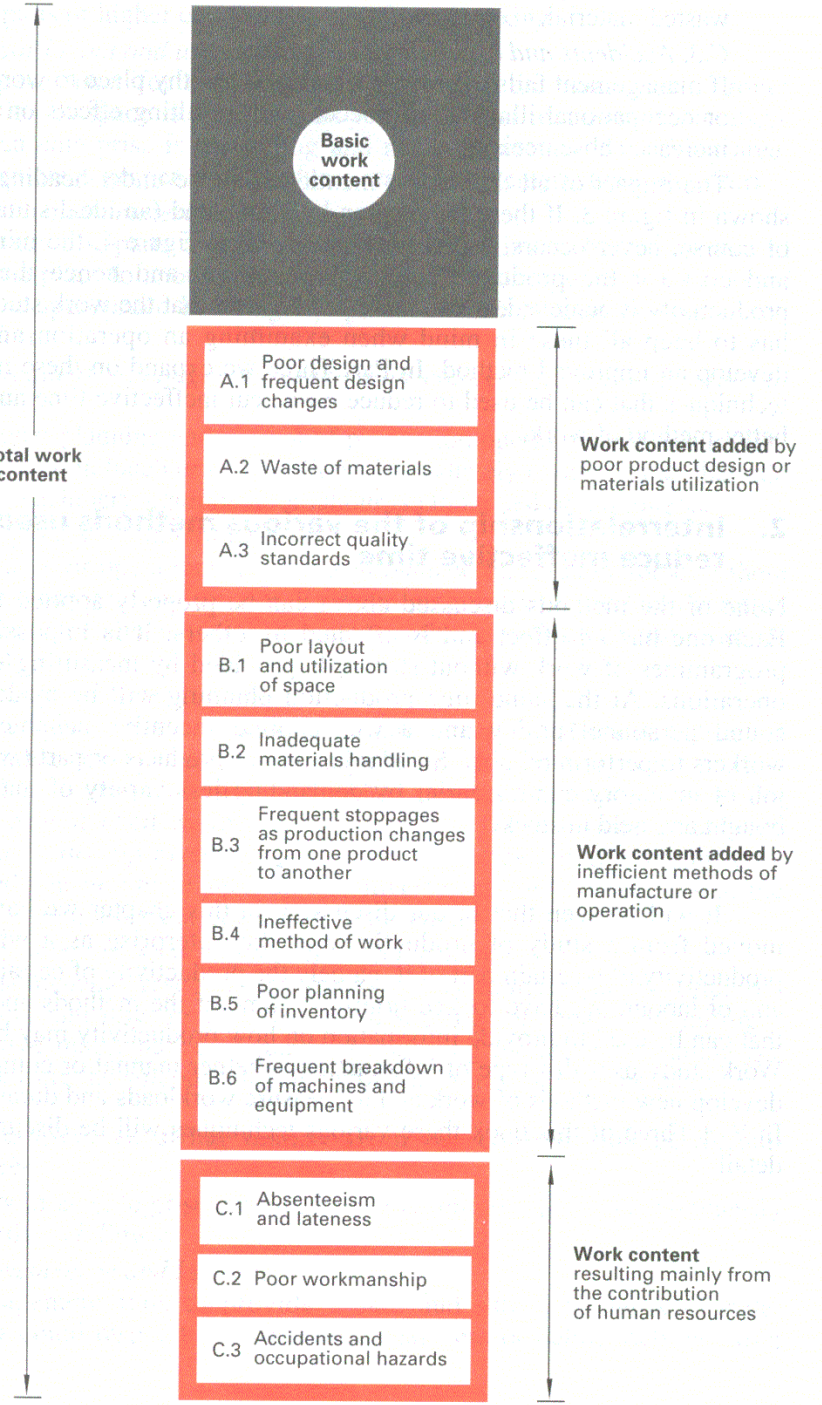
Productivity and Waste






Basic work content
Total time of operation under existing conditions
Total ineffective time
A
B
C
Basic work content of product and/or operation
Work content added by poor product design or materials utilization
Work content added by inefficient methods of manufacture or operation
Ineffective time resulting from human resources contribution


Basic work content
A.1 Poor design and frequent design changes
A.2 Waste of materials
A.3 Incorrect quality standards
B.1 Poor layout and utilization of space
B.2 Inadequate materials handling
B.3 Frequent stoppages as production changes from one product to another
B.4 Ineffective method of work
B.5 Poor planning of inventory
B.6 Frequent breakdown of machines and equipment
C.1 Absenteeism and lateness
C.2 Poor workmanship
C.3 Accidents and occupational hazards
Work content added by poor product design or materials utilization
Work content added by inefficient methods of manufacture or operation
