Jadwal Kuliah

HARI	JAM	RUANG	KELAS	DOSEN
SENIN	07.00 – 09.30	A.23	D	Lucky Radi R
	12.30 – 15.00	A.23	A	Lucky Radi R
SELASA	09.30 –12.00	B.20 A Pasca Sarjana	B	Lucky Radi R.
	12.30 – 15.00	B.20 A Pasca Sarjana	F	Lucky Radi R.
SABTU	Harap konfirmasi ke dosen ybs.	-	C,E	H. Asep Budiman

Heizer/Render
Principles of Operations Management
Operations Management

Kontrak Kuliah

- Kehadiran : Minimal 75%
- Nilai UTS dan UAS : 30% & 30%
- Tugas dan Quiz : 25%
- Partisipasi Kelas : 10%
- Absensi : 5%
- Pakaian bebas rapi, tidak memakai sandal, tidak memakai celana/rok pendek.
- Keterlambatan maksimal 15 menit.
- Penilaian tugas : tepat waktu, tepat lay out, tepat media, tepat jumlah anggota, tepat jawaban/materi, originalitas.

Rencana Pengajaran Mata Kuliah MO

Pertemuan	Materi
1	Introduction to MO
2	Competitiveness, Strategy, and Productivity
3	Product Design
4	Process Strategy
5	Selection of Equipment and Technology
6	Location Strategies
7	Lay Out Strategies
8	Human and Work Environment
	UJIAN TENGAH SEMESTER
9	Human Resources and Job Design
10	Supply Chain Management
11	Inventory Management
12	Material Requirements Planning
13	Just In Time
14	Managing Quality
15	Statistical Quality Control
16	Maintenance and Reliability
	UJIAN AKHIR SEMESTER

Operations Management

Introduction to the Field




What is Operations Management?
Defined

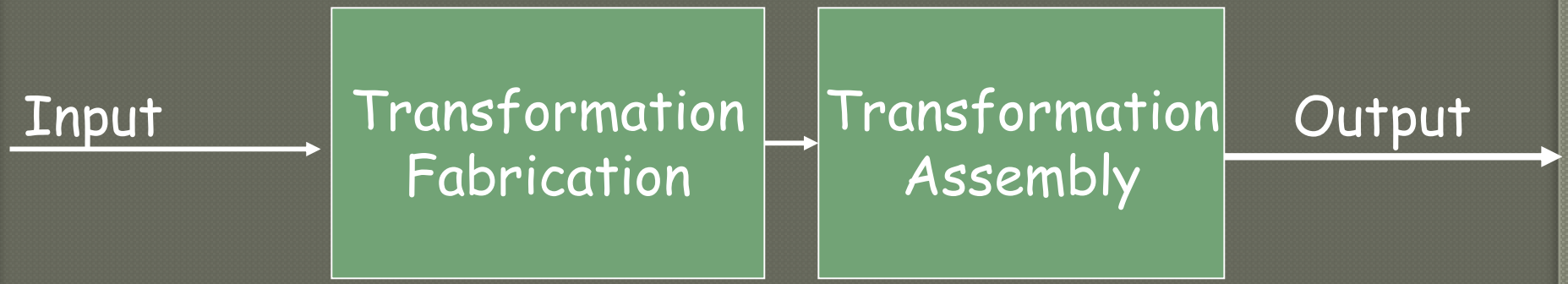
Operations management (OM) didefinisikan sebagai desain, operasi, dan peningkatan dari sistem penciptaan dan penghantaran produk utama perusahaan

Model Organisasi

Manajemen Produksi adalah setiap usaha atau kegiatan yang mengkoordinir dan menggunakan fasilitas-fasilitas produksi agar dicapai produktivitas yang tinggi.

Sistem Manajemen Produksi

Proses Manajemen Produksi



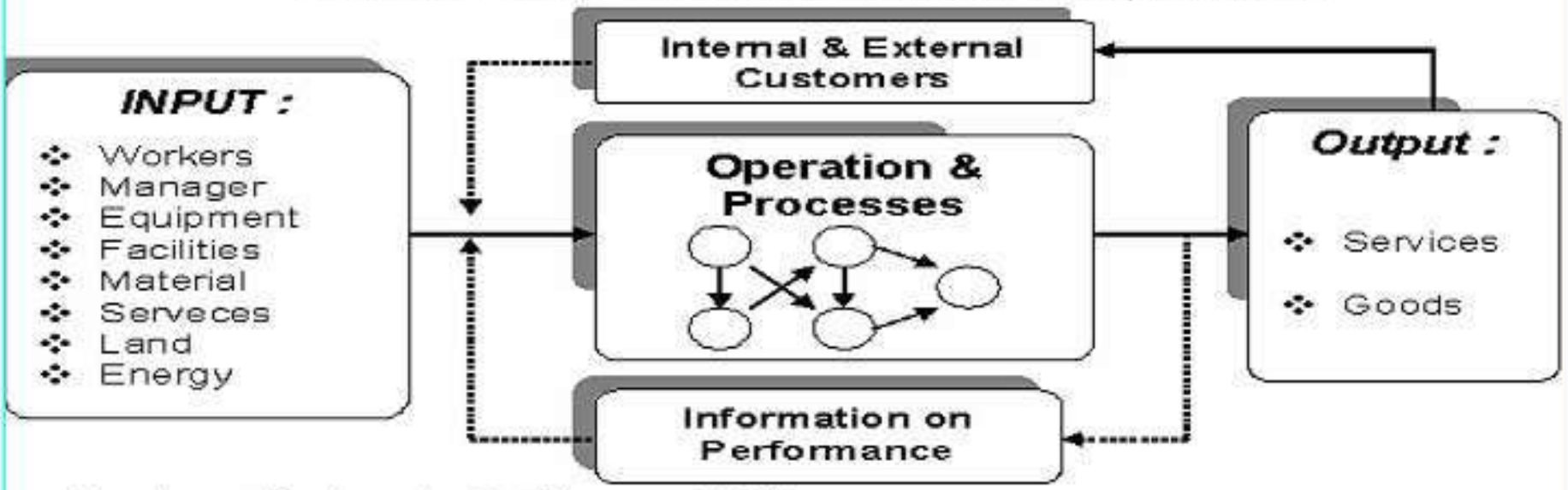
Fabrication: making the parts

Assembly: putting the parts together

Operations Management System

A. Operations Management System

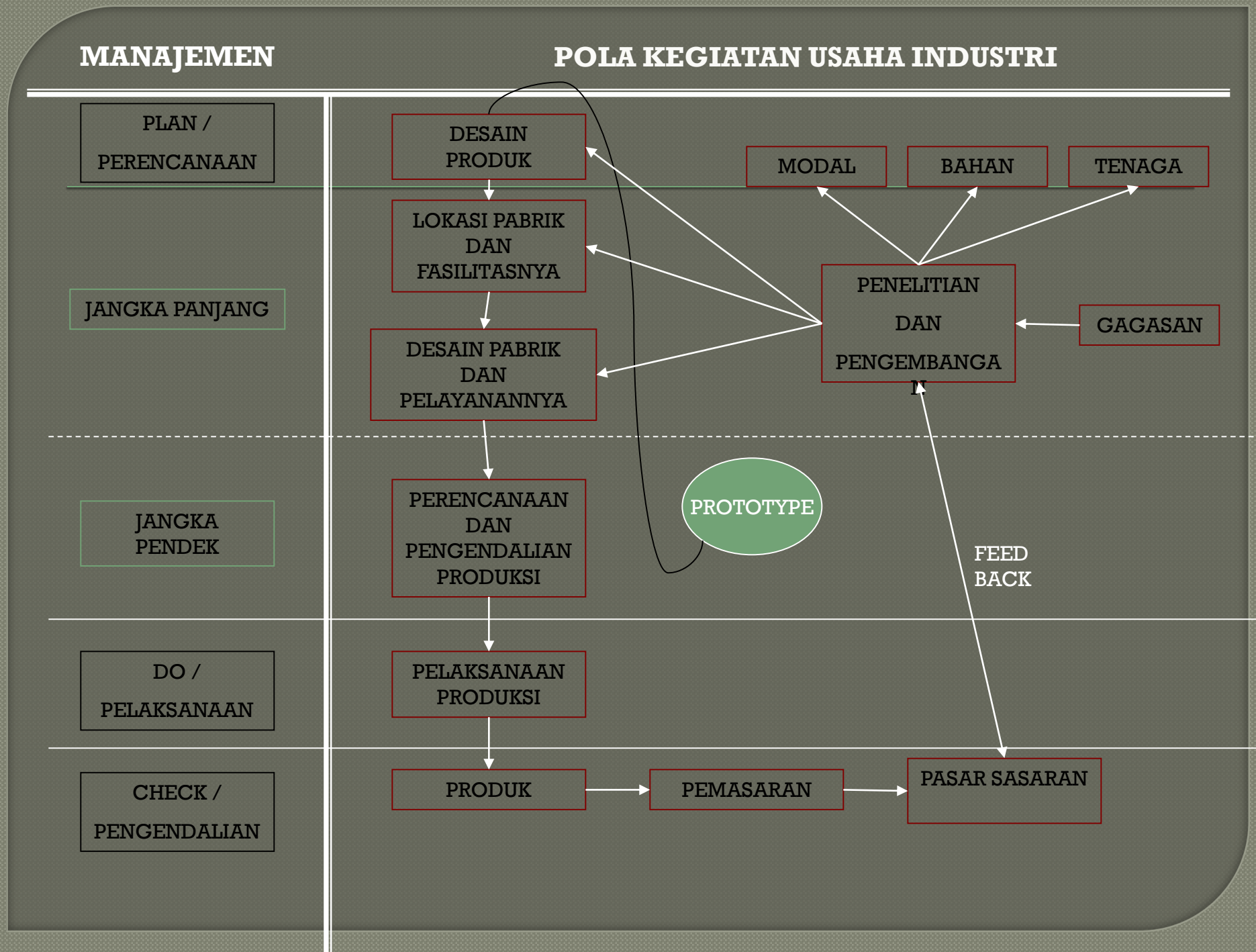
Gambar 1.3. Sistem Manajemen Opersional



Sumber : Krajewsky & Ritzman, 2002

Keterangan Gambar :

- **Proses perubahan input & output terdiri dari SDM (TK & Manajer), Modal (Peralatan & Fasilitas), Pembelian BB & jasa, tanah serta energi.**
- **Lingkaran mewakili operasi yang dilalui jasa, barang atau orang serta dimana proses dilaksanakan.**
- **Tanda panah menunjukan arah proses akan dilaksanakan. Baik perusahaan maupun disektor jasa memiliki pelanggan. Pelanggan tersebut dapat berada diluar maupun didalam organisasi.**
- **Garis terputus-putus mewakili dua imput khusus yaitu partisipasi pelanggan dan kinerja informasi berasal dari dalam/diluar organisasi.**


MANAJEMEN
POLA KEGIATAN USAHA INDUSTRI
PLAN / PERENCANAAN
JANGKA PANJANG
JANGKA PENDEK
DO / PELAKSANAAN
CHECK / PENGENDALIAN
DESAIN PRODUK
LOKASI PABRIK DAN FASILITASNYA
DESAIN PABRIK DAN PELAYANANNYA
PERENCANAAN DAN PENGENDALIAN PRODUKSI
PELAKSANAAN PRODUKSI
PRODUK
PEMASARAN
PASAR SASARAN
MODAL
BAHAN
TENAGA
PENELITIAN DAN PENGEMBANGAN
GAGASAN
PROTOTYPE
FEED BACK

The Critical Decisions

- Design of goods and services
  - Barang&/jasa apa yang harus ditawarkan?
  - Bagaimana seharusnya kita mendesain barang&/jasa tersebut?
- Managing quality
  - How do we define quality?
  - Who is responsible for quality?

Table 1.2 (cont.)

The Critical Decisions

- Process and capacity design
  - Proses apa dan berapa kapasistas yang dibutuhkan oleh produk tersebut?
  - Peralatan dan teknologi apa yang dibituhkan untuk proses tersebut?
- Location strategy
  - Where should we put the facility?
  - Kriteria apa yang dijadikan dasar keputusan pemilihan lokasi?

Table 1.2 (cont.)

The Critical Decisions

- Layout strategy
  - How should we arrange the facility?
  - Seberapa besar fasilitas disediakan agar sesuai dengan rencana?
- Human resources and job design
  - Bagaimana caranya agar tercipta lingkungan kerja yang nyaman?
  - Bagaimana kita berharap terhadap tingkat produktivitas karyawan?

Table 1.2 (cont.)

The Critical Decisions

- Supply chain management
  - Apakah kita akan membuat atau membeli komponen yang dibutuhkan?
  - Siapa yang menjadi suplier kita dan siapa yang dapat mengintegrasikan mereka dalam e-commerce program kita?
- Inventory, material requirements planning, and JIT
  - Berapa banyak persediaan yang harus tersedia?
  - When do we re-order?

Table 1.2 (cont.)

The Critical Decisions

- Intermediate and short–term scheduling
  - Akankah lebih baik jika kita tetap mempertahankan karyawan pada saat tingkat produksi menurun?
  - Which jobs do we perform next?
- Maintenance
  - Who is responsible for maintenance?
  - When do we do maintenance?

Table 1.2 (cont.)

Where are the OM Jobs?

- ☑ Technology/methods
- ☑ Facilities/space utilization
- ☑ Strategic issues
- ☑ Response time
- ☑ People/team development
- ☑ Customer service
- ☑ Quality
- ☑ Cost reduction
- ☑ Inventory reduction
- ☑ Productivity improvement

New Challenges in OM

From	To
☑ Local or national focus	☑ Global focus
☑ Batch shipments	☑ Just-in-time
☑ Low bid purchasing	☑ Supply chain partnering
☑ Lengthy product development	☑ Rapid product development, alliances
☑ Standard products	☑ Mass customization
☑ Job specialization	☑ Empowered employees, teams

New Trends in OM

Past	Causes	Future
Local or national focus	*Reliable worldwide communication and transportation networks*	*Global focus, moving production offshore*
Batch (large) shipments	*Short product life cycles and cost of capital put pressure on reducing inventory*	*Just-in-time performance*
Low-bid purchasing	*Supply chain competition requires that suppliers be engaged in a focus on the end customer*	*Supply chain partners, collaboration, alliances, outsourcing*

Figure 1.6

New Trends in OM

Past	Causes	Future
Lengthy product development	*Shorter life cycles, Internet, rapid international communication, computer-aided design, and international collaboration*	*Rapid product development, alliances, collaborative designs*
Standardized products	*Affluence and worldwide markets; increasingly flexible production processes*	*Mass customization with added emphasis on quality*
Job specialization	*Changing socioculture milieu; increasingly a knowledge and information society*	*Empowered employees, teams, and lean production*

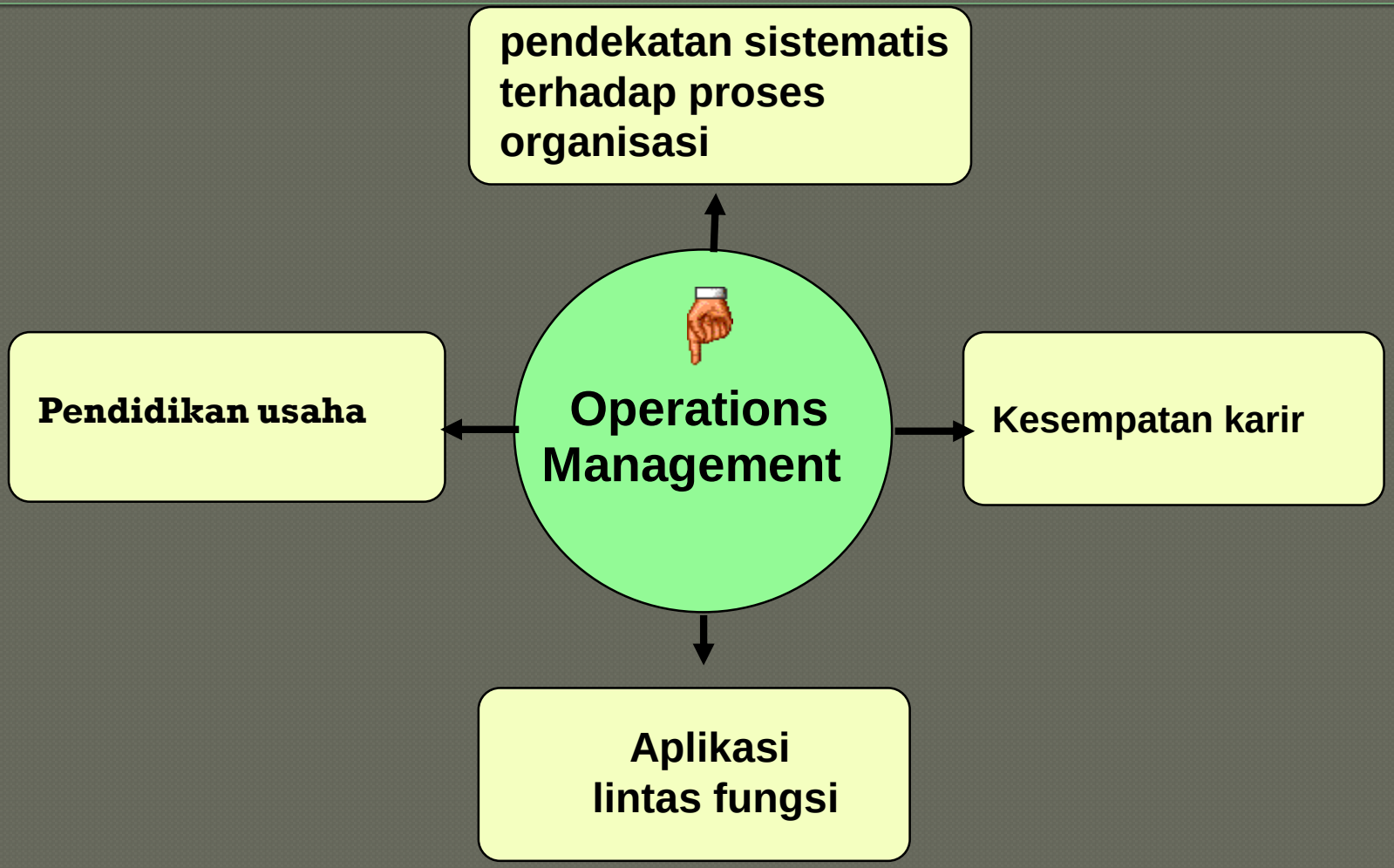
Figure 1.6

New Trends in OM

Past	Causes	Future
Low-cost focus	*Environmental issues, ISO 14000, increasing disposal costs*	*Environmentally sensitive production, green manufacturing, recycled materials, remanufacturing*
Ethics not at forefront	*Businesses operate more openly; public and global review of ethics; opposition to child labor, bribery, pollution*	*High ethical standards and social responsibility expected*

Figure 1.6

Why Study Operations Management?



What is a Transformation Process?

Defined

A transformation process didefinisikan sebagai penggunaan sumber daya untuk merubah input menjadi output yang diinginkan

Transformations

- **Physical--manufacturing**
- **Locational--transportation**
- **Exchange--retailing**
- **Storage--warehousing**
- **Physiological--health care**
- **Informational--telecommunications**

What is a Service and What is a Good?

- **“If you drop it on your foot, it won’t hurt you.” (Good or service?)**

- **“Services never include goods and goods never include services.” (True or false?)**

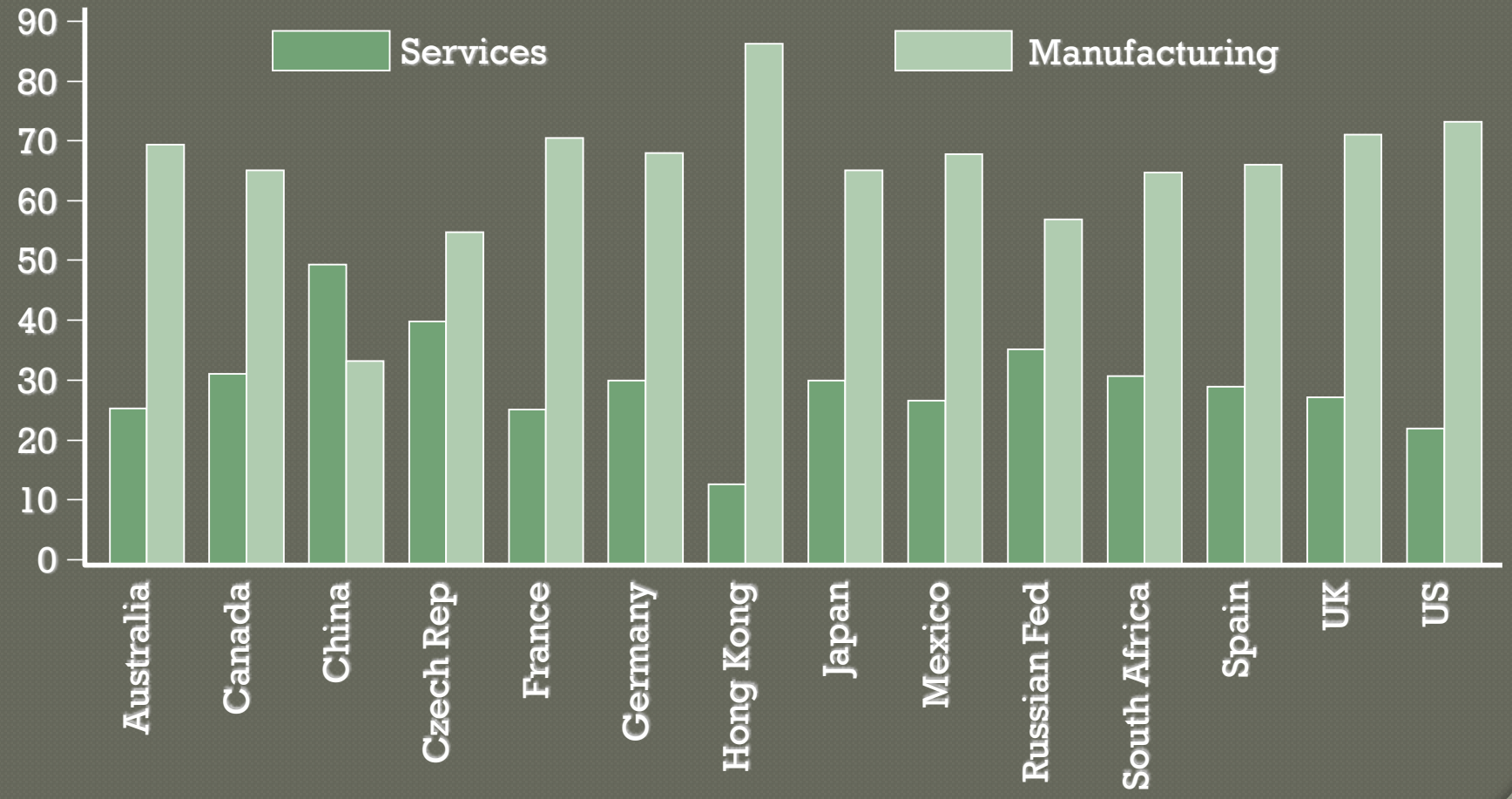
Characteristics of Goods

- ☑ Tangible product
- ☑ Consistent product definition
- ☑ Production usually separate from consumption
- ☑ Can be inventoried
- ☑ Low customer interaction

Characteristics of Service

- ☑ Intangible product
- ☑ Produced and consumed at same time
- ☑ Often unique
- ☑ High customer interaction
- ☑ Inconsistent product definition
- ☑ Often knowledge-based
- ☑ Frequently dispersed

