

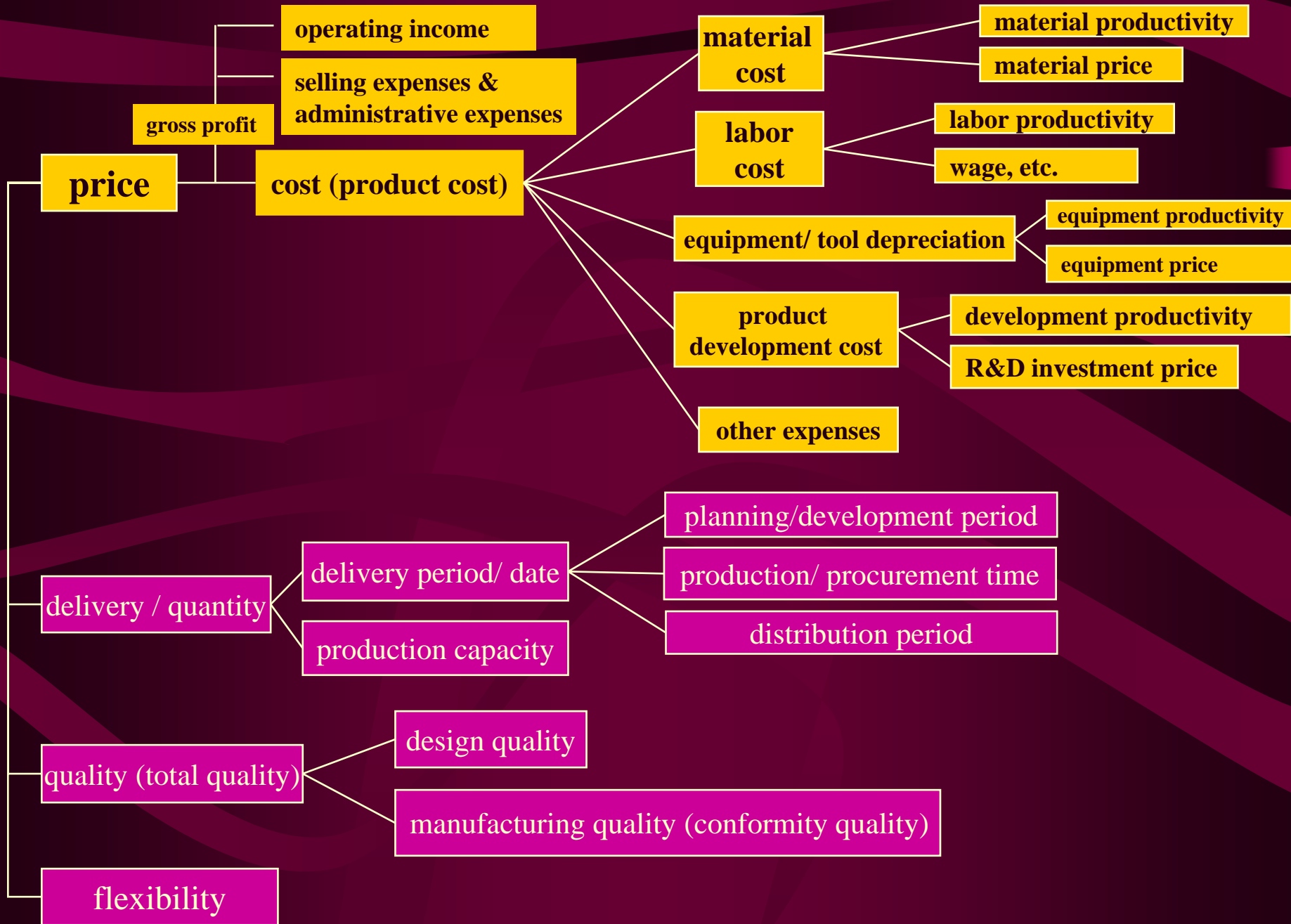
Lecture No. 8: Cost and Productivity (1)

1. Cost Control
2. Concept of Productivity and Method of Its Modification

Takahiro Fujimoto

Department of Economics, University of Tokyo

Main Factors of Product Competitiveness



1. Cost Control

Cost Control = activity to control cost of products

Cost Accounting provides cost information as premise for the above.