Work content resulting mainly from the contribution of human resources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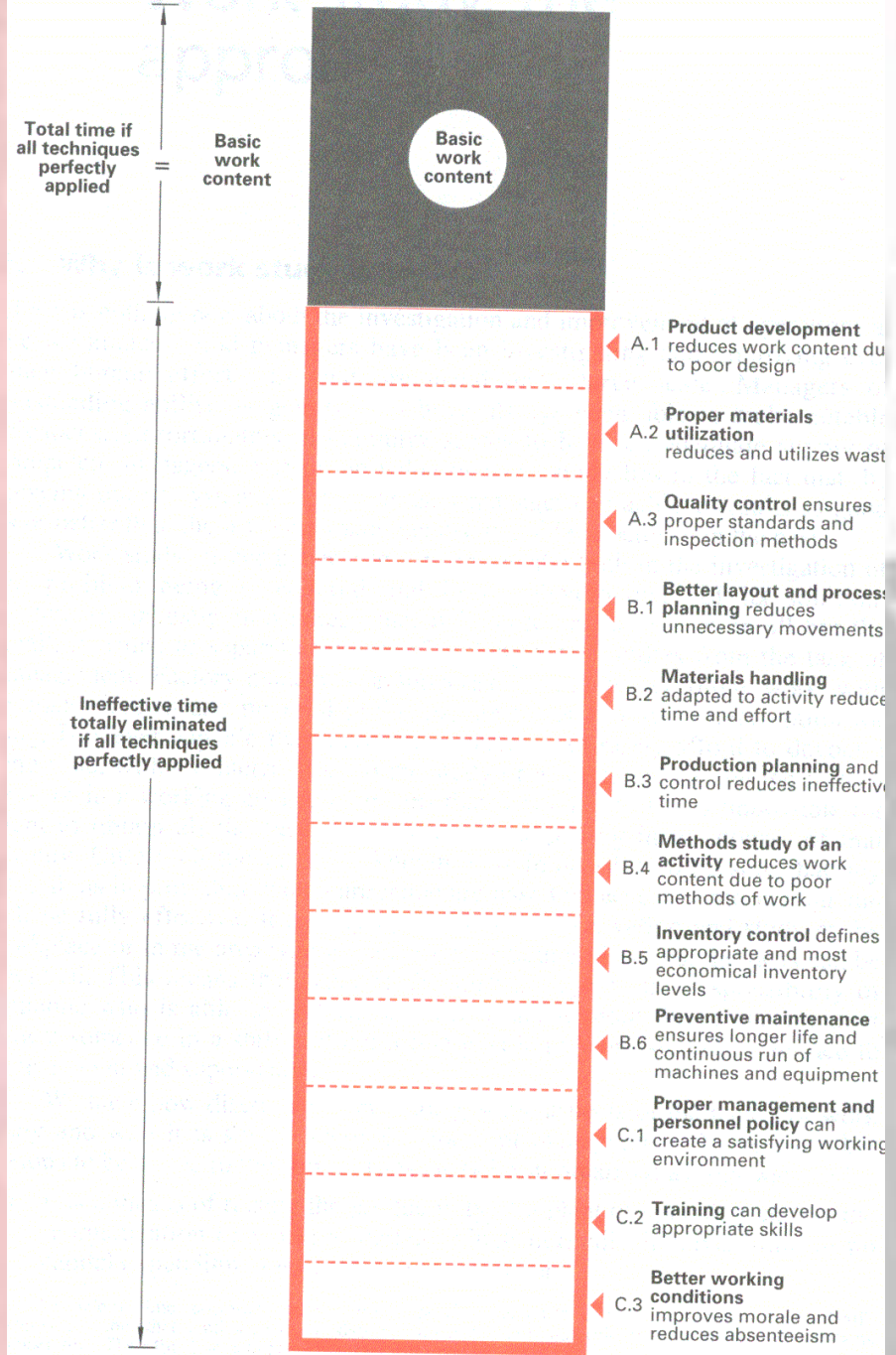
Total time if all techniques perfectly applied
=
Basic work content
Basic
work
content
Ineffective time totally eliminated if all techniques perfectly applied
A.1 Product development reduces work content du to poor design
A.2 Proper materials utilization reduces and utilizes wast
A.3 Quality control ensures proper standards and inspection methods
B.1 Better layout and proces planning reduces unnecessary movements
B.2 Materials handling adapted to activity reduce time and effort
B.3 Production planning and control reduces ineffectiv time
B.4 Methods study of an activity reduces work content due to poor methods of work
B.5 Inventory control defines appropriate and most economical inventory levels
B.6 Preventive maintenance ensures longer life and continuous run of machines and equipment
C.1 Proper management and personnel policy can create a satisfying working environment
C.2 Training can develop appropriate skills
C.3 Better working conditions improves morale and reduces absenteeism