Industry and Services as Percentage of GDP



Goods and Services

Automobile

Computer

Installed carpeting

Fast-food meal

Restaurant meal/auto repair

Hospital care

Advertising agency/ investment management

Consulting service/ teaching

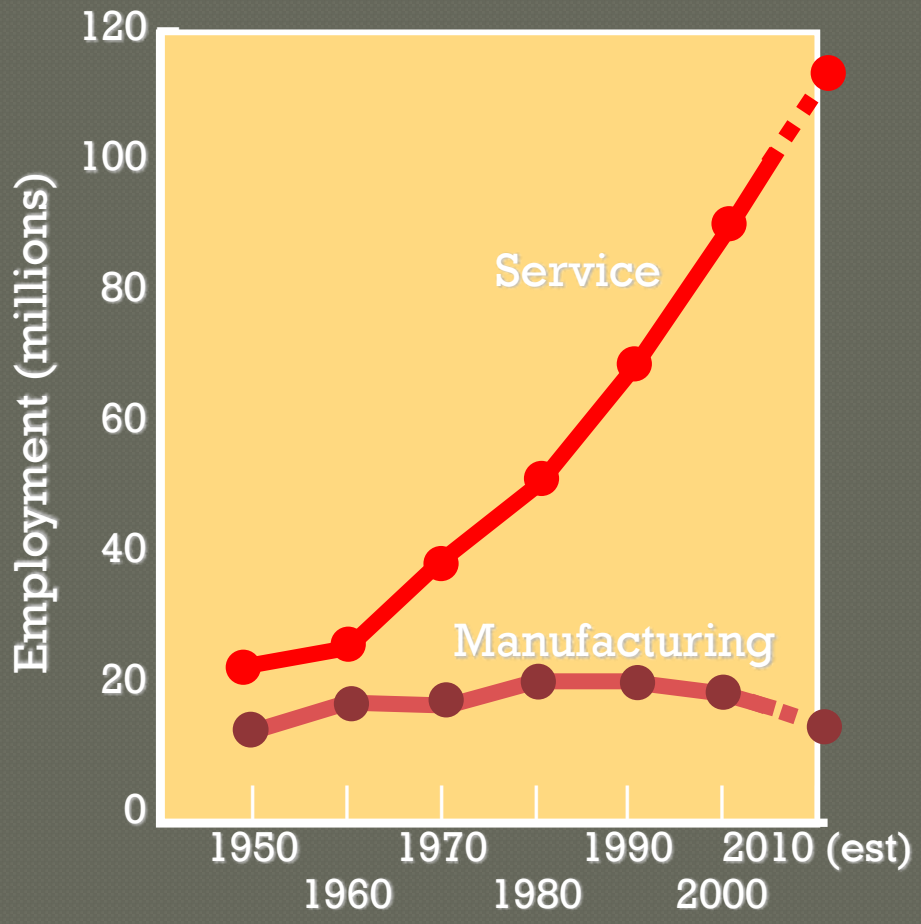
Counseling

100% 75 50 25 0 25 50 75 100%

Percent of Product that is a Good

Percent of Product that is a Service

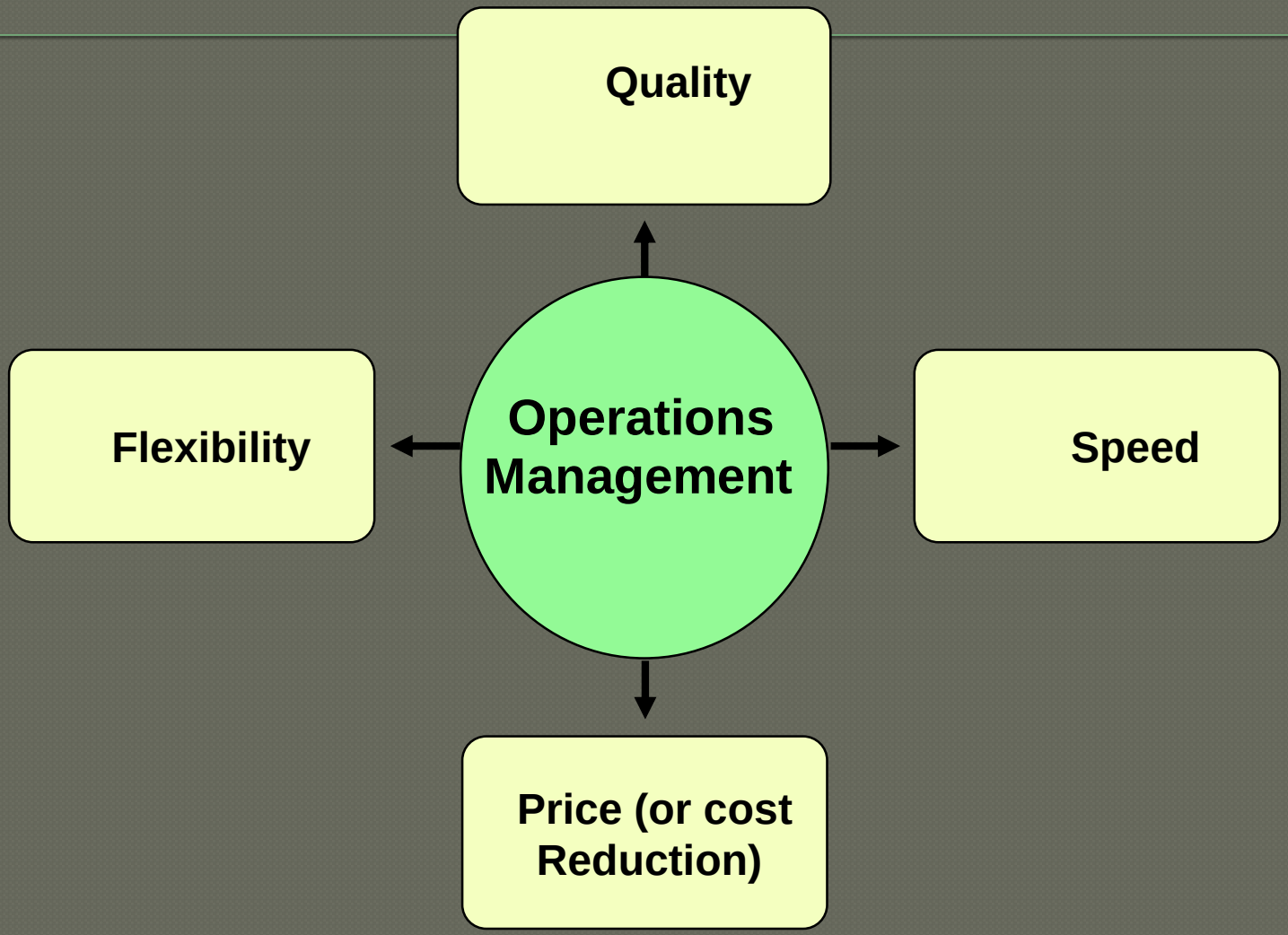
Manufacturing and Service Employment



Core Services
Defined

Core services adalah sesuatu yang penting yang diinginkan konsumen dari produk yang mereka beli

Core Services Performance Objectives

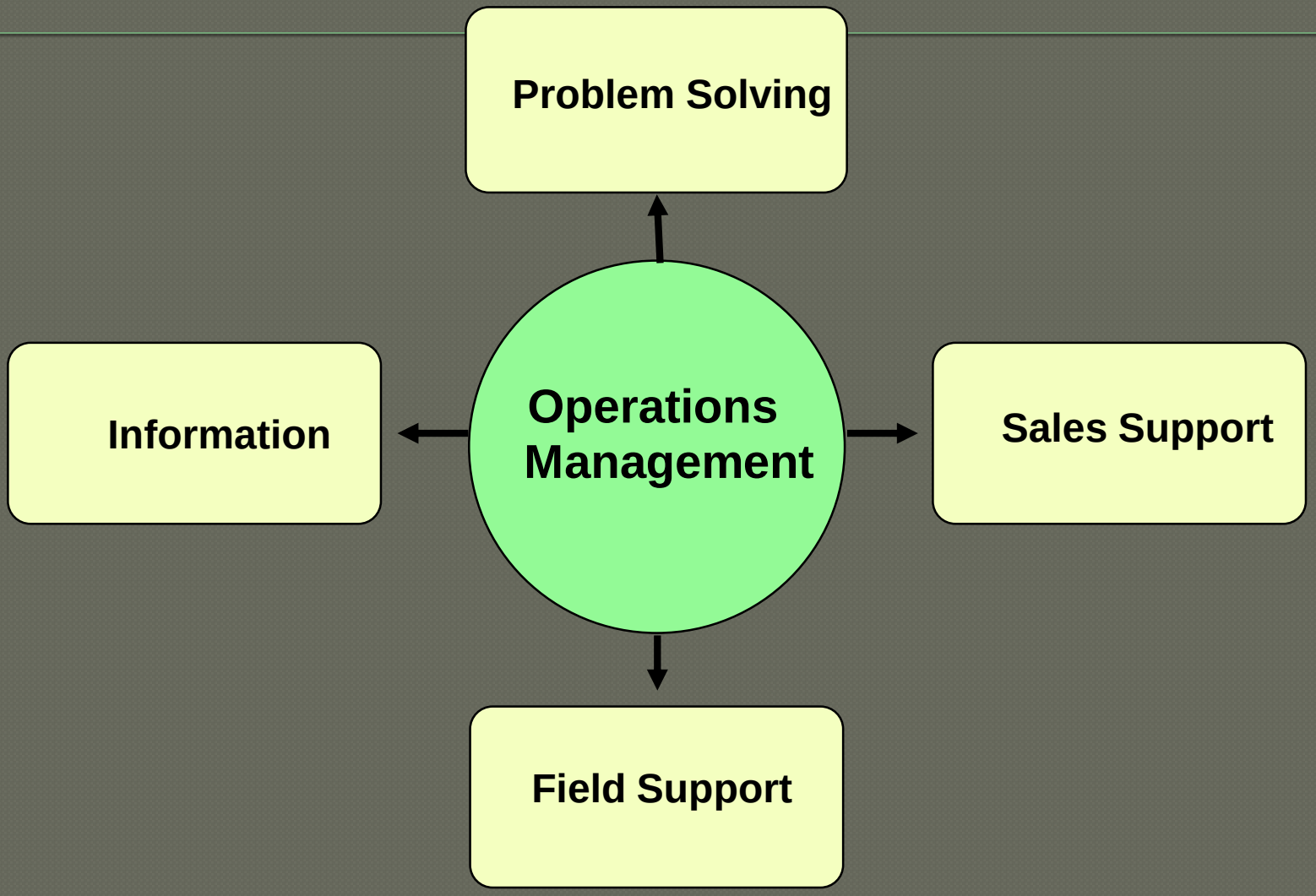


Value-Added Services

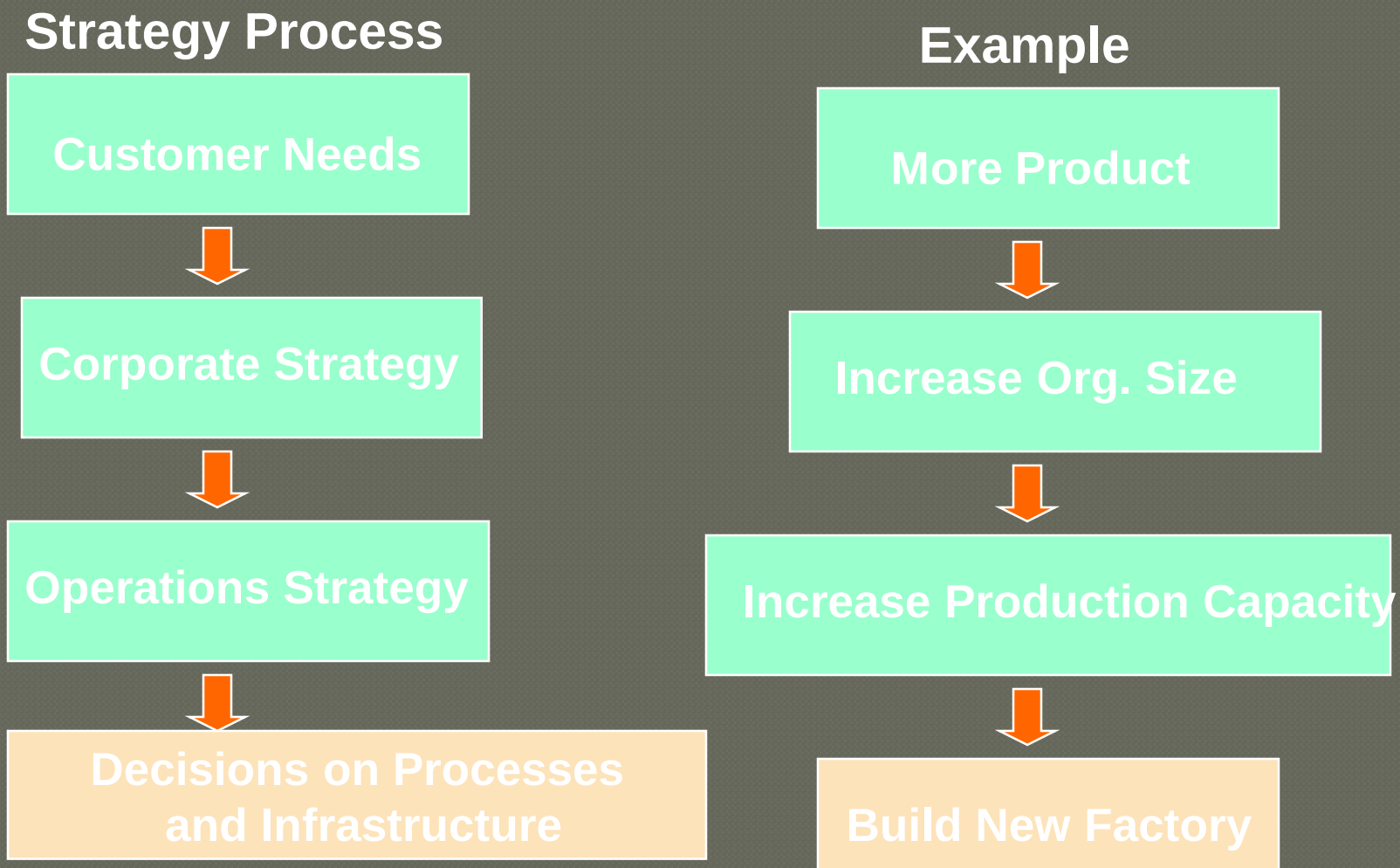
Defined

Value-added services membedakan organisasi dari pesaingnya dan membuat hubungan yang mengikat konsumen dengan perusahaan melalui cara yang halus

Value-Added Service Categories



Operations Strategy



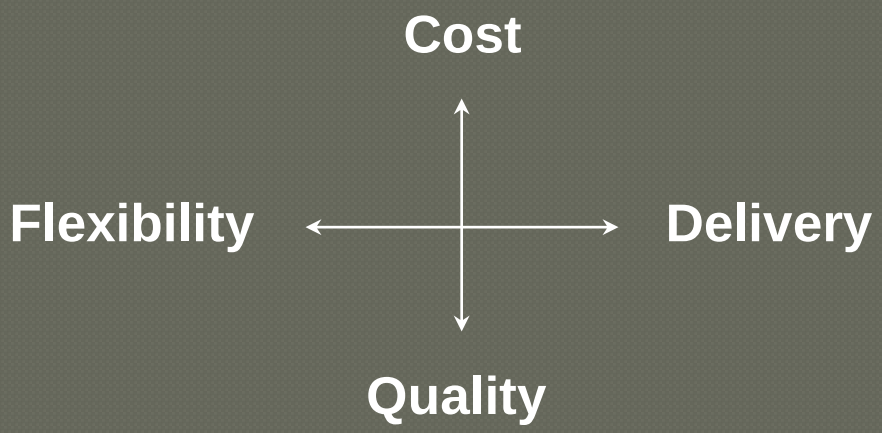
Competitive Dimensions

- **Cost or Price**
  Membuat barang atau menghantarkan jasa dengan biaya murah
- **Quality**
  - **Membuat barang atau jasa yang berkualitas**
- **Delivery Speed**
  - **Membuat produk dengan cepat**
- **Delivery Reliability**
  - **Menghantarkan tepat waktu**
- **Coping with Changes in Demand**
  - **Merubah volume produksi**
- **Flexibility and New Product Introduction Speed**
  - **Change It**
- **Other Product-Specific Criteria**
  - **Support It**

Dealing with Trade-offs

For example, apabila kita mengurangi biaya dengan cara mengurangi pemeriksaan kualitas produk, maka mungkin kualitas produk telah berkurang.

For example, apabila kemampuan pemecahan masalah bagian pelayanan pelanggan ditingkatkan, dengan cara pelatihan silang karyawan agar mampu menghadapi berbagai masalah, karyawan ini mungkin akan menjadi tidak efisien ketika harus menghadapi masalah yang bersifat umum.



Order Qualifiers and Winners Defined

- ***Order qualifiers*** **kriteria dasar yang disyaratkan agar produk perusahaan dapat dijadikan salah satu pertimbangan untuk dibeli konsumen**

- ***Order winners*** **kriteria yang membedakan produk satu perusahaan dengan perusahaan lainnya**

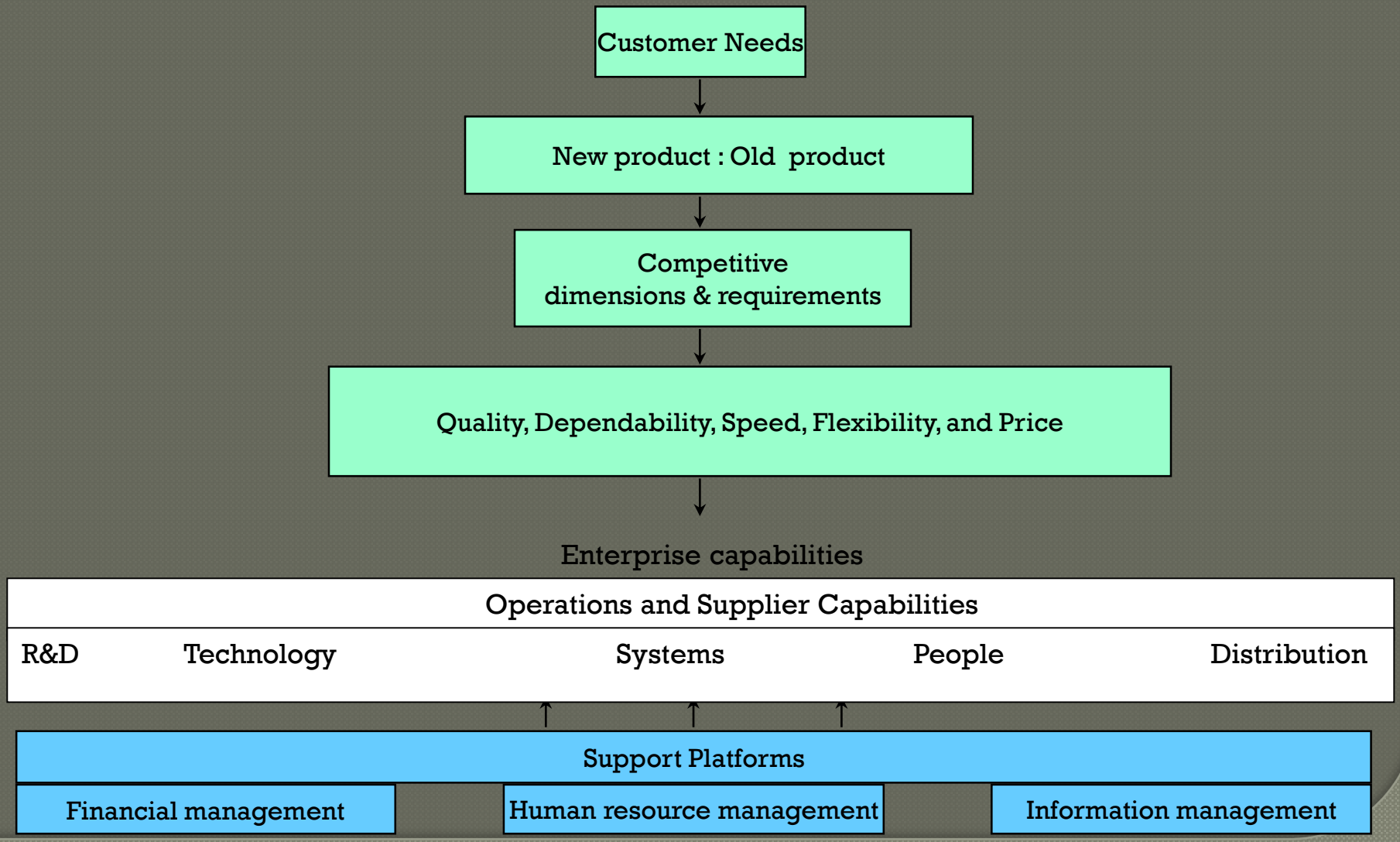
Service Breakthroughs

- A brand name car can be an "order qualifier"

- Repair services can be "order winners"

Examples: Warranty, Roadside Assistance, Leases, etc

Operations Strategy Framework



What is Productivity?