Average Cost = “In standard capacity utilization, the Cost that is computed by applying standard efficiency (productivity) and standard cost rate (factor price) against standard work method.” (Namiki, “Basic knowledge on Factory Management”)

Concept of average cost was established by Emerson (promoter of scientific control movement)

(1) Cost Maintenance (Cost Control in narrow sense)

= Measure variance between standard cost and actual cost
→ cause analysis → corrective action

By this process, maintain actual cost in vicinity of standard cost.

(2) Cost Improvement

= Revise target cost per se

→ efforts on cost reduction (VA = value analysis, etc.)

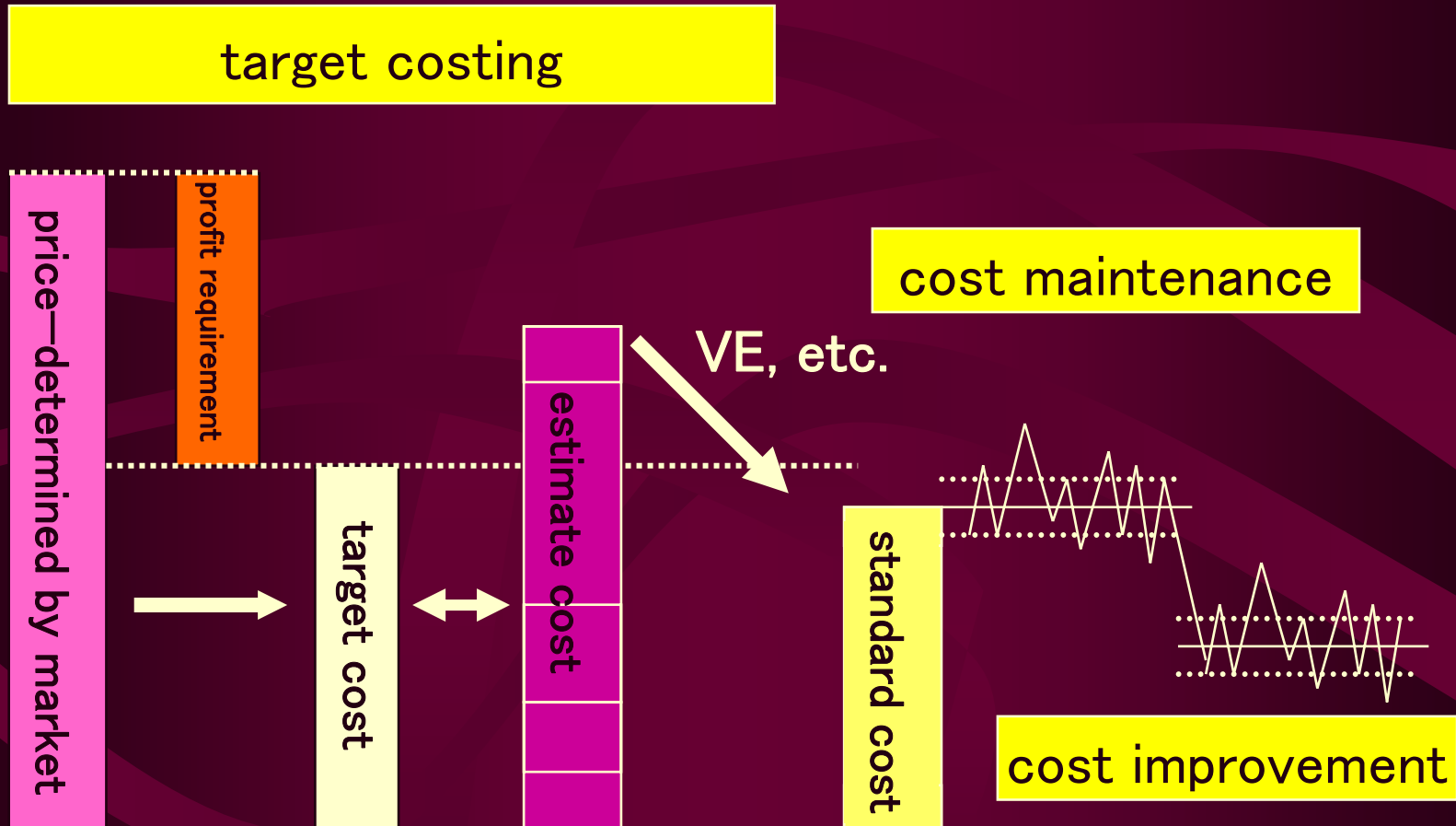
(3) Target Costing

= Implemented at stages of product planning/development

Toyota Automobile (since 1960s)

Target sales price → target costing → allocation of target cost → efforts on achieving target (VE, etc.)

Target Costing/Cost Maintenance/Cost Improvement



History of Cost Accounting (narrow sense)

Developed in USA (fiber, railroad). Outline completed in 1920s.

Until 1880s:

Direct costing (direct cost accounting) = direct expense only

Early 20th century (era of scientific control):

Full costing (full cost accounting)

= allocation of indirect cost to each sector/product

Cost Control Process by Standard Cost Calculation

1. **Standardize** cost factors
2. Set up cost standards (standard cost cards)
3. Instruct on **standard cost** to **cost center unit** (participation and motivation)
4. Calculate **actual (track record) cost**
5. Calculate **variation** from standard cost
6. **Analyze cost variance** (analysis on causes of incurring variance)
7. Examine and execute cost **improvement measures**

(Source) Miyamoto [1990, page 58]

Calculation of Standard Production Cost by Product

----- Traditionally conducted in 2 steps

(1) From the total to each cost center (e.g., process)

Select appropriate **first allocation base** by each **cost item**

→ thereby allocate to cost center, and calculate

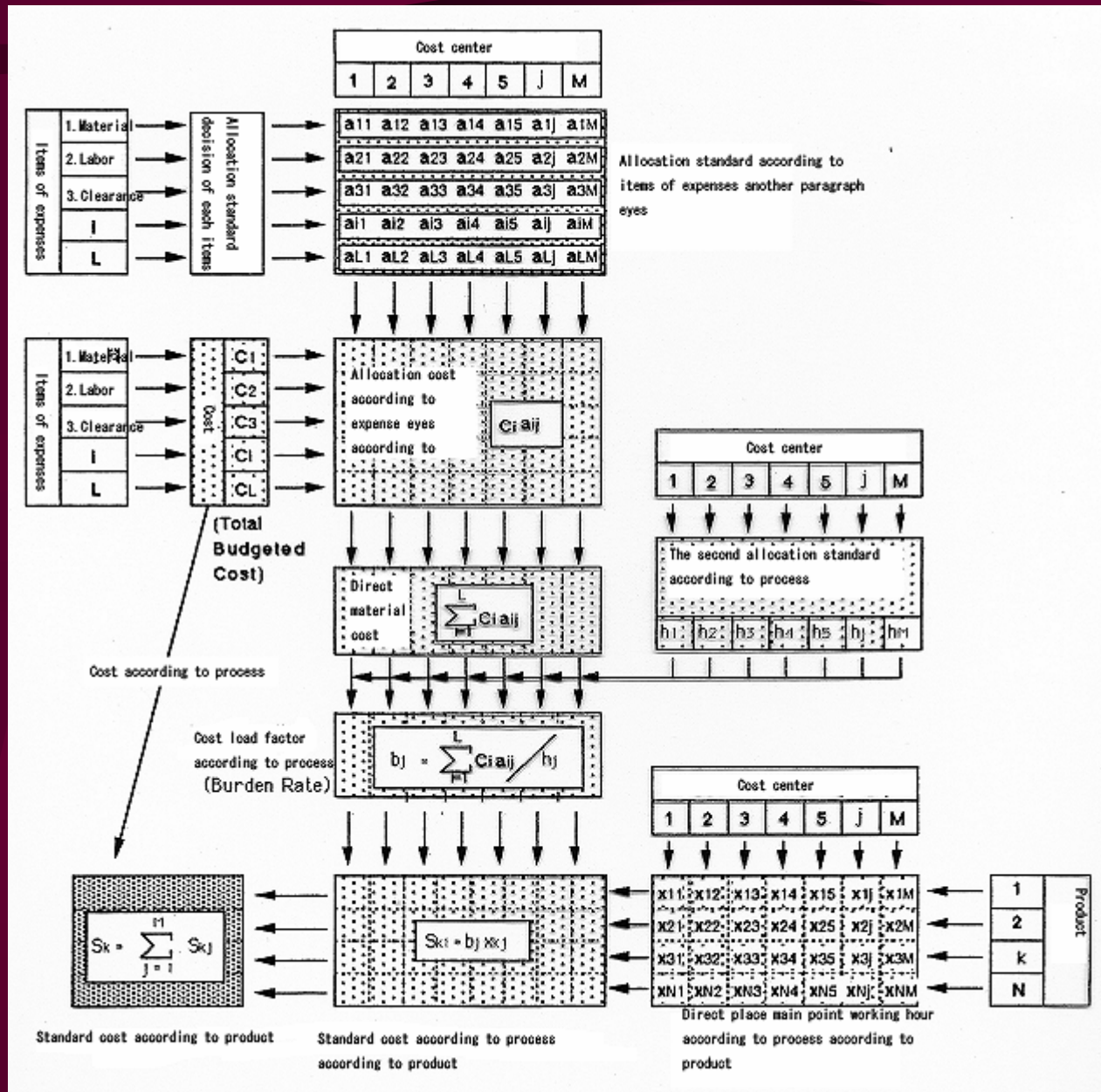
(2) From cost center to product

burden rate by process = cost by cost center / direct labor hours

burden rate x required labor hours by product/process = cost by product/process

calculate by product (First allocation base in 2nd Step is direct labor hours. Is there a problem here?)

Standard 2 Steps of Standard Cost Accounting System



Variance Analysis

Manufacturing cost variance

= variance between **actual manufacturing cost** and **standard manufacturing cost**

Measure by cost factor (labor cost, material cost, etc.)

Further, resolve into variance in **factor price**, and variance in **productivity (basic unit price)**

Verify **location of responsibility**

Three Approaches to Improve Cost Accounting System

Is the conventional system of 1920s' model inappropriate as means to enhance competitiveness?

Three approaches, in contrast (enhancing accuracy of standard cost, denying allocation base, or denying standard cost)

(1) ABC (Activity Based Costing)

Accurate allocation base

→ accuracy enhancement in standard cost

(2) Throughput accounting:

throughput = sales revenue – direct material cost

(3) Target cost system (target costing):