Defined

Productivity is a common measure on how well resources are being used. In the broadest sense, it can be defined as the following ratio:

$$\frac{\text{Outputs}}{\text{Inputs}}$$

Total Measure Productivity

Total Measure Productivity = Outputs
Inputs

or

= Goods and services produced
All resources used

Partial Measure Productivity

- **Partial measures of productivity =**

- **$\frac{\text{Output}}{\text{Labor}}$ or $\frac{\text{Output}}{\text{Capital}}$ or $\frac{\text{Output}}{\text{Materials}}$ or $\frac{\text{Output}}{\text{Energy}}$**

Multifactor Measure Productivity

- **Multifactor measures of productivity =**

$$\frac{\text{Output}}{\text{Labor} + \text{Capital} + \text{Energy}}$$

or

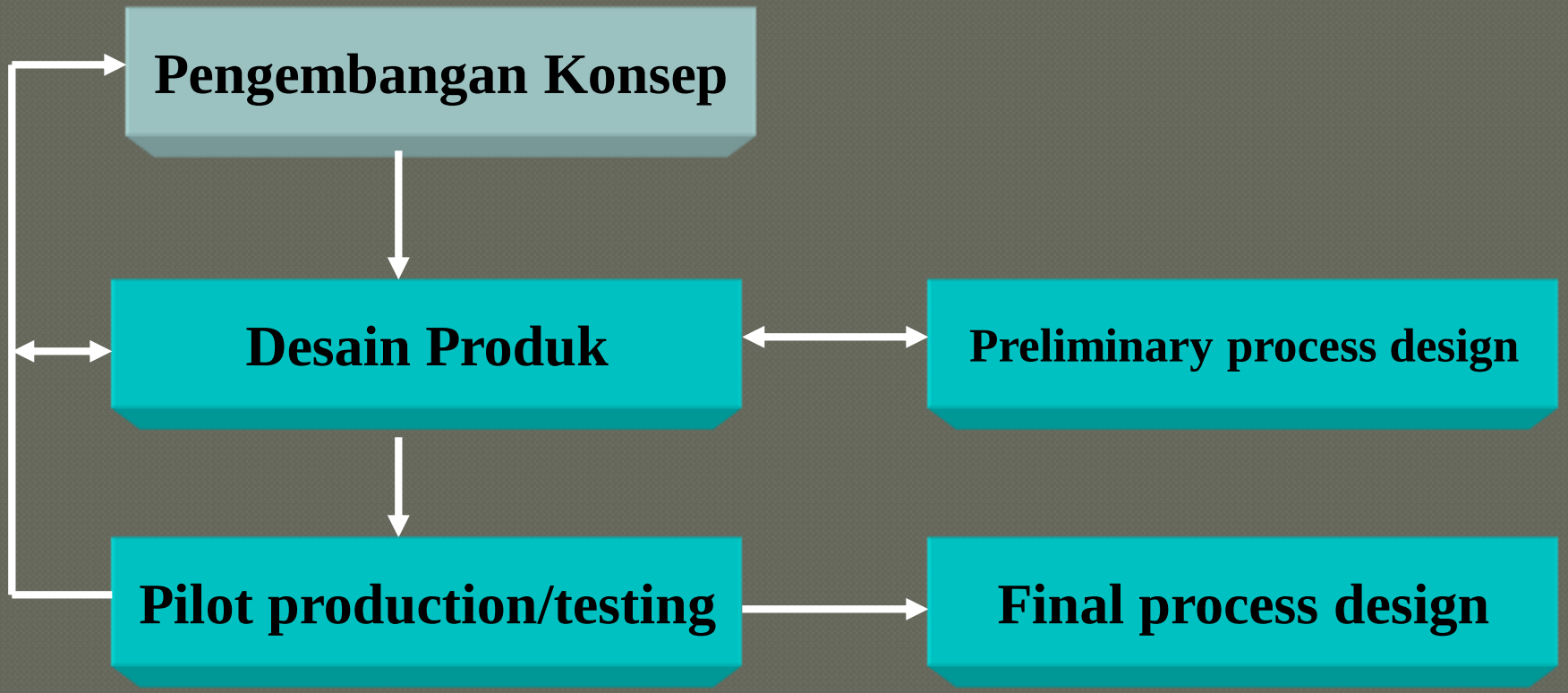
$$\frac{\text{Output}}{\text{Labor} + \text{Capital} + \text{Materials}}$$

Operations Management

Design of Goods and Services




Desain Produk



Product Life Cycles

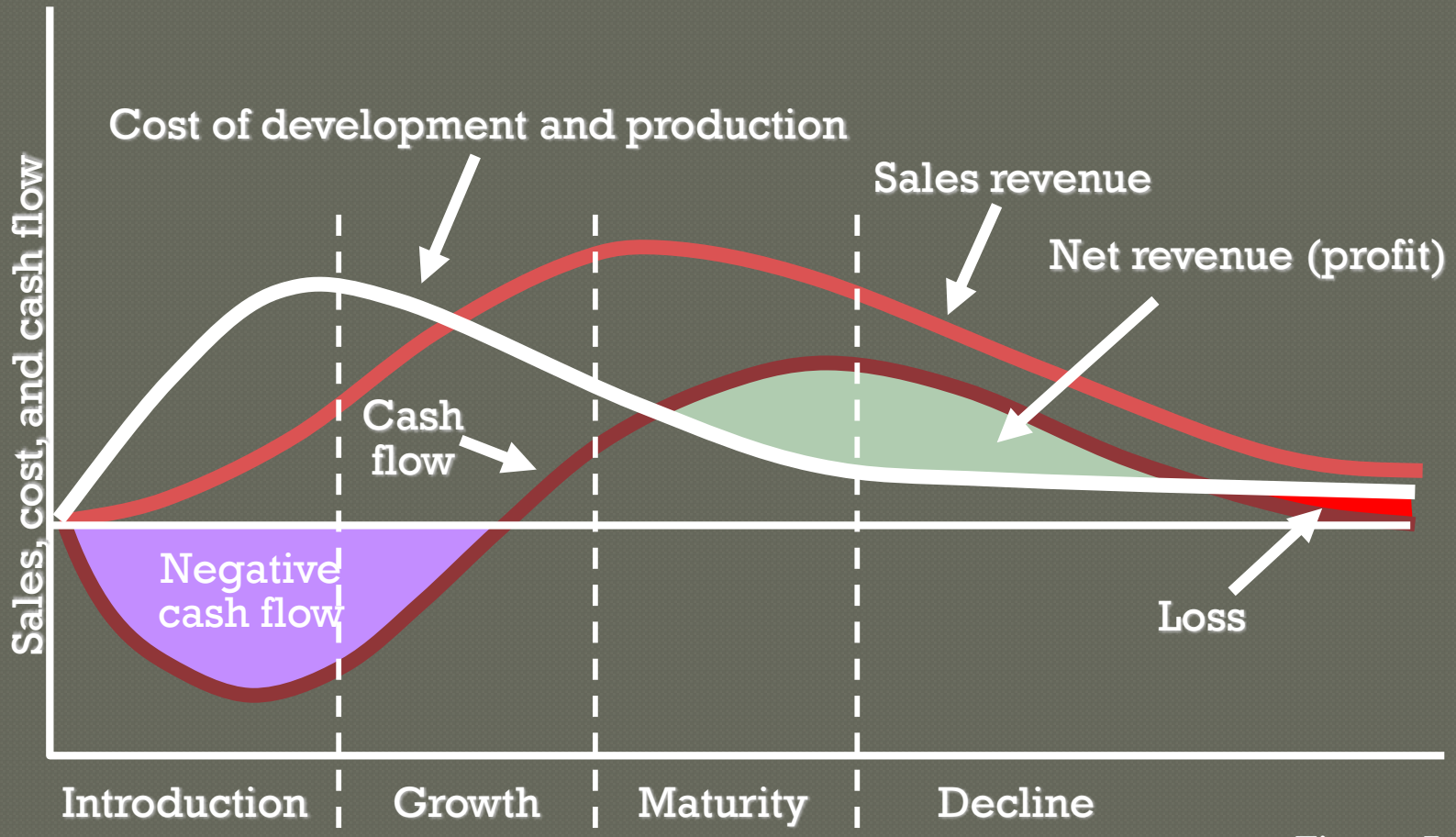


Figure 5.1

Product Life Cycle

Introduction

- ☑ Fine tuning may warrant unusual expenses for
  - ☑ Research
  - ☑ Product development
  - ☑ Process modification and enhancement
  - ☑ Supplier development

Product Life Cycle

Growth

- ☑ Product design begins to stabilize
- ☑ Effective forecasting of capacity becomes necessary
- ☑ Adding or enhancing capacity may be necessary

Product Life Cycle

Maturity

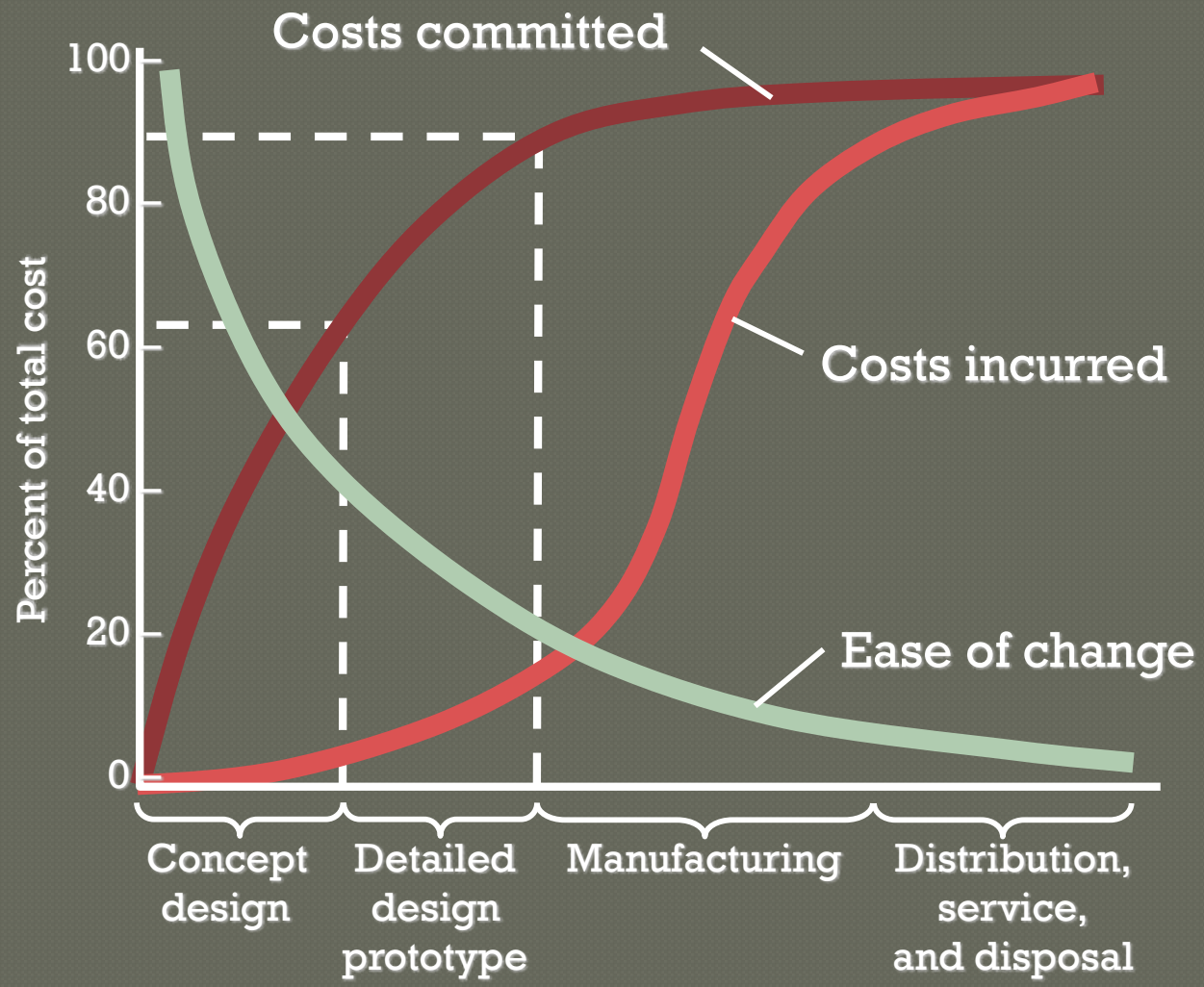
- ☑ Competitors now established
- ☑ High volume, innovative production may be needed
- ☑ Improved cost control, reduction in options, paring down of product line

Product Life Cycle

Decline

- ☑ Unless product makes a special contribution to the organization, must plan to terminate offering

Product Life Cycle Costs



Importance of New Products

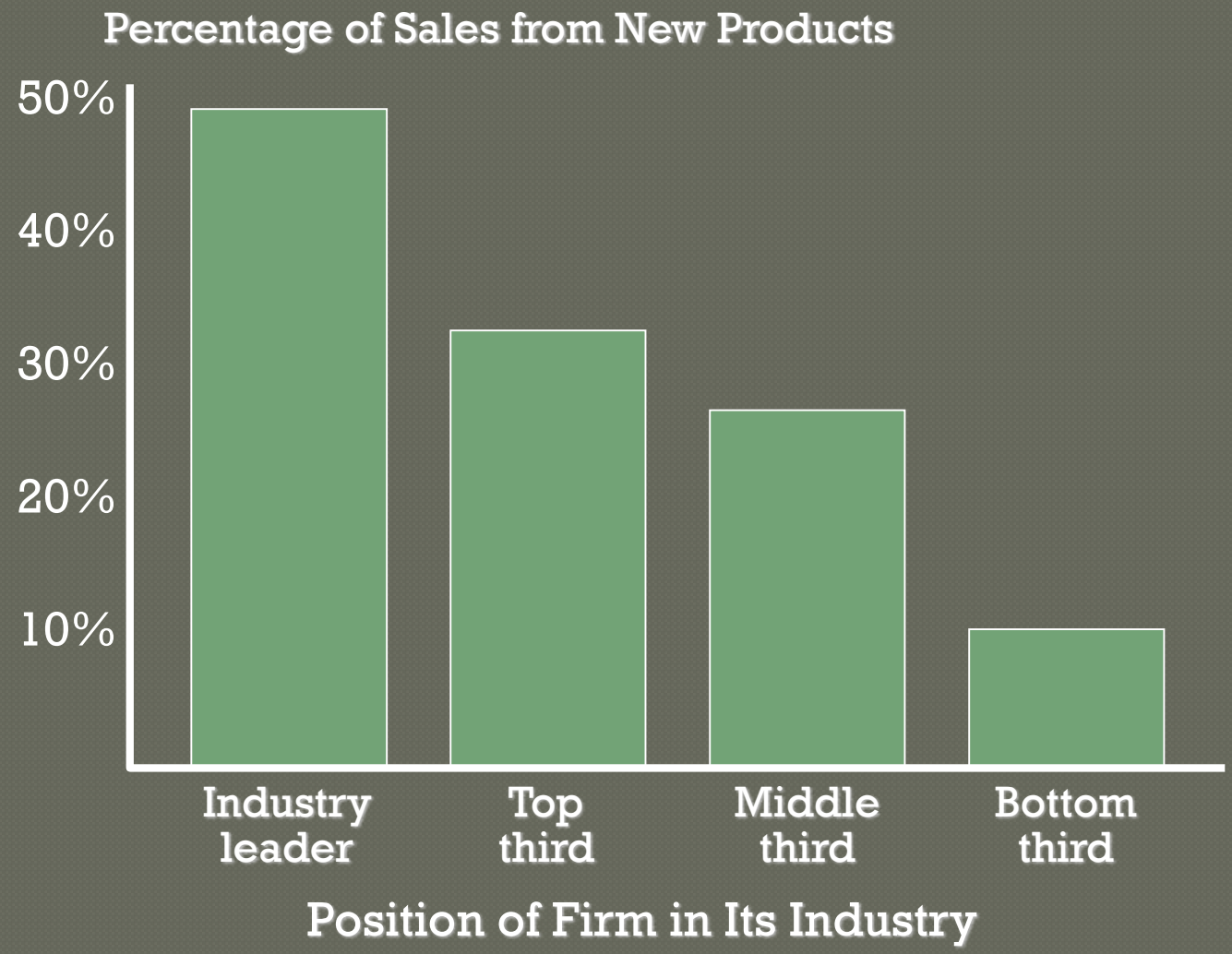


Figure 5.2

New Product Opportunities

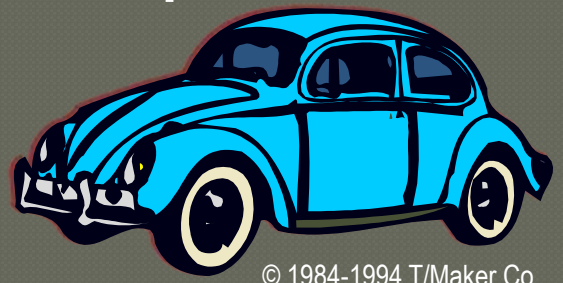
1. Lebih mengerti pelanggan
2. Perubahan ekonomi
3. Perubahan sosial dan demografi
4. Perubahan teknologi
5. Perubahan politik dan hukum
6. Market practice, professional standards, suppliers, distributors

Brainstorming merupakan alat yg tepat

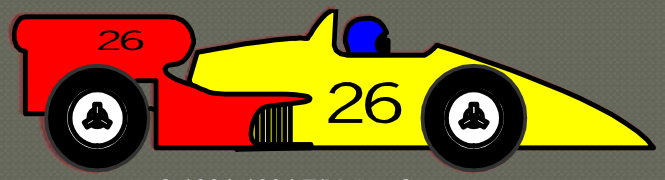
Humor in Product Design

As the customer wanted it.

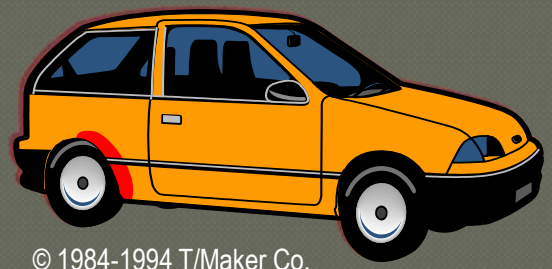
As Marketing interpreted it.



As Engineering designed it.

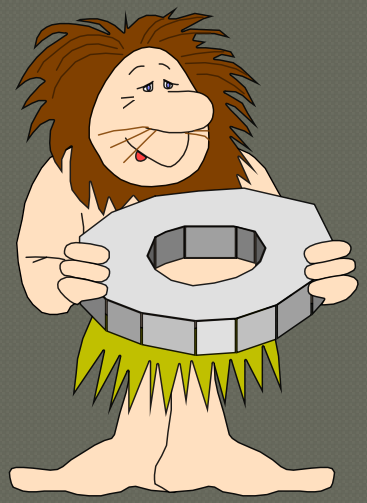


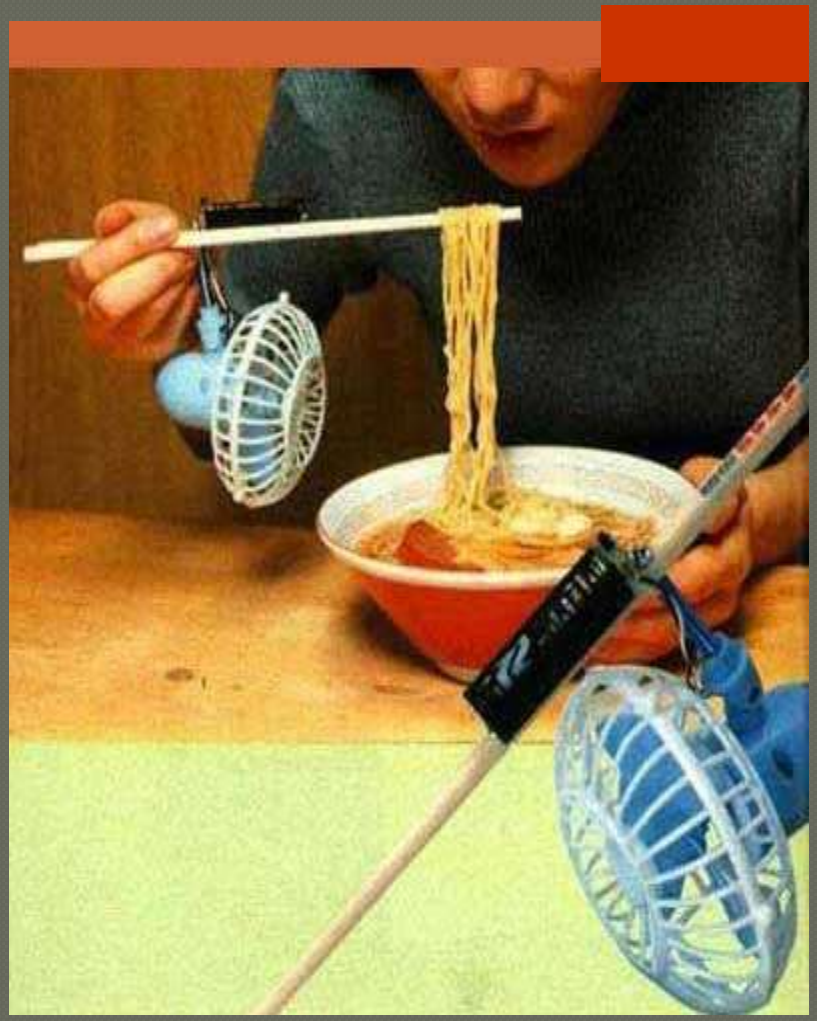
As Operations made it.



Dampak langsung dari Design Produk :

- Kualitas Produk
- Biaya Produksi
- Kepuasan Konsumen





Product Strategy Options

- ☑ Differentiation
  - ☑ Shouldice Hospital
- ☑ Low cost
  - ☑ Taco Bell
- ☑ Rapid response
  - ☑ Toyota

Sumber inovasi produk

- Customers
- Managers
- Marketing
- Operations
- Engineering
- Research and Development (R&D)
  - Basic research
  - Applied research

Product Development System

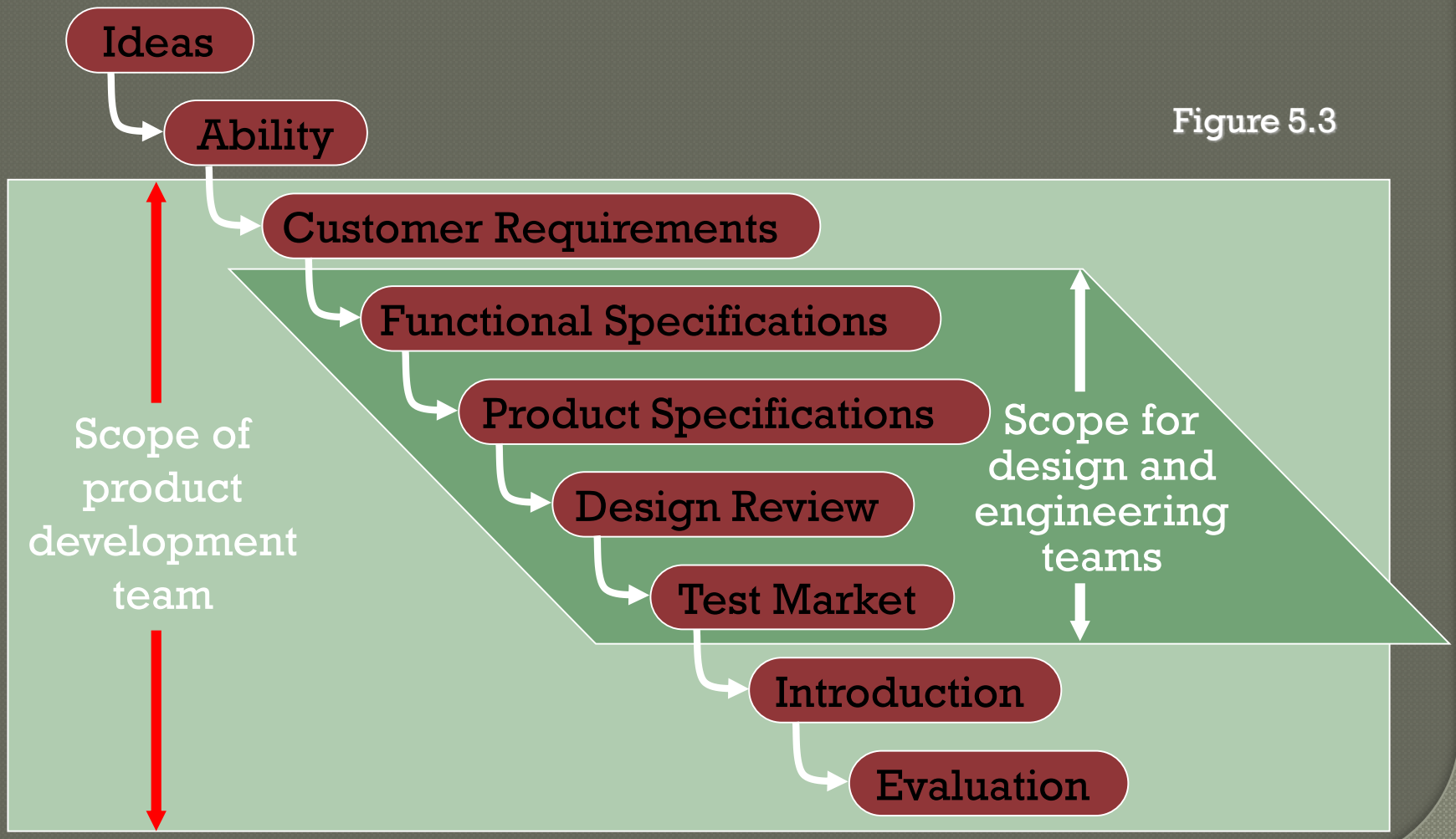


Figure 5.3

Steps in Developing New Products

1. Technical and Economic Feasibility Studies
   - Determine the advisability of establishing a project for developing the product
   - If initial feasibility studies are favorable, engineers prepare an initial prototype design

Steps in Developing New Products

2. Prototype Design
   - This design should exhibit the basic form, fit, and function of the final product
   - It will not necessarily be identical to the production model

Steps in Developing New Products

3. Performance Testing of Prototype
   - Performance testing and redesign of the prototype continues until this design-test-redesign process produces a satisfactorily performing prototype

Steps in Developing New Products

4. Market Sensing/Evaluation and Economic Evaluation of the Prototype
   - Accomplished by demonstrations to potential customers, market test, or market surveys
   - If the response to the prototype is favorable, economic evaluation of the prototype is performed to estimate production volume, costs, and profits
   - If the economic evaluation is favorable, the project enters the production design phase.

Steps in Developing New Products

5. Design of Production Model
   - The initial design of the production model will not be the final design; the model will evolve

Steps in Developing New Products

6. Market/Performance/Process Testing and Economic Evaluation of Production Model
   - The production model should exhibit:
     - low cost
     - reliable quality
     - superior performance
     - the ability to be produced in the desired quantities on the intended equipment

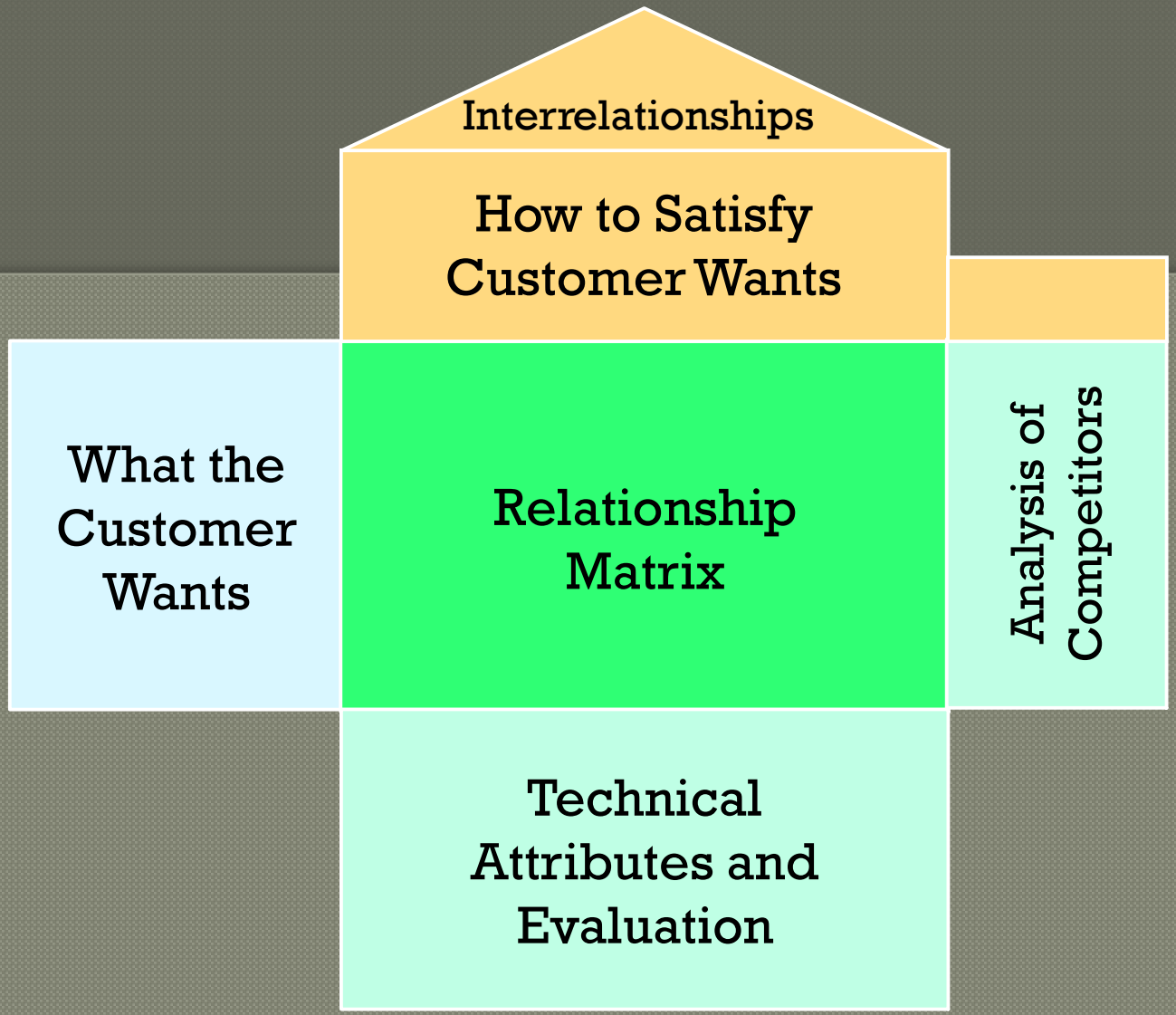
Steps in Developing New Products

7. Continuous Modification of Production Model
   - Production designs are continuously modified to:
     - Adapt to changing market conditions
     - Adapt to changing production technology
     - Allow for manufacturing improvements

Quality Function Deployment

- Identifikasi keinginan konsumen
- Identifikasi bagaimana produk akan memuaskan keinginan konsmen
- Hubungkan keinginan konsumen dengan bagaimana cara membuat produk
- Identifikasi hubungan antar bagian di perusahaan
- Bangun tingkat kepentingan
- Evaluasi produk pesaing

QFD House of Quality



Improving the Design of Existing Products/Services

- Focus is improving performance, quality, and cost
- Objective is maintaining or improving market share of maturing products/services
- Little changes can be significant
- Small, steady (continuous) improvements can add up to huge long-term improvements
- Value analysis is practiced, meaning design features are examined in terms of their cost/benefit (value).

Designing and Developing New Services

Three general dimensions of service design are:

- Degree of Standardization of the Service
  - Custom-fashioned for particular customers or basically the same for all customers?
- Degree of Customer Contact in Delivering the Service
  - High level of contact (dress boutique) or low level (fast-food restaurant)?
- Mix of Physical Goods and Intangible Services
  - Mix dominated by physical goods (tailor's shop) or by intangible services (university)?

Issues for Product Development

- Robust design
- Modular design
- Computer-aided design (CAD)
- Computer-aided manufacturing (CAM)
- Virtual reality technology
- Value analysis
- Environmentally friendly design

Goals for Ethical and Environmentally Friendly Designs

1. Develop safe and more environmentally sound products
2. Minimize waste of raw materials and energy
3. Reduce environmental liabilities
4. Increase cost-effectiveness of complying with environmental regulations
5. Be recognized as a good corporate citizen

Guidelines for Environmentally Friendly Designs

1. Make products recyclable
2. Use recycled materials
3. Use less harmful ingredients
4. Use lighter components
5. Use less energy
6. Use less material

Acquiring Technology

- By Purchasing a Firm
  - Speeds development
  - Issues concern the fit between the acquired organization and product and the host
- Through Joint Ventures
  - Both organizations learn
  - Risks are shared
- Through Alliances
  - Cooperative agreements between independent organizations

Operations Management

Process Strategy




Process Strategies

- ☑ How to produce a product or provide a service that
  - ☑ Meets or exceeds customer requirements
  - ☑ Meets cost and managerial goals
- ☑ Has long term effects on
  - ☑ Efficiency and production flexibility
  - ☑ Costs and quality

Process Strategies

Four basic strategies

- ☑ Process focus
- ☑ Repetitive focus
- ☑ Product focus
- ☑ Mass customization

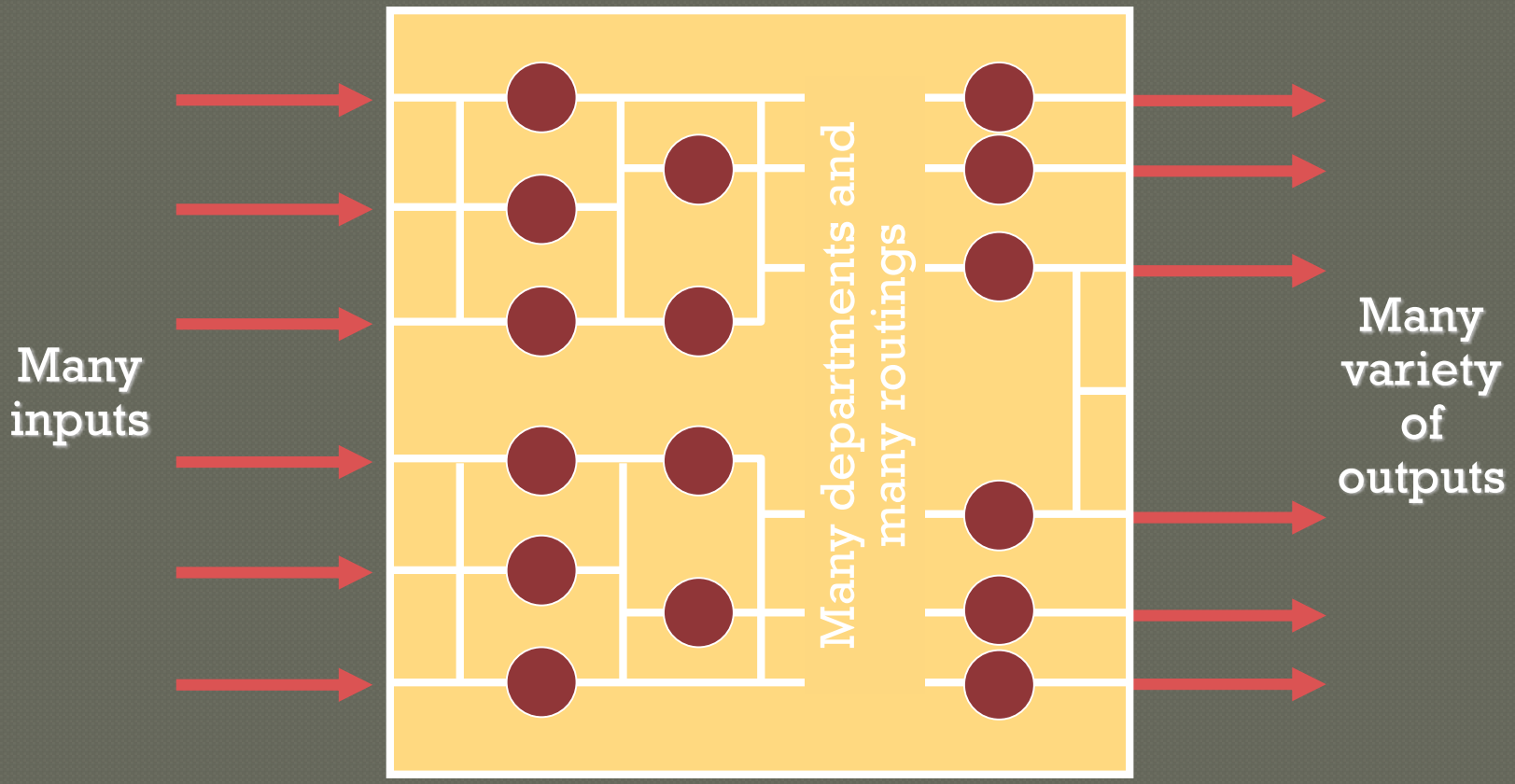
Within these basic strategies there are many ways they may be implemented

Process Focus

- ☑ Facilities are organized around specific activities or processes
- ☑ General purpose equipment and skilled personnel
- ☑ High degree of product flexibility
- ☑ Typically high costs and low equipment utilization
- ☑ Product flows may vary considerably making planning and scheduling a challenge

Process

Job Shop



Process Flow Diagram

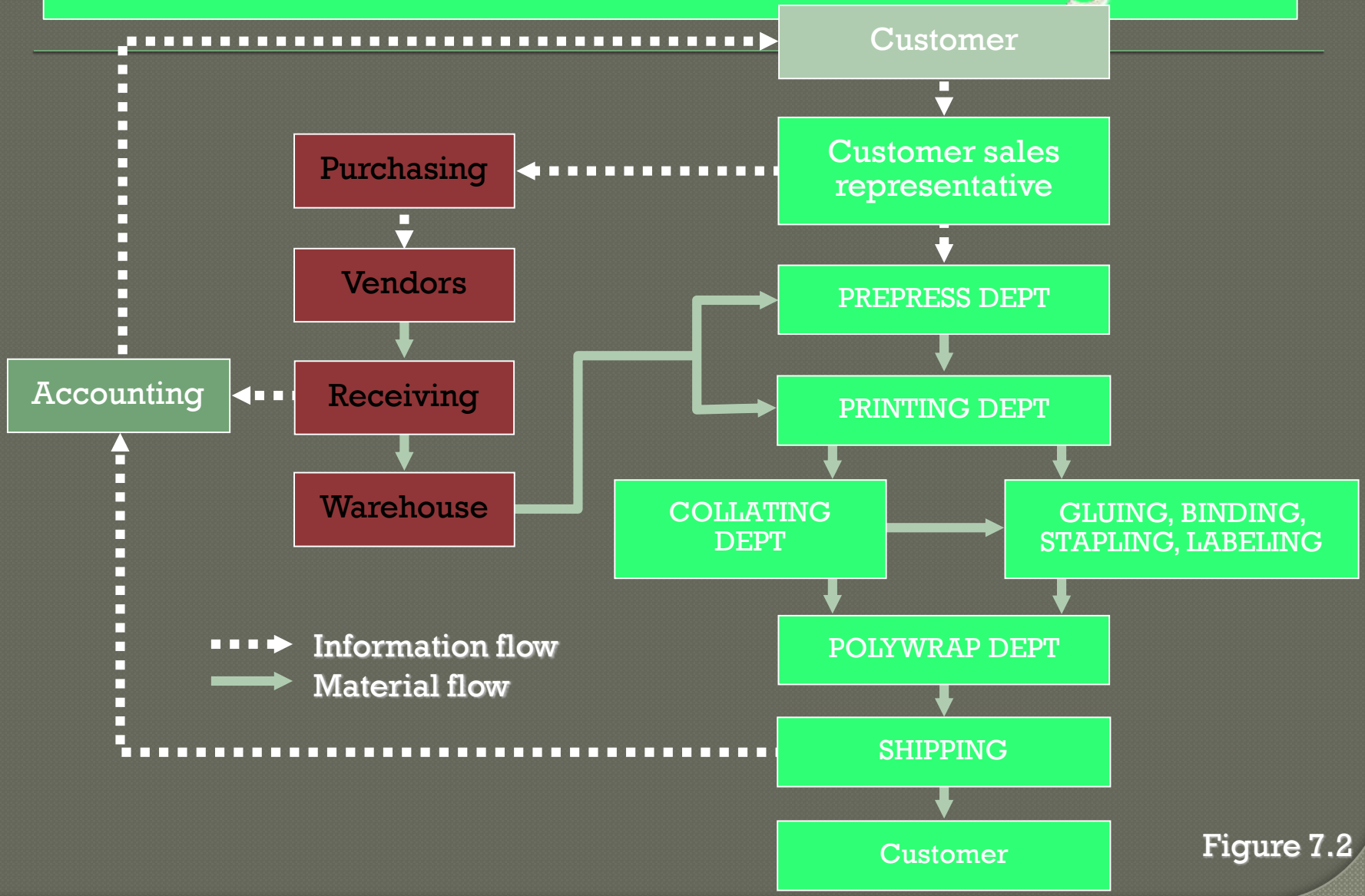


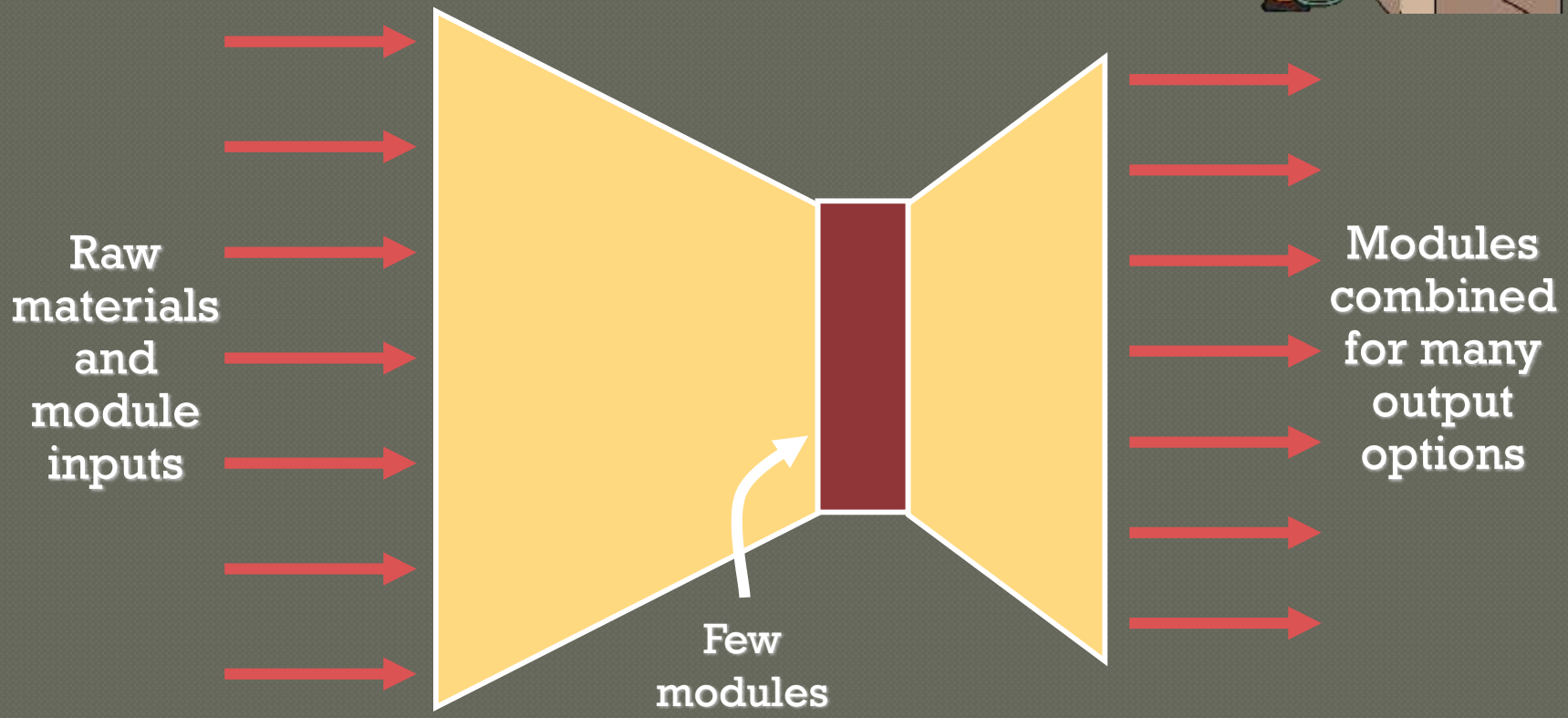
Figure 7.2

Repetitive Focus

- ☑ Facilities often organized as assembly lines
- ☑ Characterized by modules with parts and assemblies made previously
- ☑ Modules may be combined for many output options
- ☑ Less flexibility than process-focused facilities but more efficient

Repetitive Focus

Automobile Assembly Line



Process Flow Diagram

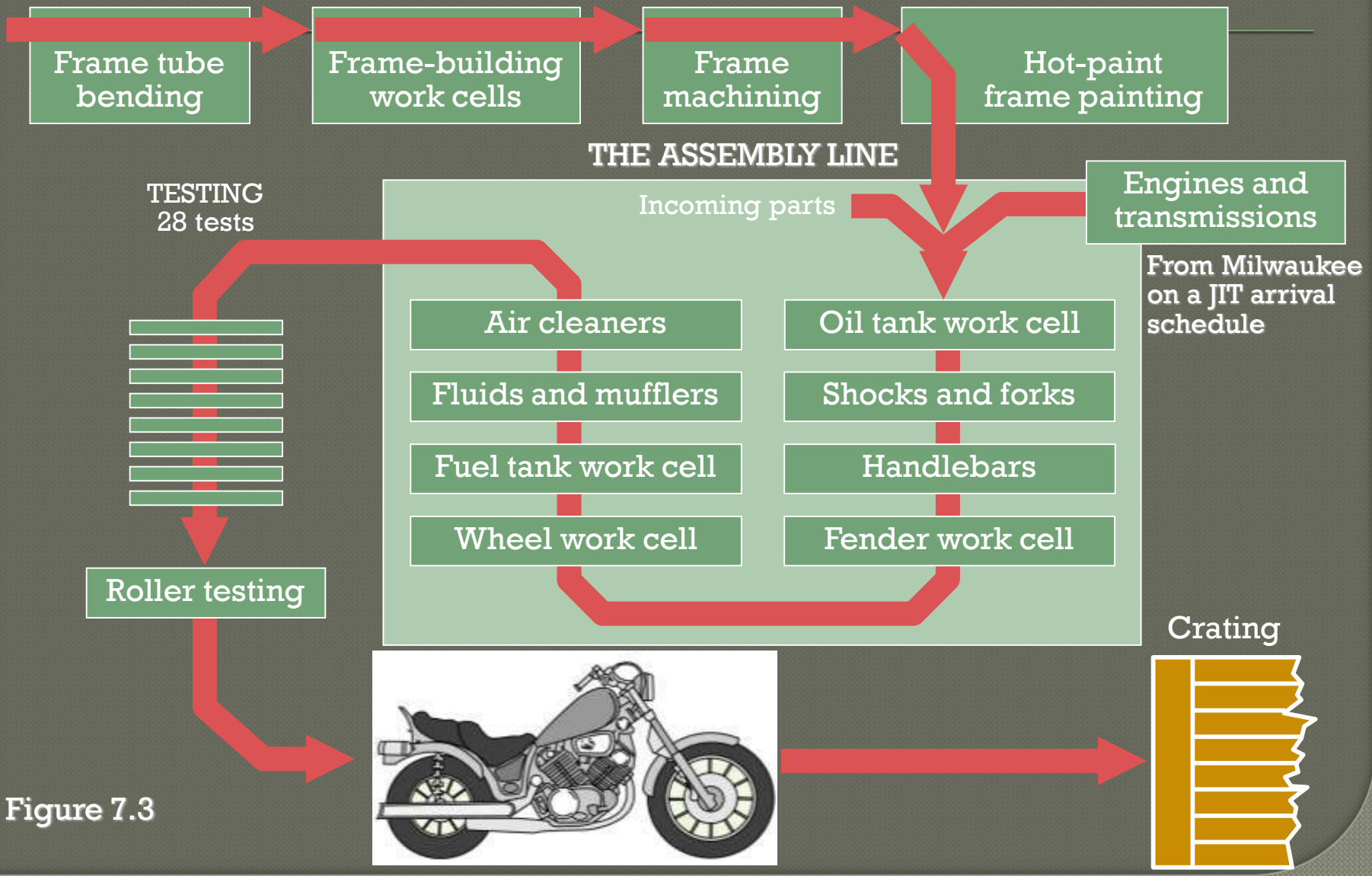
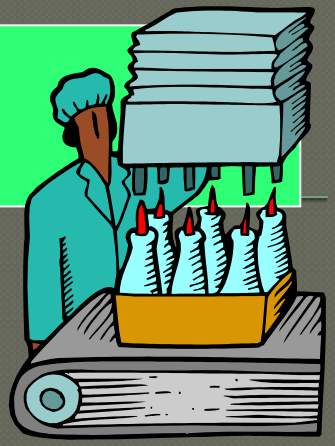


Figure 7.3

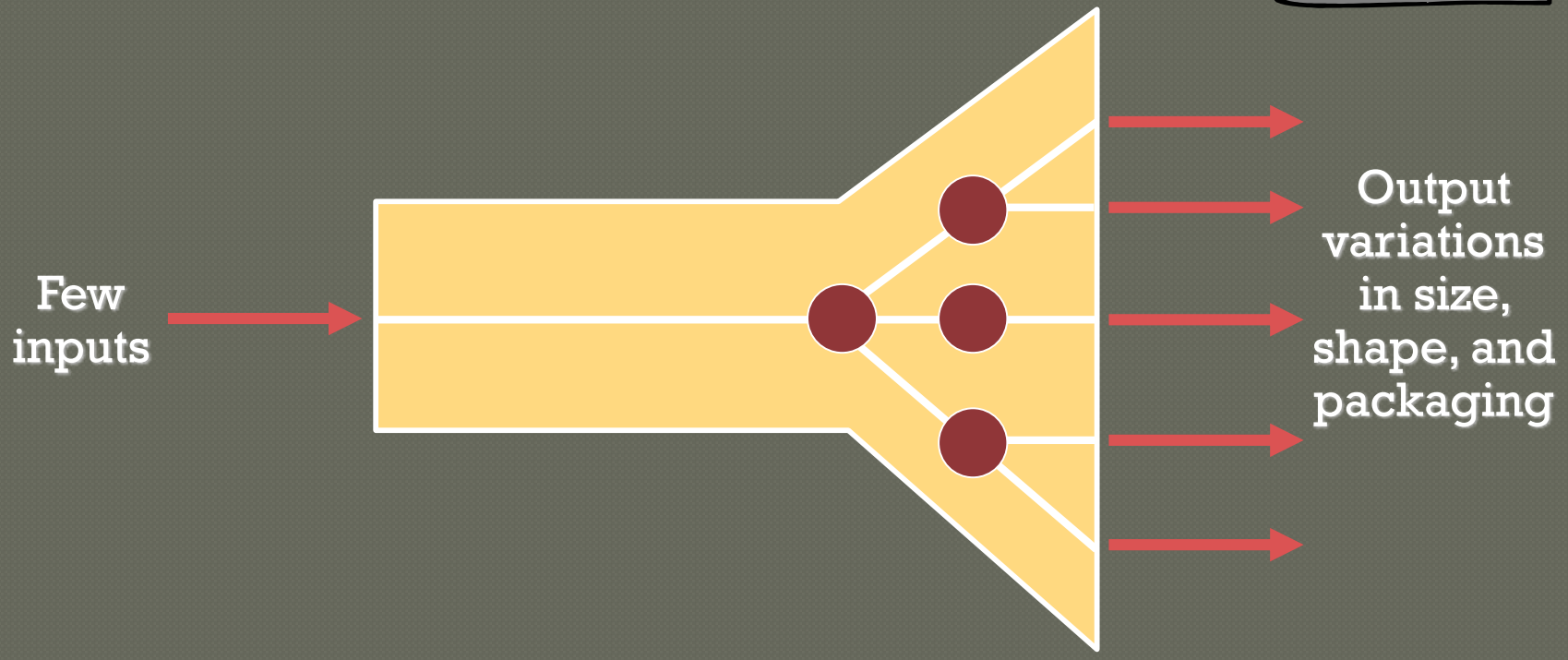
Product Focus

- ☑ Facilities are organized by product
- ☑ High volume but low variety of products
- ☑ Long, continuous production runs enable efficient processes
- ☑ Typically high fixed cost but low variable cost
- ☑ Generally less skilled labor