Backward nature of Standard Cost → control by Target Cost

Basic Concept of ABC

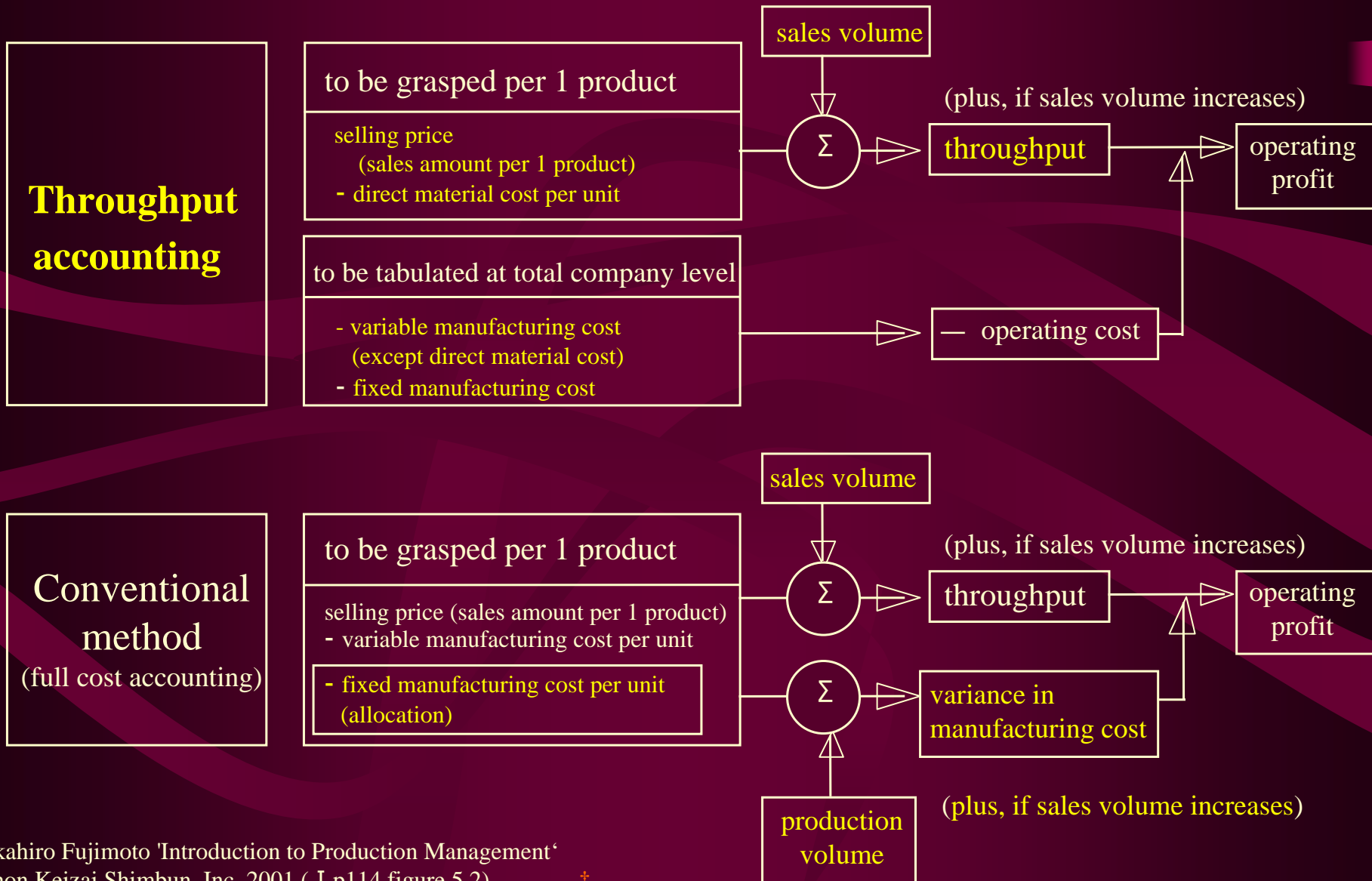
Figure removed
due to copyright restrictions



Figure removed

due to copyright restrictions

Basic Logic of Throughput Accounting



2. Concept of Productivity and Method of Its Modification

Enhancement in cost competitiveness

← (1) increase in **productivity**

← (2) decrease in **factor cost**

Productivity is ---

“ratio of input and output”

“level of efficient utilization of various production factors”

“transmission efficiency at the time of transcribing product design information from process to product”

(1) Classification by Output

Physical productivity --- unit of material volume

Value productivity ----- unit of monetary sum (added value, revenue, etc.)