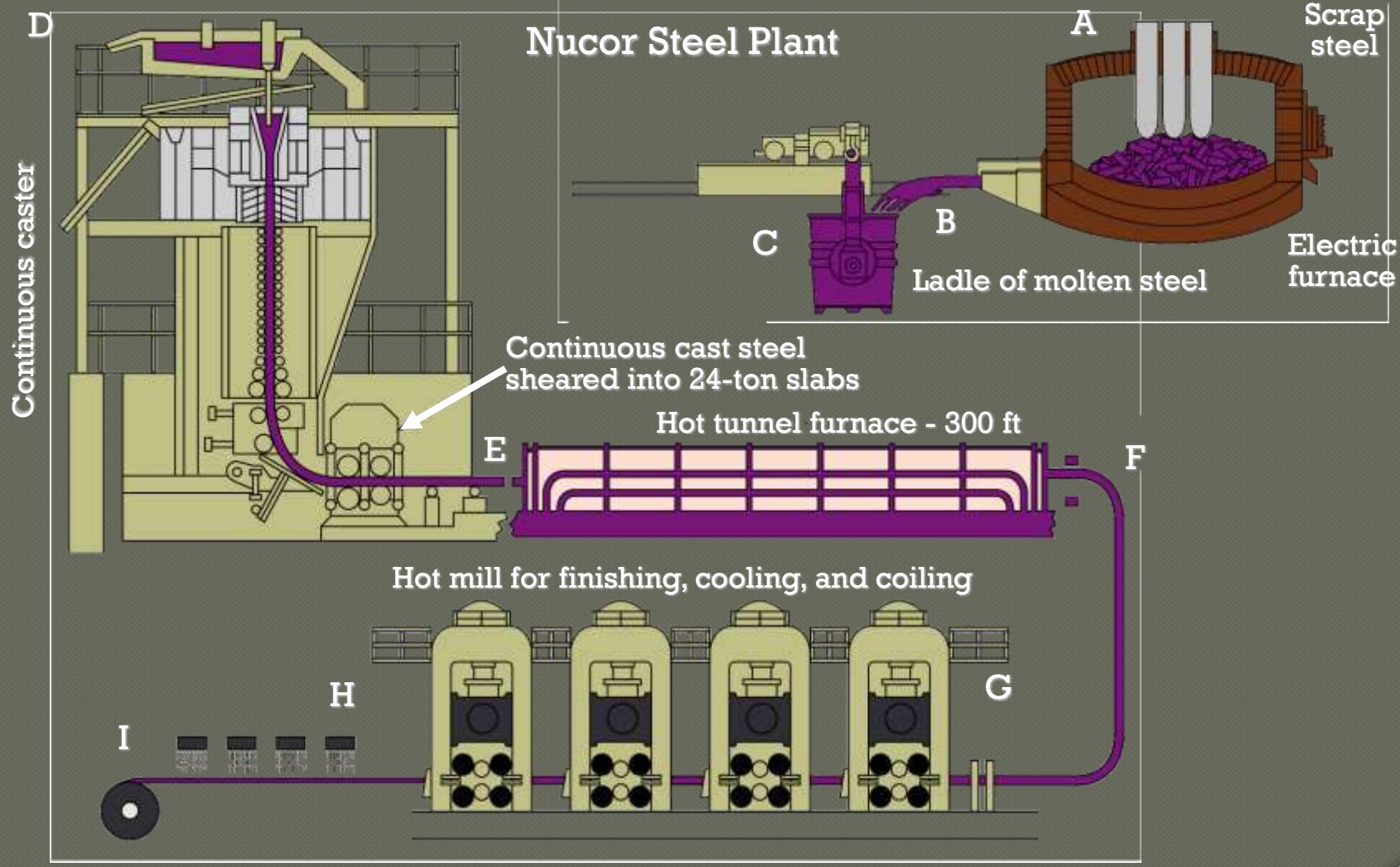
Product Focus



Continuous Work Flow



Product Focus

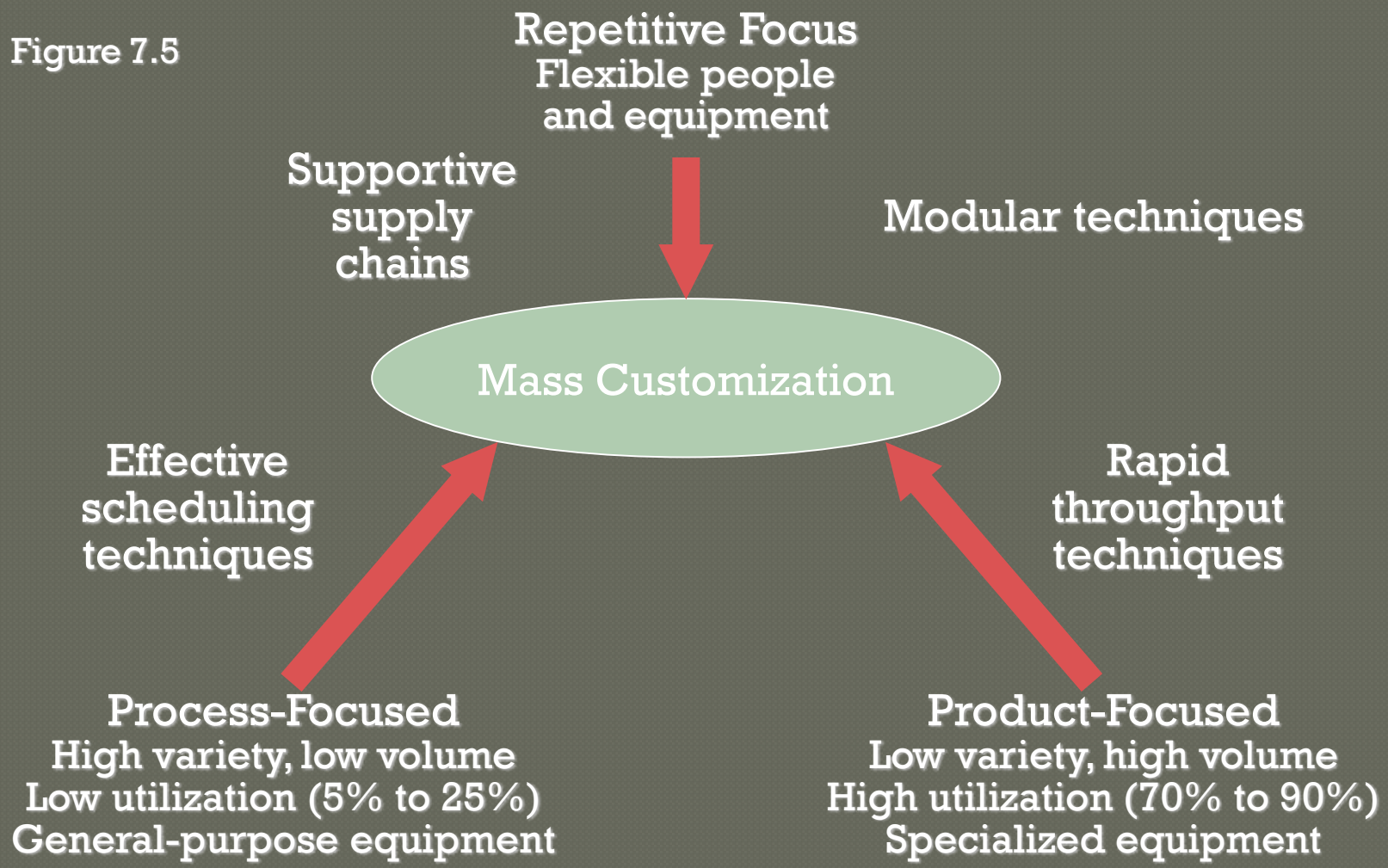


Mass Customization

- ☑ The rapid, low-cost production of goods and service to satisfy increasingly unique customer desires
- ☑ Combines the flexibility of a process focus with the efficiency of a product focus

Mass Customization

Figure 7.5



Comparison of Processes

Process Focus (Low volume, high variety)	Repetitive Focus (Modular)	Product Focus (High-volume, low-variety)	Mass Customization (High-volume, high-variety)
Small quantity, large variety of products	Long runs, standardized product made from modules	Large quantity, small variety of products	Large quantity, large variety of products
General purpose equipment	Special equipment aids in use of assembly line	Special purpose equipment	Rapid changeover on flexible equipment

Table 7.2

Comparison of Processes

Process Focus (Low volume, high variety)	Repetitive Focus (Modular)	Product Focus (High-volume, low-variety)	Mass Customization (High-volume, high-variety)
Operators are broadly skilled	Employees are modestly trained	Operators are less broadly skilled	Flexible operators are trained for the necessary customization
Many job instructions as each job changes	Repetition reduces training and changes in job instructions	Few work orders and job instructions because jobs standardized	Custom orders require many job instructions

Table 7.2

Comparison of Processes

Process Focus (Low volume, high variety)	Repetitive Focus (Modular)	Product Focus (High-volume, low-variety)	Mass Customization (High-volume, high-variety)
Raw material inventories high	JIT procurement techniques used	Raw material inventories are low	Raw material inventories are low
Work-in-process is high	JIT inventory techniques used	Work-in-process inventory is low	Work-in-process inventory driven down by JIT, lean production

Table 7.2

Comparison of Processes

Process Focus (Low volume, high variety)	Repetitive Focus (Modular)	Product Focus (High-volume, low-variety)	Mass Customization (High-volume, high-variety)
Units move slowly through the plant	Movement is measured in hours and days	Swift movement of unit through the facility is typical	Goods move swiftly through the facility
Finished goods made to order	Finished goods made to frequent forecast	Finished goods made to forecast and stored	Finished goods often build-to-order (BTO)

Table 7.2

Comparison of Processes

Process Focus (Low volume, high variety)	Repetitive Focus (Modular)	Product Focus (High-volume, low-variety)	Mass Customization (High-volume, high-variety)
Scheduling is complex, trade-offs between inventory, availability, customer service	Scheduling based on building various models from a variety of modules to forecasts	Relatively simple scheduling, establishing output rate to meet forecasts	Sophisticated scheduling required to accommodate custom orders

Table 7.2

Comparison of Processes

Process Focus (Low volume, high variety)	Repetitive Focus (Modular)	Product Focus (High-volume, low-variety)	Mass Customization (High-volume, high-variety)
Fixed costs low, variable costs high	Fixed costs dependent on flexibility of the facility	Fixed costs high, variable costs low	Fixed costs high, variable costs must be low
Costing estimated before job, known only after the job	Costs usually known due to extensive experience	High fixed costs mean costs dependent on utilization of capacity	High fixed costs and dynamic variable costs make costing a challenge

Table 7.2

Focused Processes

- Focus brings efficiency
- Focus on depth of product line rather than breadth
- Focus can be
  - Customers
  - Products
  - Service
  - Technology

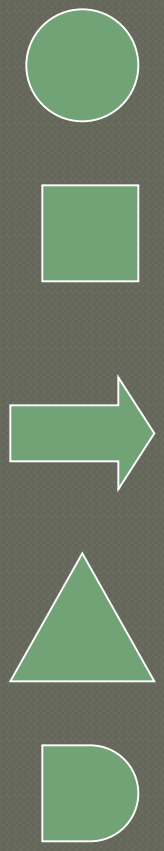
Changing Processes

- ☑ Difficult and expensive
- ☑ May mean starting over
- ☑ Process strategy determines transformation strategy for an extended period
- ☑ Important to get it right

Process Analysis and Design

- ☑ Flow Diagrams - Shows the movement of materials
- ☑ Time-Function Mapping - Shows flows and time frame
- ☑ Value-Stream Mapping - Shows flows and time and value added beyond the immediate organization
- ☑ Process Charts - Uses symbols to show key activities
- ☑ Service Blueprinting - focuses on customer/provider interaction

Symbols for Flow-Process Chart



Operation *(a task or work activity)*

Inspection *(an inspection of the product for quantity or quality)*

Transportation *(a movement of material from one point to another)*

Storage *(an inventory or storage of materials awaiting the next operation)*

Delay *(a delay in the sequence of operations)*

Process Chart

Present Method [X] PROCESS CHART Proposed Method [ ]

SUBJECT CHARTED Hamburger Assembly Process DATE 8/1/07

DEPARTMENT _____ CHART BY KH SHEET NO 1 OF 1

DIST. IN FEET	TIME IN MINS.	CHART SYMBOLS	PROCESS DESCRIPTION
	—	○ ⇨ □ D ▽	Meat Patty in Storage
1.5	.05	○ ⇨ □ D ▽	Transfer to Broiler
	2.50	○ ⇨ □ D ▽	Broiler
	.05	○ ⇨ □ D ▽	Visual Inspection
1.0	.05	○ ⇨ □ D ▽	Transfer to Rack
	.15	○ ⇨ □ D ▽	Temporary Storage
.5	.10	○ ⇨ □ D ▽	Obtain Buns, Lettuce, etc.
	.20	○ ⇨ □ D ▽	Assemble Order
.5	.05	○ ⇨ □ D ▽	Place in Finish Rack
		○ ⇨ □ D ▽	
3.5	3.15	2 4 1 – 2	TOTALS

Value-added time = Operation time/Total time = (2.50+.20)/3.15 = 85.7%

○ = operation; ⇨ = transportation; □ = inspection; D = delay; ▽ = storage.

Figure 7.9

Service Blueprint

- ☑ Focuses on the customer and provider interaction
- ☑ Defines three levels of interaction
- ☑ Each level has different management issues
- ☑ Identifies potential failure points

Classification by Type of Customer Order

- Make to Stock (MTS)
- Make to Order (MTO)
- Assemble to Order (ATO)

Make to Stock (MTS)

- Produce finished goods; customer buys from inventory
- Advantage: smooth production
- Disadvantage: inventory
- Key performance measures (next slide)

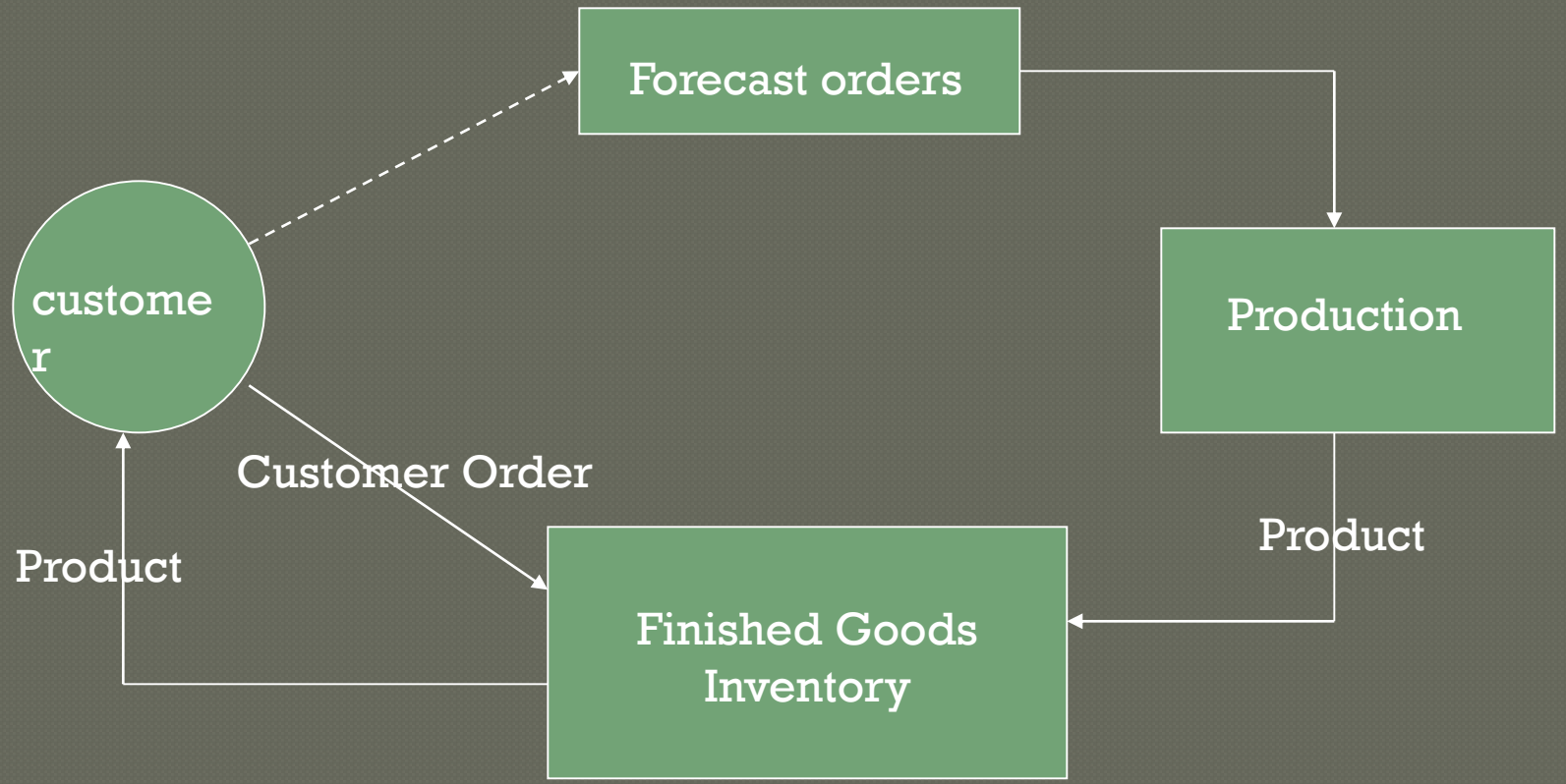
Make to Order (MTO)

- Start production when customer orders.
- Advantage: no finished goods inventory
- Disadvantage: intermittent production
- Key performance measures
  - Lead time
  - Orders completed on time (or late)
  - Quality measures

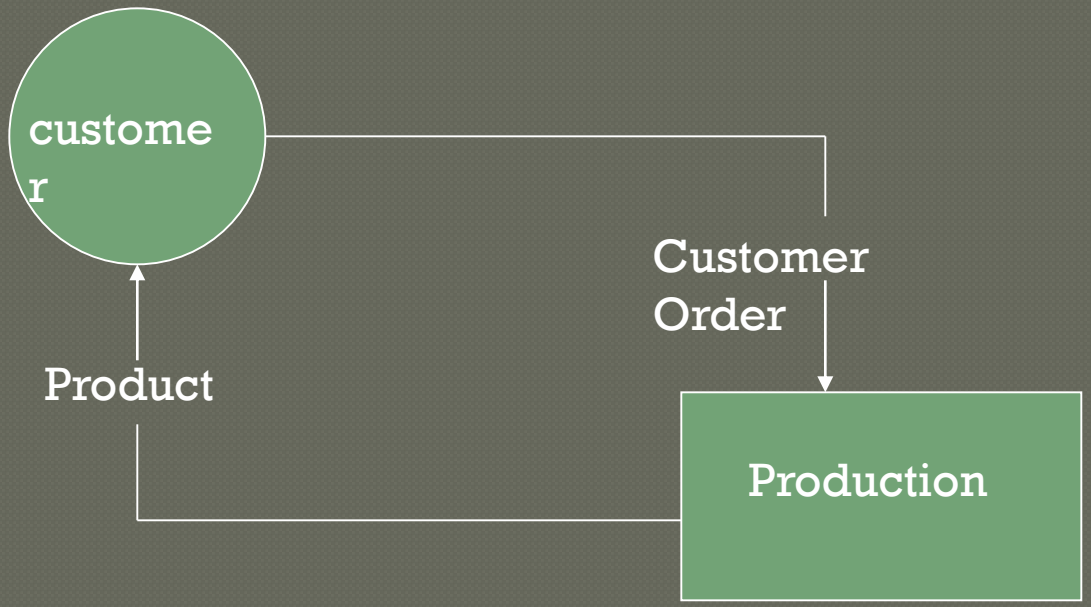
Assemble to Order (ATO)

- Make parts and subassemblies; finish when customer places order.
- Advantages: less inventory, faster service
- Disadvantage: some WIP inventory
- Key performance measures
  - speed of service
  - inventory levels
  - quality of product and service

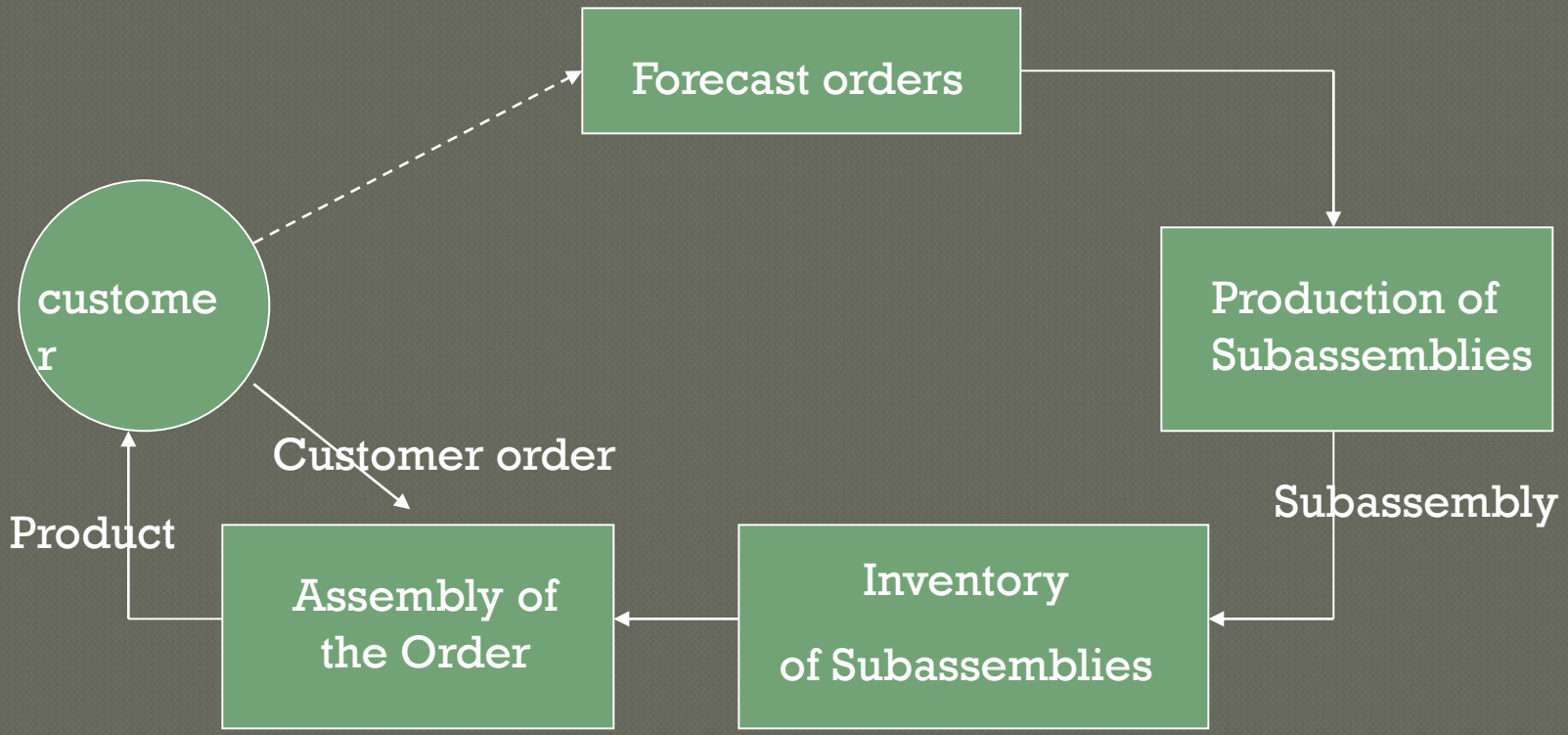
Make-to-Stock (Figure 4-3)



Make-to-Order (Figure 4-3)



Assemble-to-Order (Figure 4-3)



Service Blueprint

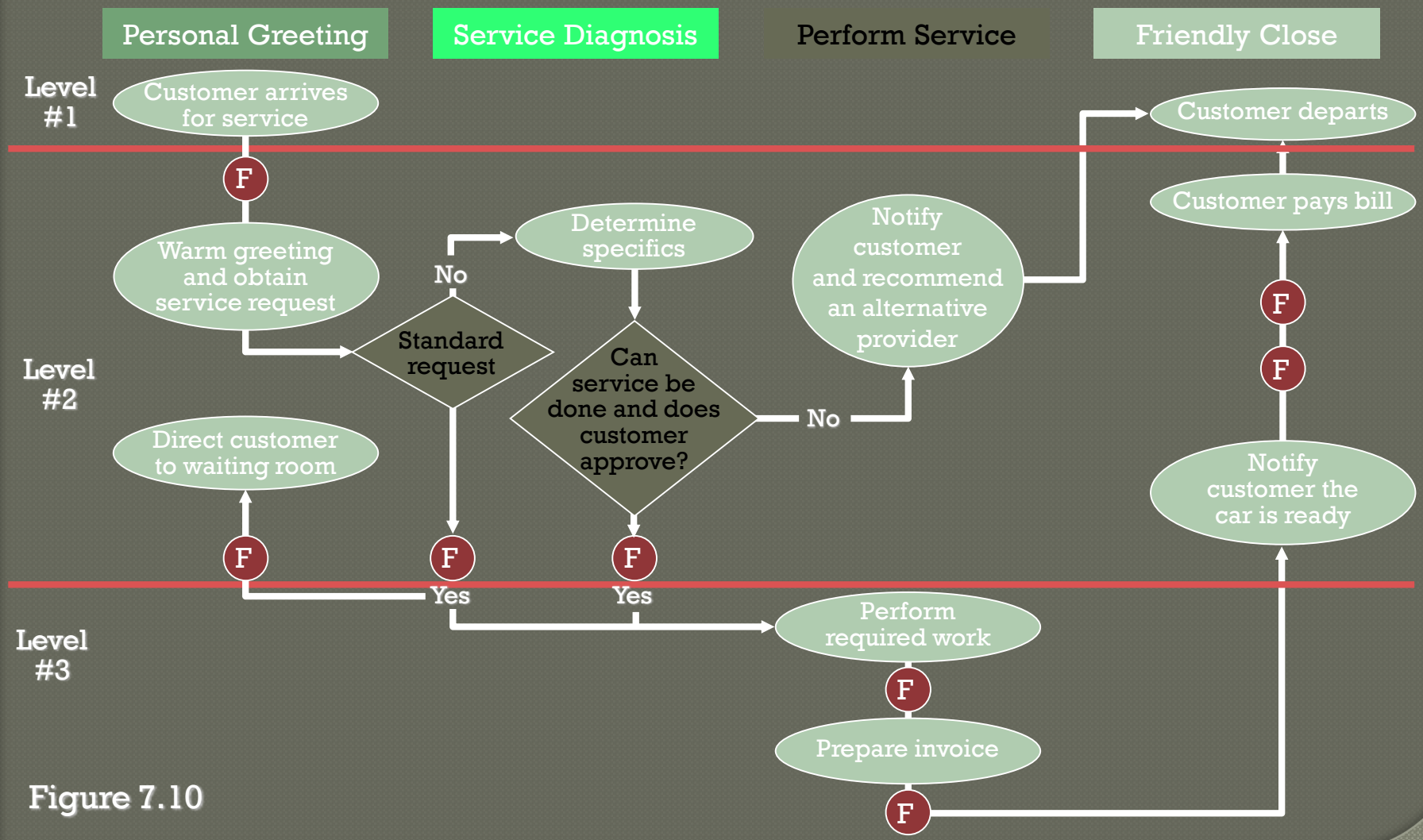


Figure 7.10

Service Process Matrix

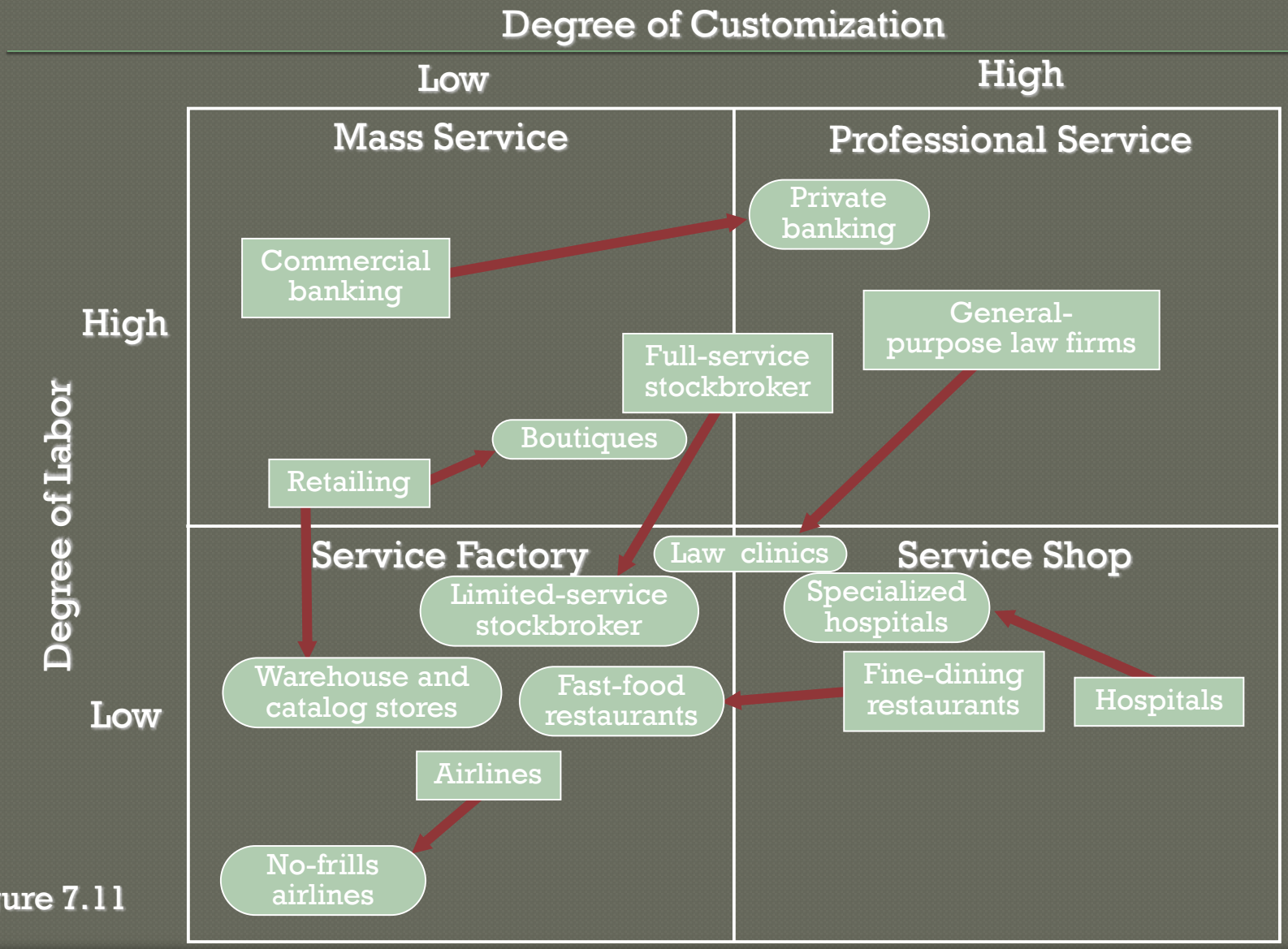


Figure 7.11

Service Process Matrix

Mass Service and Professional Service

- ☑ Labor involvement is high
- ☑ Selection and training highly important
- ☑ Focus on human resources
- ☑ Personalized services

Service Factory and Service Shop

- ☑ Automation of standardized services
- ☑ Low labor intensity responds well to process technology and scheduling
- ☑ Tight control required to maintain standards

Improving Service Processes

- ☑ Layout
  - ☑ Product exposure, customer education, product enhancement
- ☑ Human Resources
  - ☑ Recruiting and training
  - ☑ Impact of flexibility

Equipment and Technology

- ☑ Often complex decisions
- ☑ Possible competitive advantage
  - ☑ Flexibility
  - ☑ Stable processes
- ☑ May allow enlarging the scope of the processes

Technology in Services

Service Industry	Example
Financial Services	Debit cards, electronic funds transfer, ATMs, Internet stock trading
Education	Electronic bulletin boards, on-line journals, WebCT and Blackboard
Utilities and government	Automated one-man garbage trucks, optical mail and bomb scanners, flood warning systems
Restaurants and foods	Wireless orders from waiters to kitchen, robot butchering, transponders on cars that track sales at drive-throughs
Communications	Electronic publishing, interactive TV

Table 7.4

Technology in Services

Service Industry	Example
Hotels	Electronic check-in/check-out, electronic key/lock system
Wholesale/retail trade	ATM-like kiosks, point-of-sale (POS) terminals, e-commerce, electronic communication between store and supplier, bar coded data
Transportation	Automatic toll booths, satellite-directed navigation systems
Health care	Online patient-monitoring, online medical information systems, robotic surgery
Airlines	Ticketless travel, scheduling, Internet purchases

Table 7.4

Type of volume	Type of Manufacturing	Type of Machine	Type of Lay out	Type of Material Handling
Mass Production	Continous	Special	By Product	Fix Path
Job Order	Discontinous	General	By Process	Variable Path

Operations Management

Location Strategies




Location Strategy

- ☑ Salah satu keputusan penting
- ☑ Semakin kompleks
- ☑ Efek jangka panjang dan sulitnya merubah keputusan
- ☑ Bertujuan memaksimalkan keuntungan lokasi bagi perusahaan
- ☑ Keputusan yang tidak terstruktur
- ☑ Keputusan akan mempengaruhi biaya tetap dan variabel

Competitive Imperatives Impacting Location

- Kebutuhan untuk berproduksi dekat dengan konsumen karena kompetisi berbasis waktu, perjanjian dagang, dan biaya pengiriman
- Kebutuhan untuk lokasi yang berdekatan dengan sumber tenaga kerja agar mendapat keuntungan kompetitif biaya tenaga kerja yang murah atau skill yang handal

Issues in Facility Location

- Dekat dengan pasar
- Iklim bisnis
- biaya
- Infrastructure
- Quality of Labor
- Suppliers
- Other Facilities

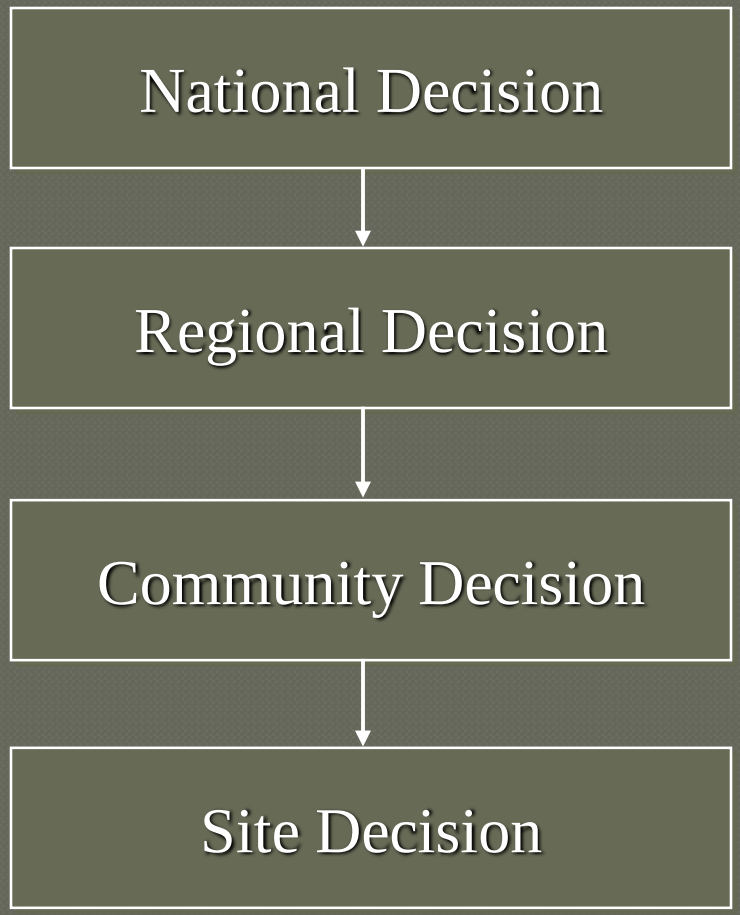
Issues in Facility Location

- Free Trade Zones
- Political Risk
- Government Barriers
- Hambatan perdagangan
- Peraturan lingkungan
- Lingkungan sekitar
- Competitive Advantage

Location and Innovation

- ☑ Cost is not always the most important aspect of a strategic decision
- ☑ Four key attributes when strategy is based on innovation
  - ☑ High-quality and specialized inputs
  - ☑ An environment that encourages investment and local rivalry
  - ☑ A sophisticated local market
  - ☑ Local presence of related and supporting industries

Urutan pengambilan keputusan



Political, social, economic stability; Currency exchange rates; . . . . .

Climate; Customer concentrations; Degree of unionization; . . . . .

Transportation system availability; Preference of management; . . . . .

Site size/cost; Environmental impact; Zoning restrictions; . . . . .

Location Decisions

Country Decision

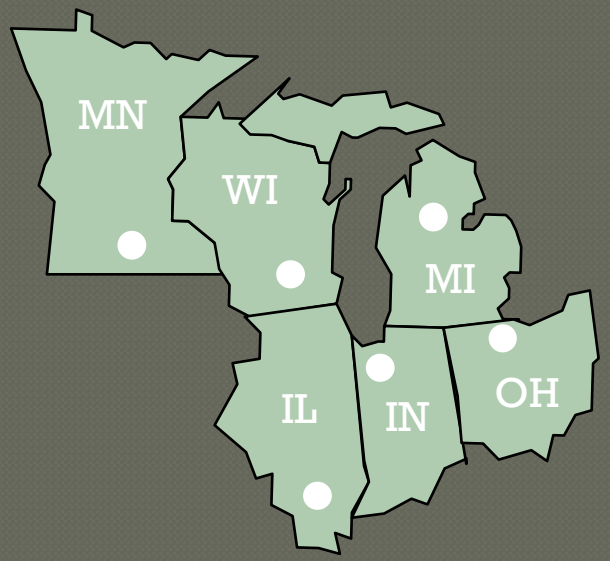
Figure 8.1

Critical Success Factors

1. Political risks, government rules, attitudes, incentives
2. Cultural and economic issues
3. Location of markets
4. Labor talent, attitudes, productivity, costs
5. Availability of supplies, communications, energy
6. Exchange rates and currency risks

Location Decisions

Region/ Community Decision



Critical Success Factors

1. Corporate desires
2. Attractiveness of region
3. Labor availability, costs, attitudes towards unions
4. Costs and availability of utilities
5. Environmental regulations
6. Government incentives and fiscal policies
7. Proximity to raw materials and customers
8. Land/construction costs

Figure 8.1

Location Decisions

Site Decision

Figure 8.1

Critical Success Factors

1. Site size and cost
2. Air, rail, highway, and waterway systems
3. Zoning restrictions
4. Proximity of services/ supplies needed
5. Environmental impact issues

Factors That Affect Location Decisions

- ☑ Labor productivity
  - ☑ Wage rates are not the only cost
  - ☑ Lower production may increase total cost

$$\frac{\text{Labor cost per day}}{\text{Production (units per day)}} = \text{Cost per unit}$$

Connecticut

$$\frac{\$70}{60 \text{ units}} = \$1.17 \text{ per unit}$$

Juarez

$$\frac{\$25}{20 \text{ units}} = \$1.25 \text{ per unit}$$

Factors That Affect Location Decisions

- ☑ Exchange rates and currency risks
  - ☑ Can have a significant impact on cost structure
  - ☑ Rates change over time
- ☑ Costs
  - ☑ Tangible - easily measured costs such as utilities, labor, materials, taxes
  - ☑ Intangible - less easy to quantify and include education, public transportation, community, quality-of-life

Factors That Affect Location Decisions

- ☑ Exchange rates and currency risks
  - ☑ Can have a signifi
  - ☑ Rates change over
- ☑ Costs
  - ☑ Tangible - easily m materials, taxes
  - ☑ Intangible - less ea public transportati

Location decisions based on costs alone can create difficult ethical situations

Factors That Affect Location Decisions

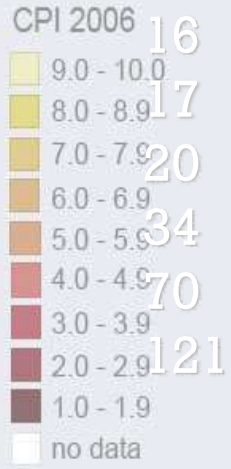
- ☑ Political risk, values, and culture
  - ☑ National, state, local governments attitudes toward private and intellectual property, zoning, pollution, employment stability may be in flux
  - ☑ Worker attitudes towards turnover, unions, absenteeism
  - ☑ Globally cultures have different attitudes towards punctuality, legal, and ethical issues

Ranking Corruption

Rank	Country	2006 CPI Score (out of 10)
1	Finland	9.6
1	Iceland	9.6
1	New Zealand	9.6
5	Singapore	9.4
7	Switzerland	9.1
11	UK	8.6
14	Canada	8.5
15	Hong Kong	8.3
16	Germany	8.0
17	Japan	7.6
20	USA, Belgium	7.3
34	Israel, Taiwan	5.9
70	Brazil, China, Mexico	3.3
121	Russia	2.5

Least Corrupt

Most Corrupt



TRANSPARENCY INTERNATIONAL
the global coalition against corruption

Table 8.2

Factors That Affect Location Decisions

- ☑ Proximity to markets
  - ☑ Very important to services
  - ☑ JIT systems or high transportation costs may make it important to manufacturers
- ☑ Proximity to suppliers
  - ☑ Perishable goods, high transportation costs, bulky products

Factors That Affect Location Decisions

- ☑ Proximity to competitors
  - ☑ Called clustering
  - ☑ Often driven by resources such as natural, information, capital, talent
  - ☑ Found in both manufacturing and service industries

Factor-Rating Method

- ☑ Popular because a wide variety of factors can be included in the analysis
- ☑ Six steps in the method
  1. Develop a list of relevant factors called critical success factors
  2. Assign a weight to each factor
  3. Develop a scale for each factor
  4. Score each location for each factor
  5. Multiply score by weights for each factor for each location
  6. Recommend the location with the highest point score

Factor-Rating Example

Critical Success Factor	Weight	Scores (out of 100) France	Scores (out of 100) Denmark	Weighted Scores France	Weighted Scores Denmark
Labor availability and attitude	.25	70	60	(.25)(70) = 17.5	(.25)(60) = 15.0
People-to-car ratio	.05	50	60	(.05)(50) = 2.5	(.05)(60) = 3.0
Per capita income	.10	85	80	(.10)(85) = 8.5	(.10)(80) = 8.0
Tax structure	.39	75	70	(.39)(75) = 29.3	(.39)(70) = 27.3
Education and health	.21	60	70	(.21)(60) = 12.6	(.21)(70) = 14.7
Totals	1.00			70.4	68.0

Table 8.4

Center-of-Gravity Method

- ☑ Finds location of distribution center that minimizes distribution costs
- ☑ Considers
  - ☑ Location of markets
  - ☑ Volume of goods shipped to those markets
  - ☑ Shipping cost (or distance)

Center-of-Gravity Method

- ☑ Place existing locations on a coordinate grid
  - ☑ Grid origin and scale is arbitrary
  - ☑ Maintain relative distances
- ☑ Calculate X and Y coordinates for 'center of gravity'
  - ☑ Assumes cost is directly proportional to distance and volume shipped

Center-of-Gravity Method

$$\text{x - coordinate} = \frac{\sum_i d_{ix} Q_i}{\sum_i Q_i}$$

$$\text{y - coordinate} = \frac{\sum_i d_{iy} Q_i}{\sum_i Q_i}$$

where

d_{ix} = x-coordinate of location i

d_{iy} = y-coordinate of location i

Q_i = Quantity of goods moved to or from location i

Center-of-Gravity Method

Figure 8.3

Center-of-Gravity Method

Store Location	Number of Containers Shipped per Month
Chicago (30, 120)	2,000
Pittsburgh (90, 110)	1,000
New York (130, 130)	1,000
Atlanta (60, 40)	2,000

$$\text{x-coordinate} = \frac{(30)(2000) + (90)(1000) + (130)(1000) + (60)(2000)}{2000 + 1000 + 1000 + 2000}$$

$$= 66.7$$

$$\text{y-coordinate} = \frac{(120)(2000) + (110)(1000) + (130)(1000) + (40)(2000)}{2000 + 1000 + 1000 + 2000}$$

$$= 93.3$$

Center-of-Gravity Method

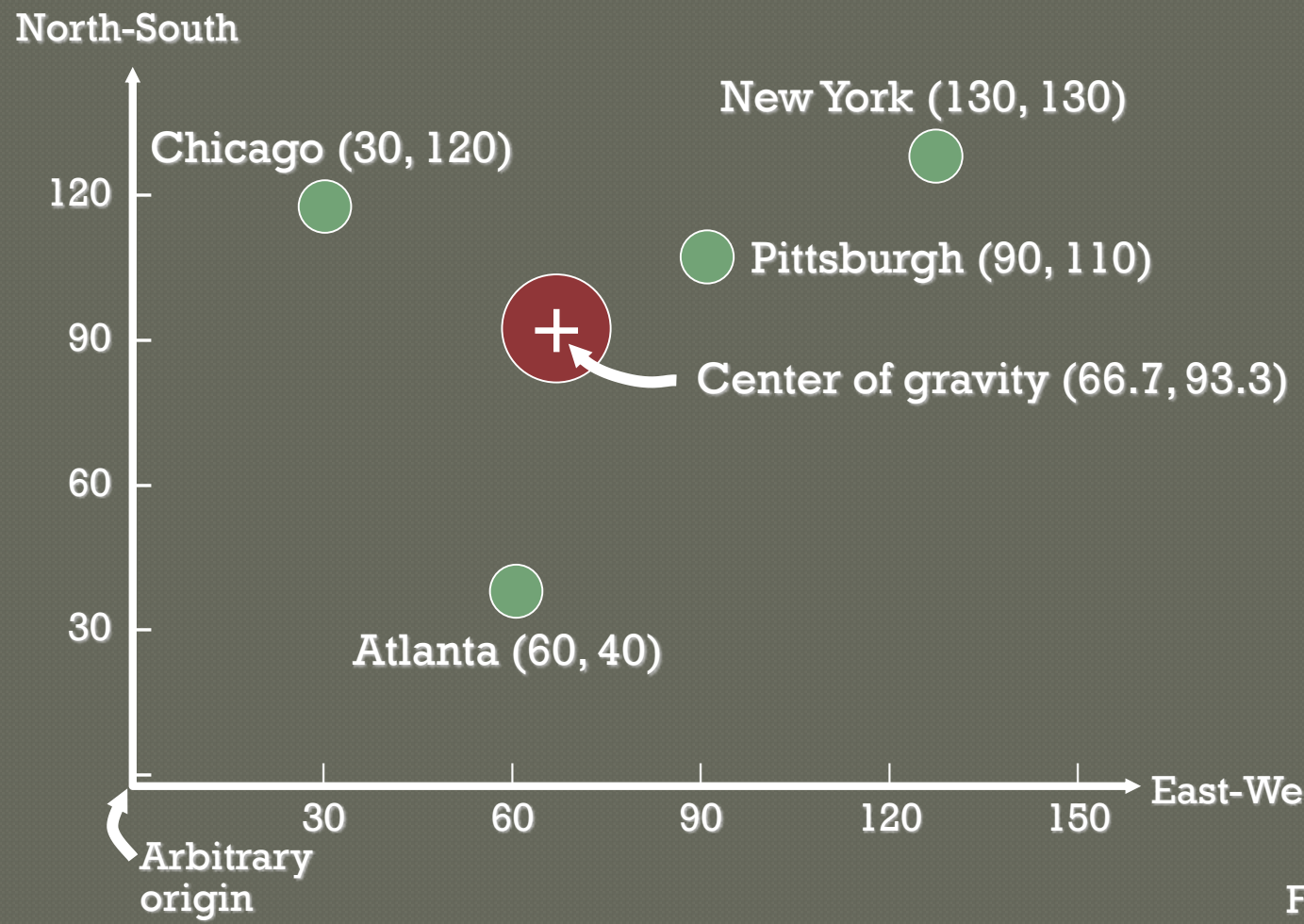


Figure 8.3

Transportation Model

- ☑ Finds amount to be shipped from several points of supply to several points of demand
- ☑ Solution will minimize total production and shipping costs
- ☑ A special class of linear programming problems