(2) Classification by Input

Total factor productivity, TFP

Partial productivity, or individual factor productivity

Labor productivity (head count or man-hour = man/time)

Capital productivity

Material productivity (basic unit)

Measurement of material labor productivity (example of numerical value)

- “production quantity per **one person**” or “production quantity per **one man-hour**”
- **scheduled working hours**, or **actual working hours**
- handling of “**unpaid overtime**”
- dealing of difference in **degree of proficiency**
- concept of “**man-hour**” (person/hour per unit)

Case

Factory	A Factory	B Factory
Annual output	900,000 units	1,200,000 units
Direct workers	100 men	100 men
Scheduled working hours	1,800 hours	2,000 hours
	/year- number	/year- number
Actual working hours (recorded)	1,800 hours	2,400 hours
	/year- number	/year- number
Actual working hours (unrecorded, estimate)	1,800 hours	2,500 hours
	/year- number	/year- number

Way of measurements decides either A Factory or B Factory in terms of higher productivity.

Capital Productivity

Problem lies in **heterogeneity** of facilities.

Tally in the form of **actual tangible fixed asset**?

In case of same kind of machines, “**lifecycle cumulative production quantity per equipment**”?

Material Productivity

Case of assembly–industry type:

Data and yield rate of bill of materials

Case of apparatus–industry type:

More important (**yield rate** of semiconductor, rate of coke(s) in making pig iron)

Labor Productivity at Individual Level (Efficiency in Information Transcription)

actual working hours = net operating hours + other hours

net operating hours = hours used to transcribe information (added value)

other hours = waste in **waiting**, work insert and pull, walking, preparation, **set-up change**, etc.

Physical productivity of individual

= actual working hours / output

= (net operating hours/output) ÷ (net operating hours/actual working hours)

(↓ : speed up)

(↑ : decrease in waste and setup)



can be saved immediately

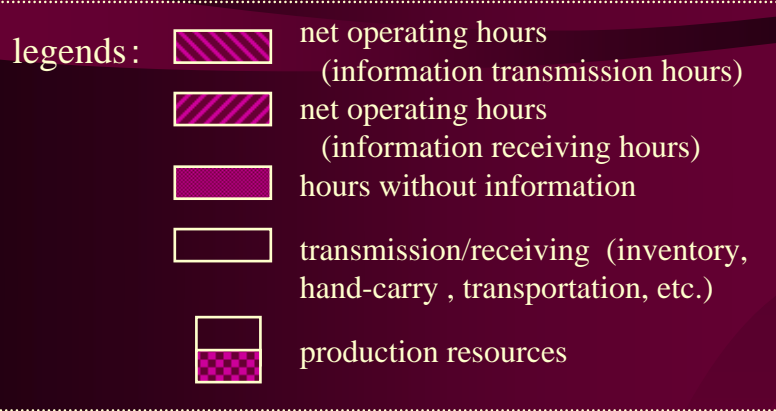
- **waiting**
- wasteful transportation
- stacking up semi-manufactured products
- changing hands
- duplicated transportation

under current working condition

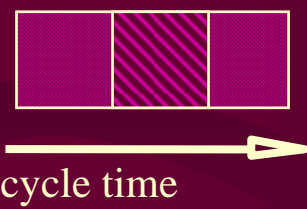
- go get parts
- unpack subcontract parts
- to take out parts little by little from large pallet
- operating hand-push cutter button



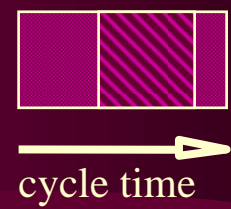
Factor Productivity and Production Leadtime (concept diagram)