Worldwide Distribution of Volkswagens and Parts

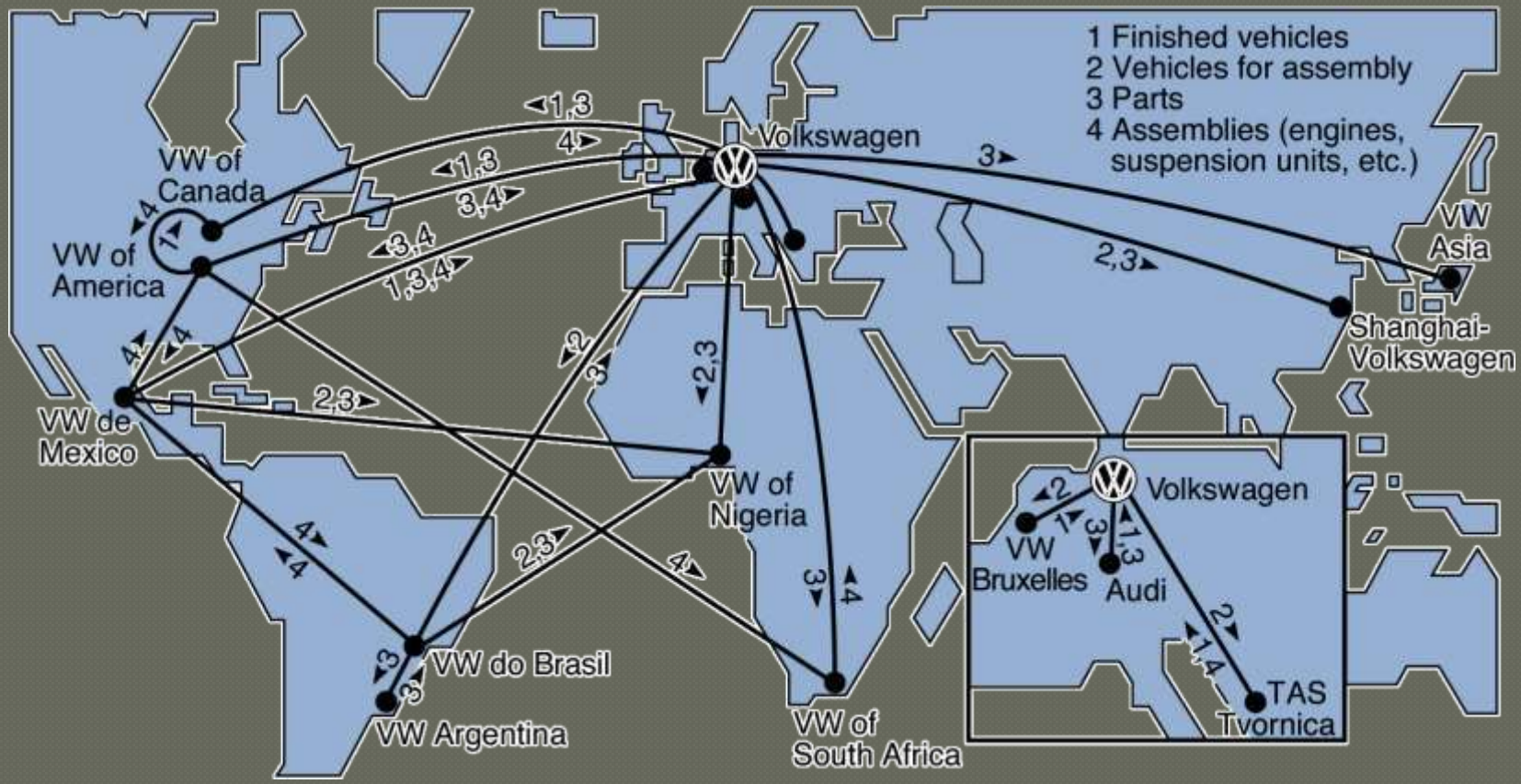


Figure 8.4

Operations Management

Layout Strategies




Innovations at McDonald's

- ☑ Indoor seating (1950s)
- ☑ Drive-through window (1970s)
- ☑ Adding breakfast to the menu (1980s)
- ☑ Adding play areas (late 1980s)
- ☑ Redesign of the kitchens (1990s)
- ☑ Self-service kiosk (2004)
- ☑ Now three separate dining sections

Innovations at McDonald's

- ☑ Indoor seating (1950s)
- ☑ Drive-through wi
- ☑ Adding breakfast
- ☑ Adding play area
- ☑ Redesign of the k
- ☑ Self-service kiosk (2004)
- ☑ Now three separate dining sections

Six out of the seven are layout decisions!

McDonald's New Layout

- Seventh major innovation
- Redesigning all 30,000 outlets around the world
- Three separate dining areas
  - Linger zone with comfortable chairs and Wi-Fi connections
  - Grab and go zone with tall counters
  - Flexible zone for kids and families
- Facility layout is a source of competitive advantage

Strategic Importance of Layout Decisions

The objective of layout strategy is to develop a cost-effective layout that will meet a firm's competitive needs

Layout Design Considerations

- ☑ Higher utilization of space, equipment, and people
- ☑ Improved flow of information, materials, or people
- ☑ Improved employee morale and safer working conditions
- ☑ Improved customer/client interaction
- ☑ Flexibility

Types of Layout

1. Office layout: Positions workers, their equipment, and spaces/offices to provide for movement of information
2. Retail layout: Allocates shelf space and responds to customer behavior
3. Warehouse layout: Addresses trade-offs between space and material handling

Types of Layout

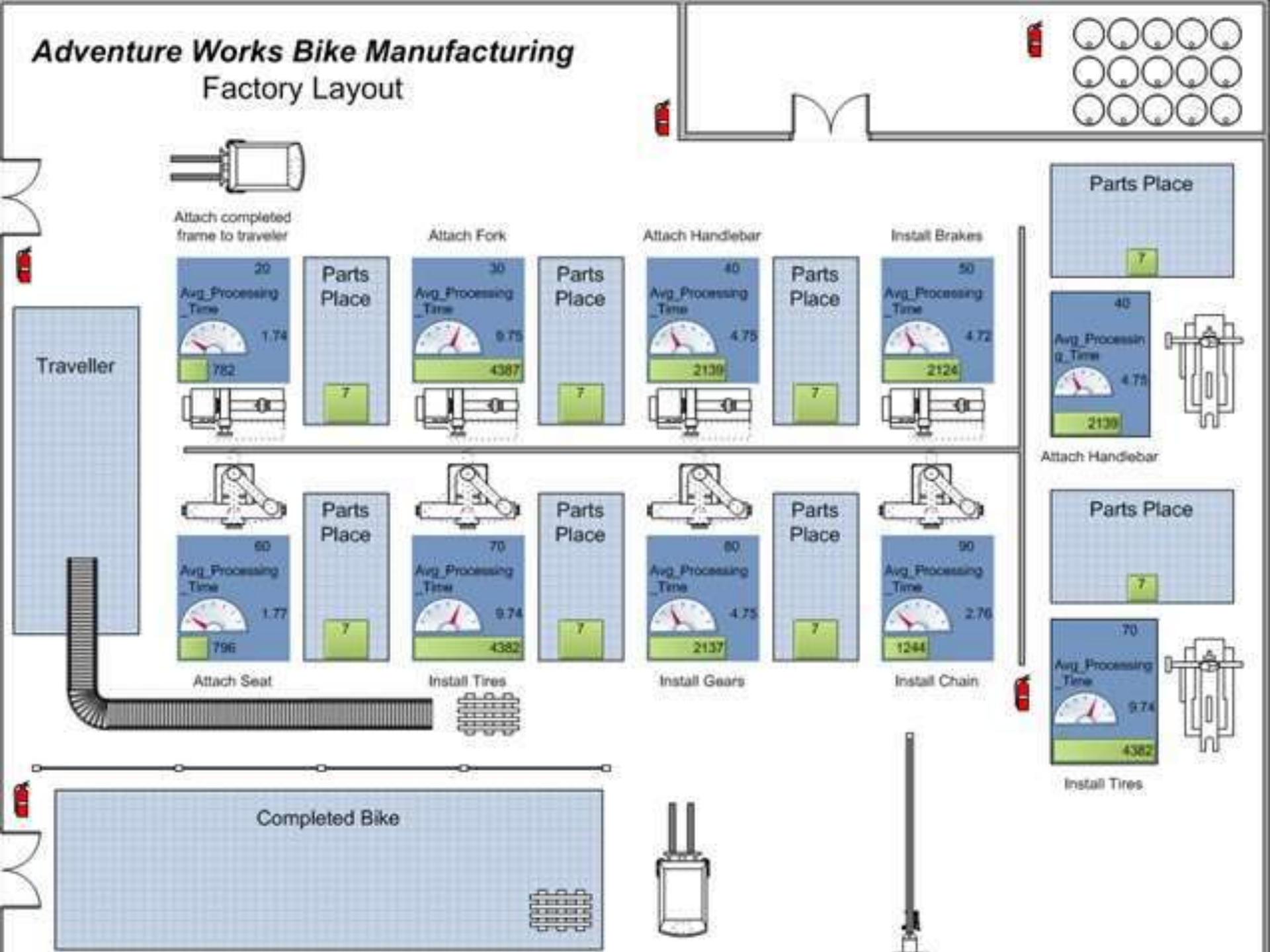
4. Fixed-position layout: Addresses the layout requirements of large, bulky projects such as ships and buildings
5. Process-oriented layout: Deals with low-volume, high-variety production (also called job shop or intermittent production)

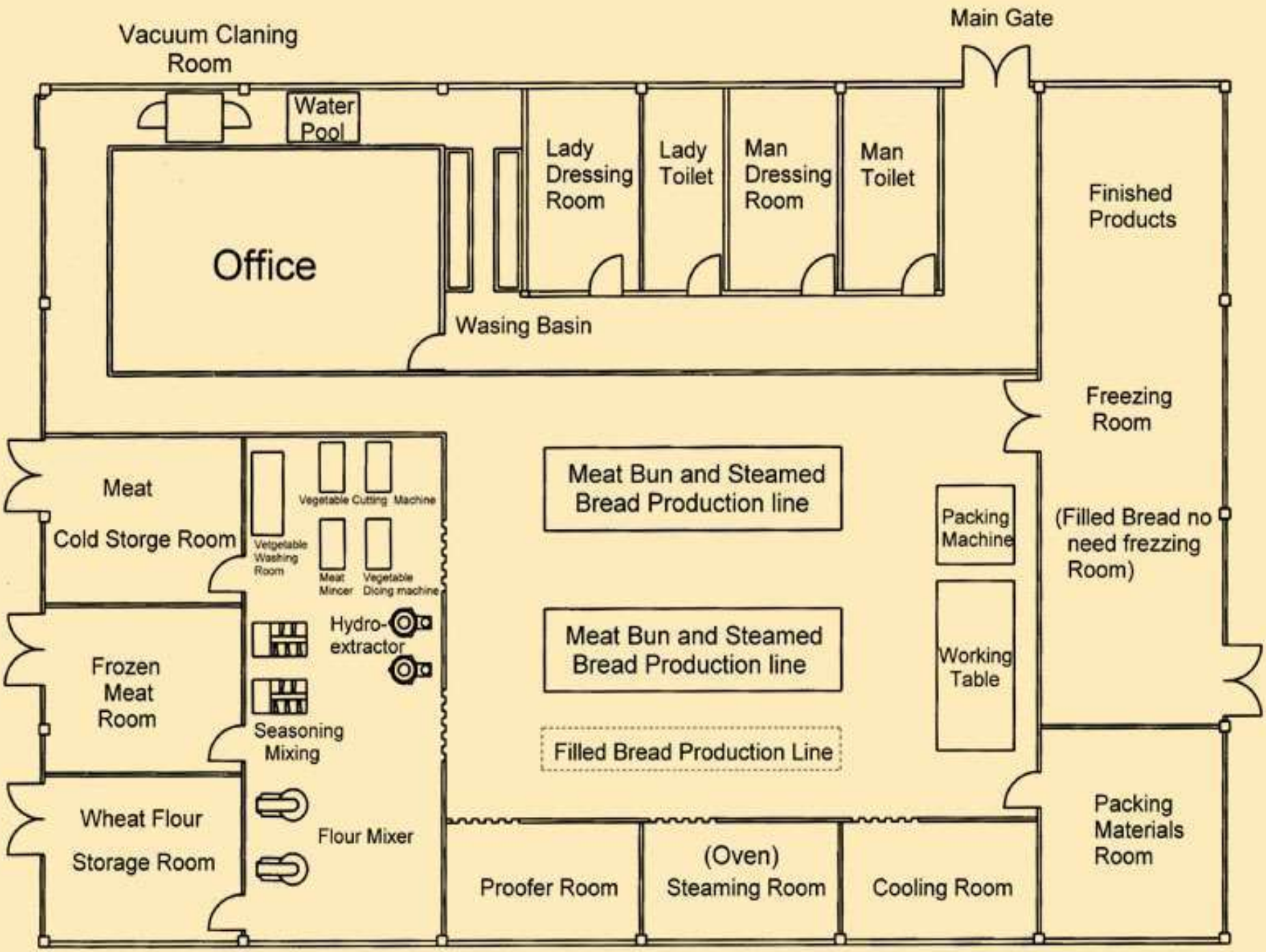
Types of Layout

6. Work cell layout: Arranges machinery and equipment to focus on production of a single product or group of related products
7. Product-oriented layout: Seeks the best personnel and machine utilizations in repetitive or continuous production

Adventure Works Bike Manufacturing

Factory Layout




Vacuum Claning Room
Main Gate
Water Pool
Office
Wasing Basin
Lady Dressing Room
Lady Toilet
Man Dressing Room
Man Toilet
Finished Products
Freezing Room
(Filled Bread no need frezzing Room)
Meat Cold Storge Room
Vetgetable Washing Room
Vegetable Cutting Machine
Meat Mincer
Vegetable Dicing machine
Hydro-extractor
Seasoning Mixing
Frozen Meat Room
Wheat Flour Storage Room
Flour Mixer
Meat Bun and Steamed Bread Production line
Meat Bun and Steamed Bread Production line
Filled Bread Production Line
Packing Machine
Working Table
Proofer Room
(Oven) Steaming Room
Cooling Room
Packing Materials Room

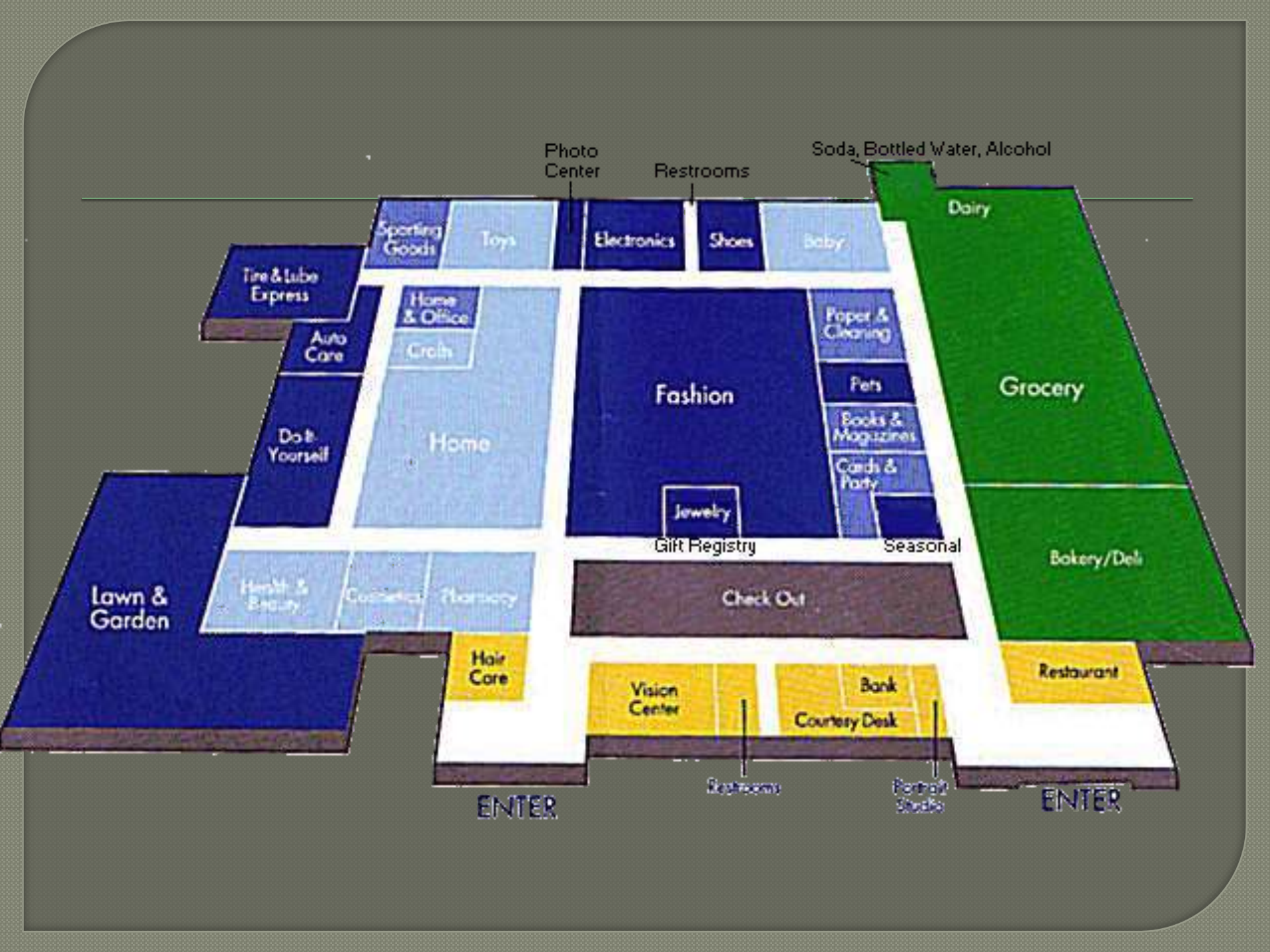


Photo Center
Restrooms
Soda, Bottled Water, Alcohol
Sporting Goods
Toys
Electronics
Shoes
Baby
Dairy
Tire & Lube Express
Auto Care
Home & Office
Crafts
Paper & Cleaning
Pets
Fashion
Grocery
Do It Yourself
Home
Books & Magazines
Cards & Party
Jewelry
Gift Registry
Seasonal
Bakery/Deli
Lawn & Garden
Health & Beauty
Cosmetics
Pharmacy
Check Out
Hair Care
Vision Center
Bank
Courtesy Desk
Restaurant
Restrooms
Portrait Studio
ENTER
ENTER

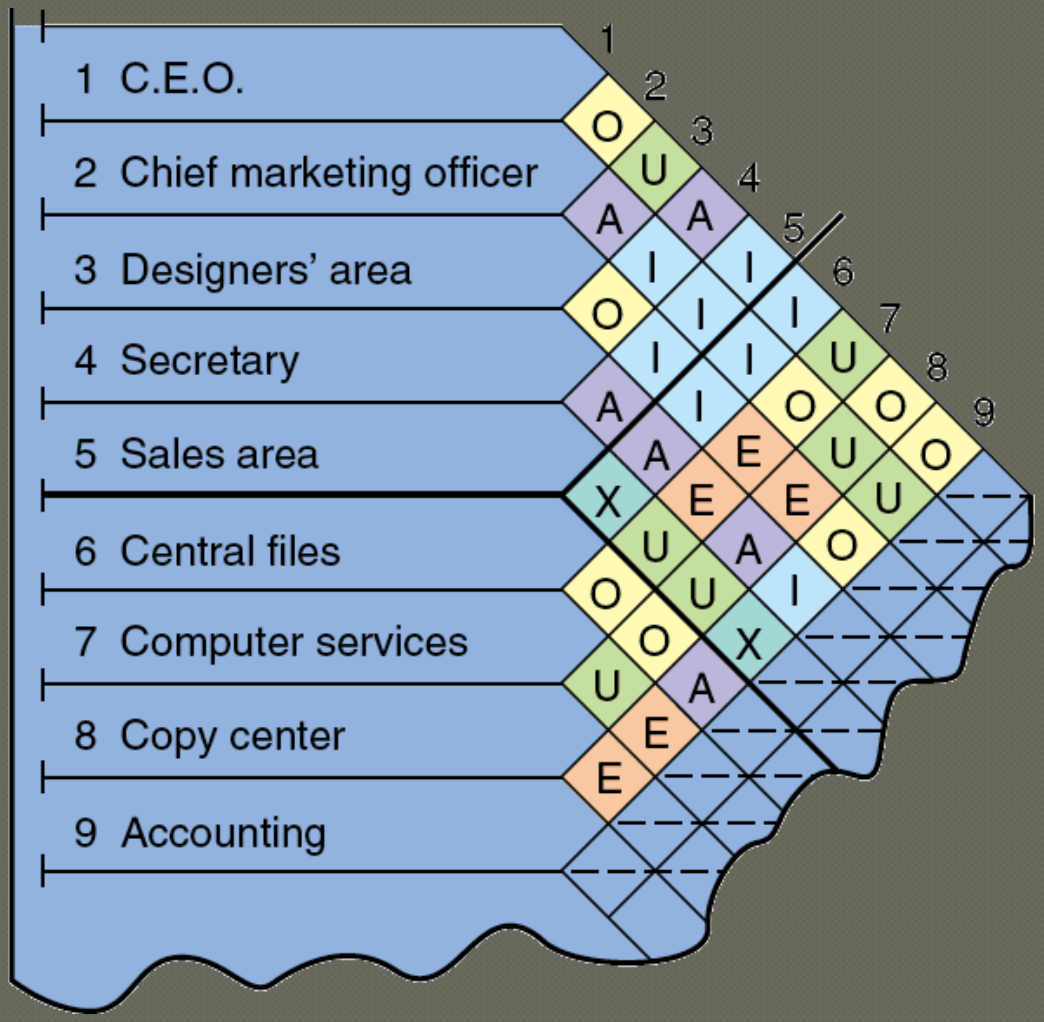
Good Layouts Consider

1. Material handling equipment
2. Capacity and space requirements
3. Environment and aesthetics
4. Flows of information
5. Cost of moving between various work areas