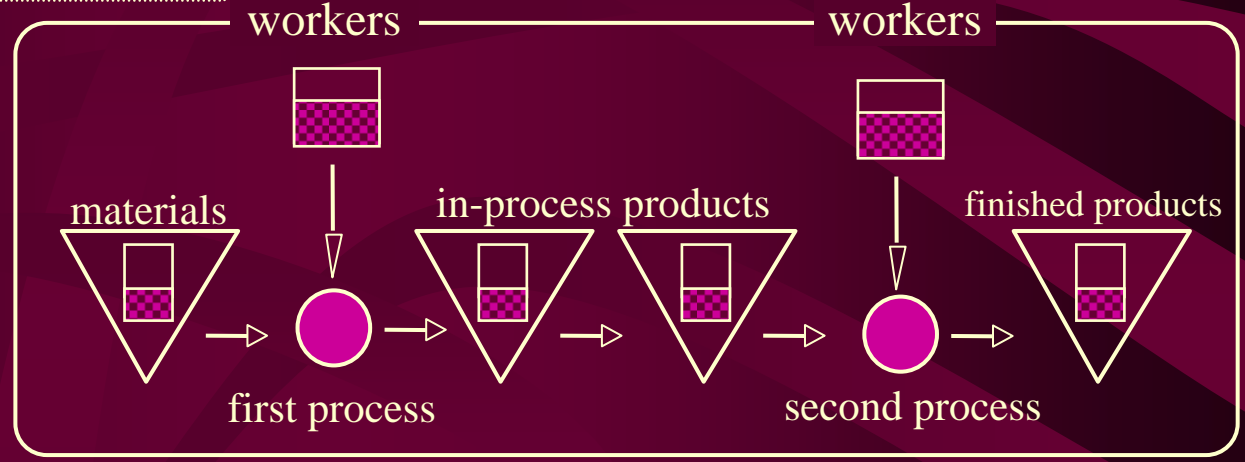
productivity of first process
(man-hour per 1 unit)



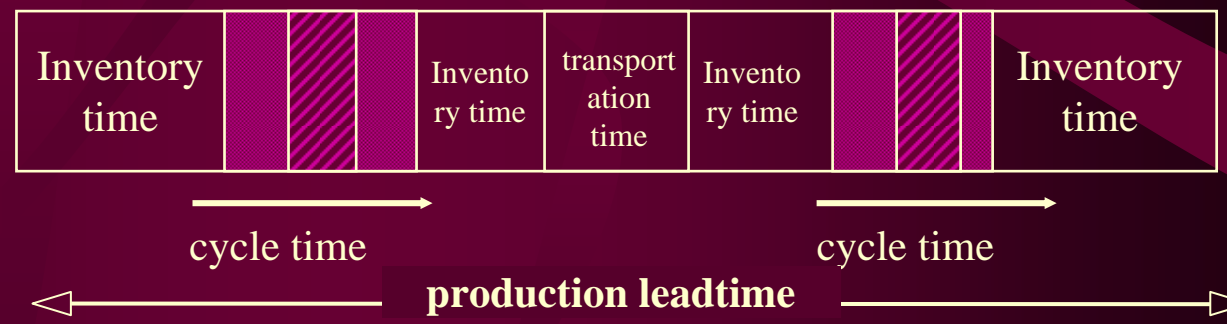
productivity of second process
(man-hour per 1 unit)



**Transmitting party
(productivity)**



**Receiving party
(lead time)**



Productivity and Net Operating Hours (density approach and speed approach)

(Labor productivity)

man-hour
requirement
per unit

$$= \frac{\text{total actual working hours per day}}{\text{production units per day}}$$

(Speed of information
transcription)

$$= \frac{\text{total net operating hours per day}}{\text{production units per day}}$$

(Density of information
transcription)

$$\div \frac{\text{total net operating hours per day}}{\text{total actual working hours per day}}$$

$$= \text{gross net operating hours per day}$$

$$\div \text{rate of average net operating hours}$$