Office Layout

- ☑ Grouping of workers, their equipment, and spaces to provide comfort, safety, and movement of information
- ☑ Movement of information is main distinction
- ☑ Typically in state of flux due to frequent technological changes

Relationship Chart



Value	CLOSENESS
A	Absolutely necessary
E	Especially important
I	Important
O	Ordinary OK
U	Unimportant
X	Not desirable

Figure 9.1

Supermarket Retail Layout

- ☑ Objective is to maximize profitability per square foot of floor space
- ☑ Sales and profitability vary directly with customer exposure

Five Helpful Ideas for Supermarket Layout

1. Locate high-draw items around the periphery of the store
2. Use prominent locations for high-impulse and high-margin items
3. Distribute power items to both sides of an aisle and disperse them to increase viewing of other items
4. Use end-aisle locations
5. Convey mission of store through careful positioning of lead-off department

Store Layout

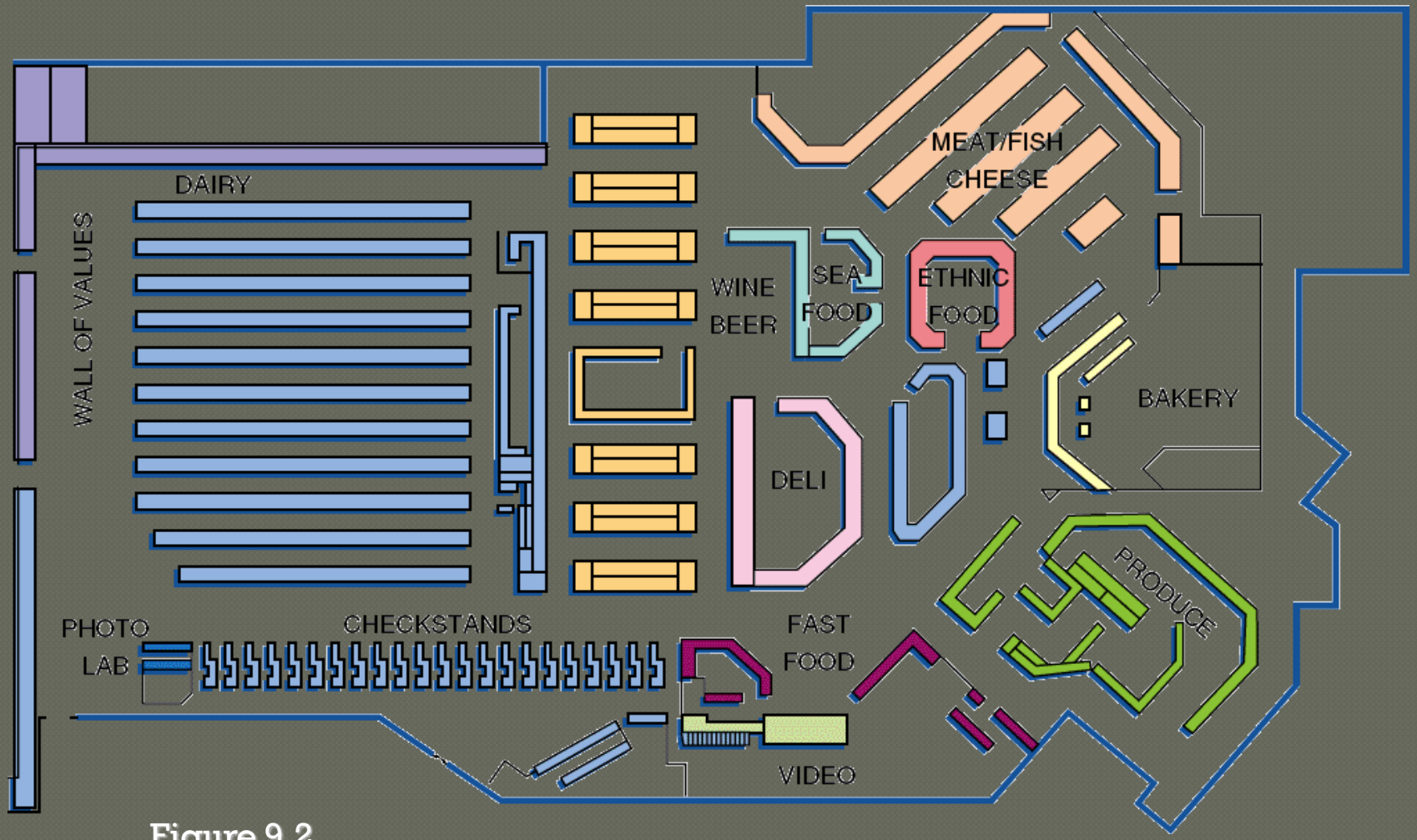


Figure 9.2

Retail Slotting

- ☑ Manufacturers pay fees to retailers to get the retailers to display (slot) their product
- ☑ Contributing factors
  - ☑ Limited shelf space
  - ☑ An increasing number of new products
  - ☑ Better information about sales through POS data collection
  - ☑ Closer control of inventory

Warehousing and Storage Layouts

- ☑ Objective is to optimize trade-offs between handling costs and costs associated with warehouse space
- ☑ Maximize the total "cube" of the warehouse – utilize its full volume while maintaining low material handling costs

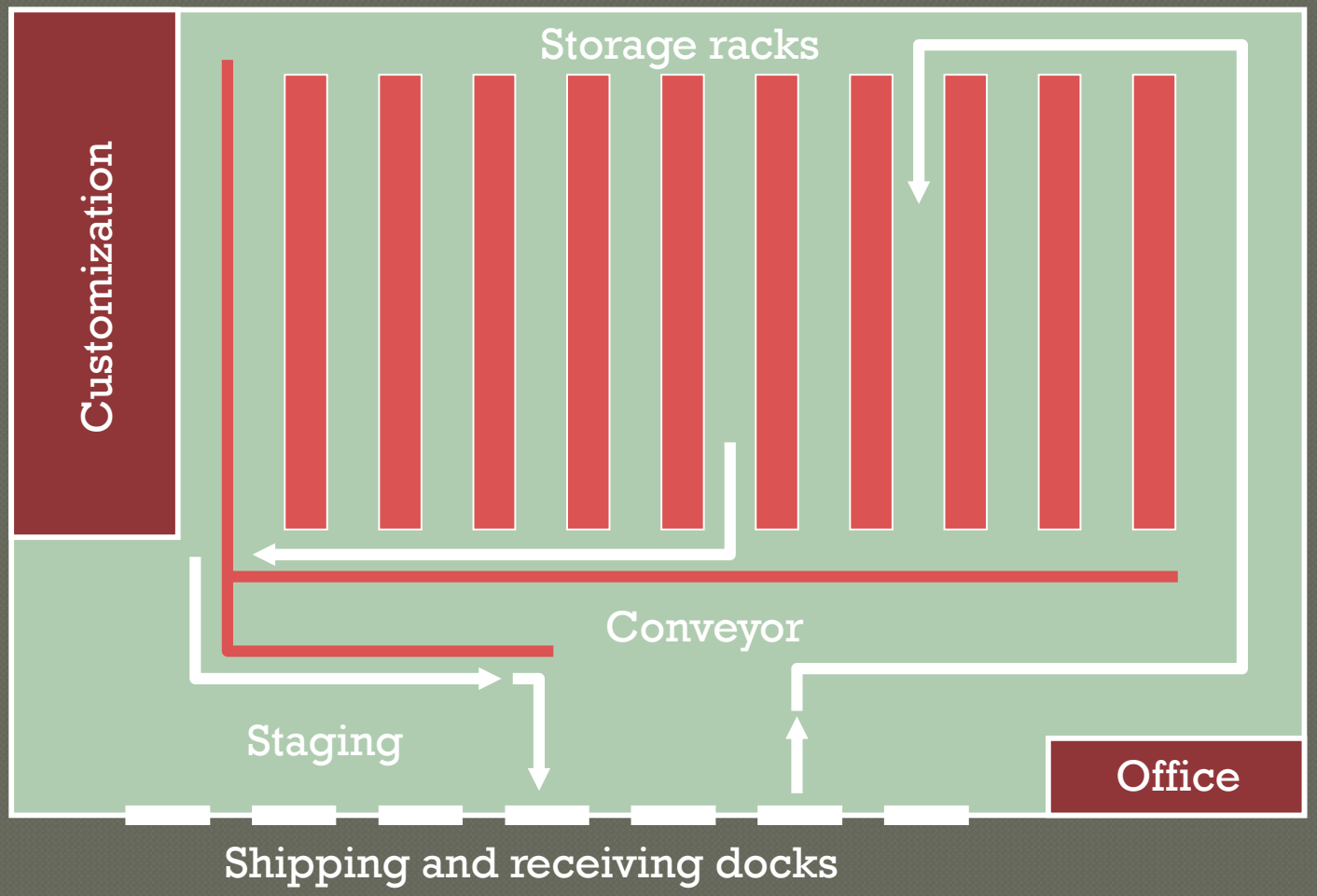
Warehousing and Storage Layouts

Material Handling Costs

- ☑ All costs associated with the transaction
  - ☑ Incoming transport
  - ☑ Storage
  - ☑ Finding and moving material
  - ☑ Outgoing transport
  - ☑ Equipment, people, material, supervision, insurance, depreciation
- ☑ Minimize damage and spoilage

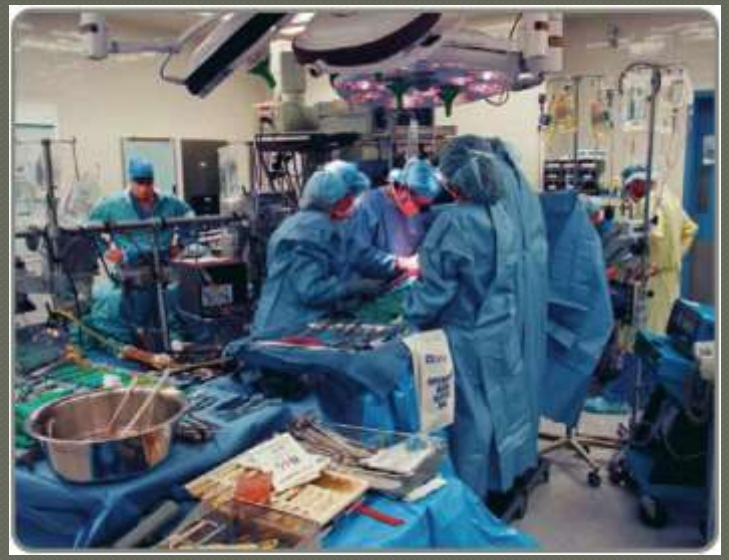
Warehouse Layout

Traditional Layout



Fixed-Position Layout

- ☑ Product remains in one place
- ☑ Workers and equipment come to site
- ☑ Complicating factors
  - ☑ Limited space at site
  - ☑ Different materials required at different stages of the project
  - ☑ Volume of materials needed is dynamic



Alternative Strategy

- ☑ As much of the project as possible is completed off-site in a product-oriented facility
- ☑ This can significantly improve efficiency but is only possible when multiple similar units need to be created

Process-Oriented Layout

- ☑ Like machines and equipment are grouped together
- ☑ Flexible and capable of handling a wide variety of products or services
- ☑ Scheduling can be difficult and setup, material handling, and labor costs can be high

Process-Oriented Layout

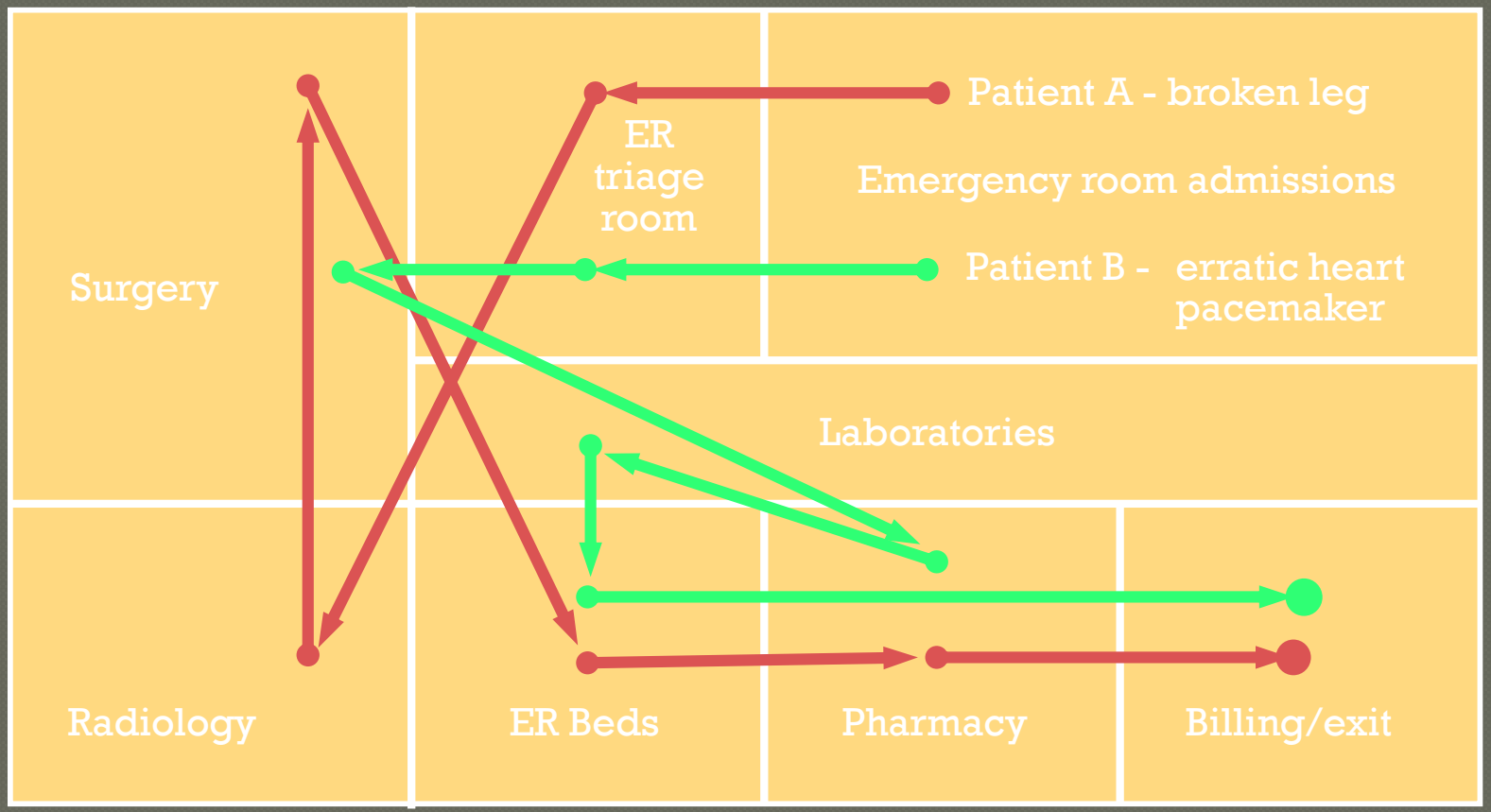
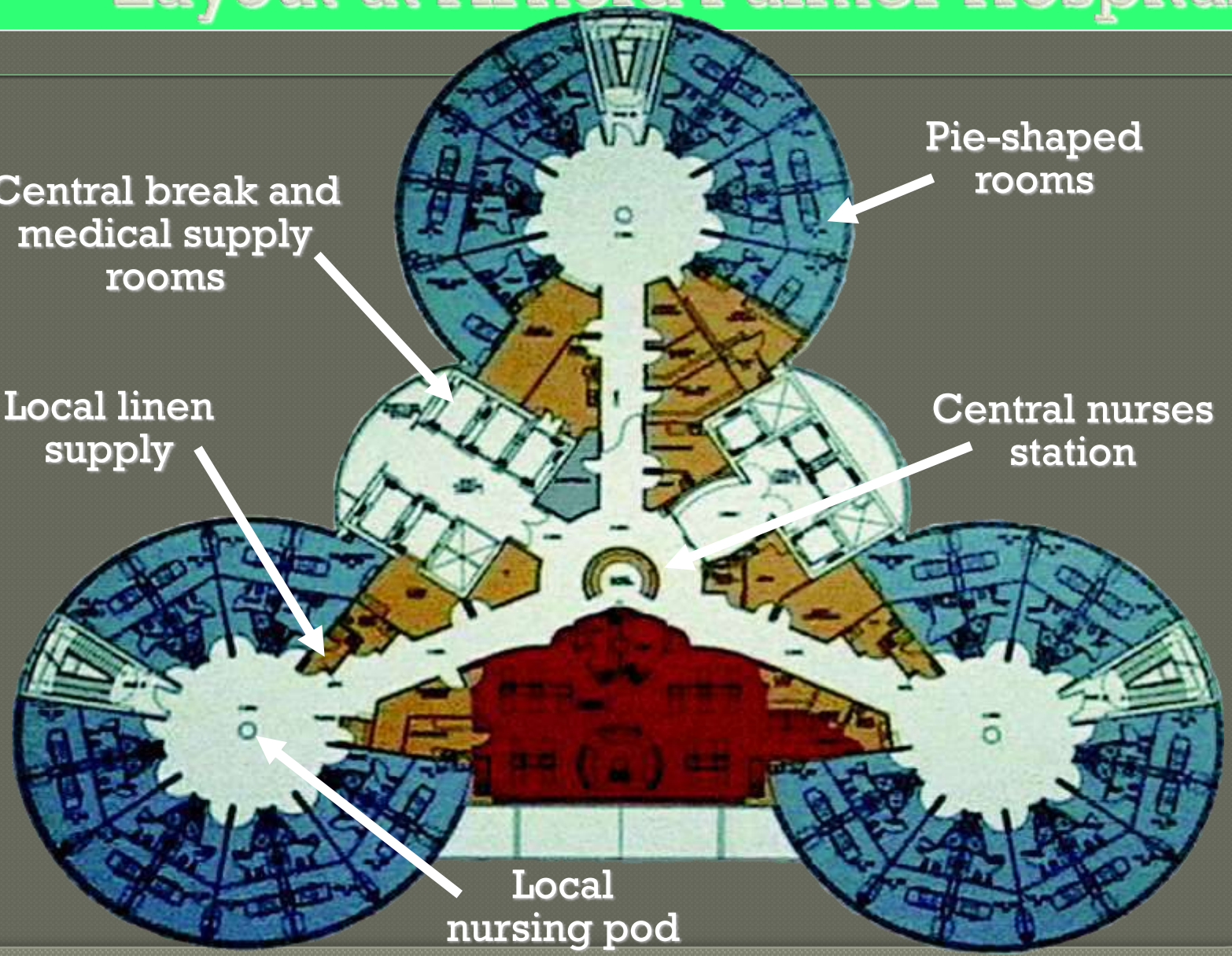


Figure 9.3

Layout at Arnold Palmer Hospital



Process-Oriented Layout

- ☑ Arrange work centers so as to minimize the costs of material handling
- ☑ Basic cost elements are
  - ☑ Number of loads (or people) moving between centers
  - ☑ Distance loads (or people) move between centers

Computer Software

- Three dimensional visualization software allows managers to view possible layouts and assess process, material handling, efficiency, and safety issues

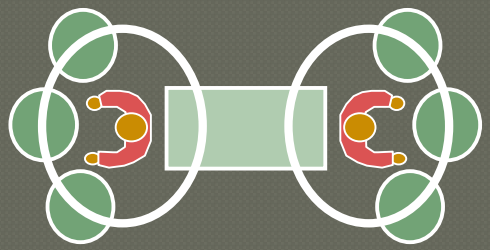
Work Cells

- ☑ Reorganizes people and machines into groups to focus on single products or product groups
- ☑ Group technology identifies products that have similar characteristics for particular cells
- ☑ Volume must justify cells
- ☑ Cells can be reconfigured as designs or volume changes

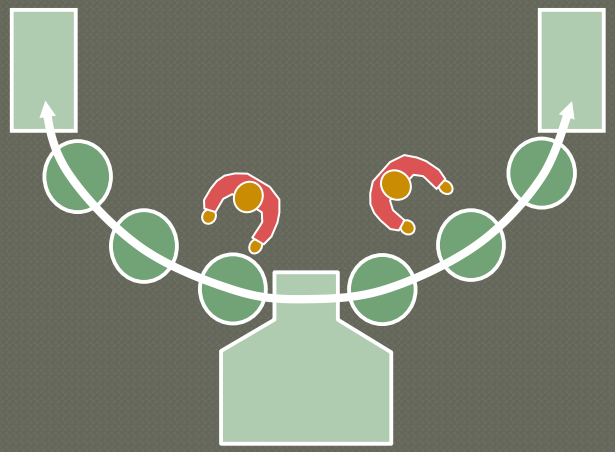
Advantages of Work Cells

1. Reduced work-in-process inventory
2. Less floor space required
3. Reduced raw material and finished goods inventory
4. Reduced direct labor
5. Heightened sense of employee participation
6. Increased use of equipment and machinery
7. Reduced investment in machinery and equipment

Improving Layouts Using Work Cells



Current layout - workers in small closed areas. Cannot increase output without a third worker and third set of equipment.

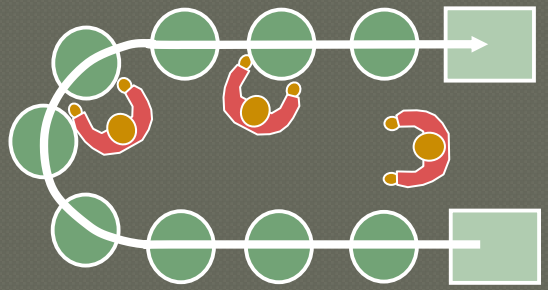


Improved layout - cross-trained workers can assist each other. May be able to add a third worker as additional output is needed.

Figure 9.10 (a)

Improving Layouts Using Work Cells

Current layout - straight lines make it hard to balance tasks because work may not be divided evenly



Improved layout - in U shape, workers have better access. Four cross-trained workers were reduced.

U-shaped line may reduce employee movement and space requirements while enhancing communication, reducing the number of workers, and facilitating inspection

Figure 9.10 (b)

Requirements of Work Cells

1. Identification of families of products
2. A high level of training, flexibility and empowerment of employees
3. Being self-contained, with its own equipment and resources
4. Test (poka-yoke) at each station in the cell

Staffing and Balancing Work Cells

Determine the takt time

$$\text{Takt time} = \frac{\text{Total work time available}}{\text{Units required}}$$

Determine the number of operators required

$$\text{Workers required} = \frac{\text{Total operation time required}}{\text{Takt time}}$$

Repetitive and Product-Oriented Layout

Organized around products or families of similar high-volume, low-variety products

1. Volume is adequate for high equipment utilization
2. Product demand is stable enough to justify high investment in specialized equipment
3. Product is standardized or approaching a phase of life cycle that justifies investment
4. Supplies of raw materials and components are adequate and of uniform quality

Product-Oriented Layouts

- ☑ Fabrication line
  - ☑ Builds components on a series of machines
  - ☑ Machine-paced
  - ☑ Require mechanical or engineering changes to balance
- ☑ Assembly line
  - ☑ Puts fabricated parts together at a series of workstations
  - ☑ Paced by work tasks
  - ☑ Balanced by moving tasks

Both types of lines must be balanced so that the time to perform the work at each station is the same

Product-Oriented Layouts

Advantages

1. Low variable cost per unit
2. Low material handling costs
3. Reduced work-in-process inventories
4. Easier training and supervision
5. Rapid throughput

Disadvantages

1. High volume is required
2. Work stoppage at any point ties up the whole operation
3. Lack of flexibility in product or production rates

McDonald's Assembly Line

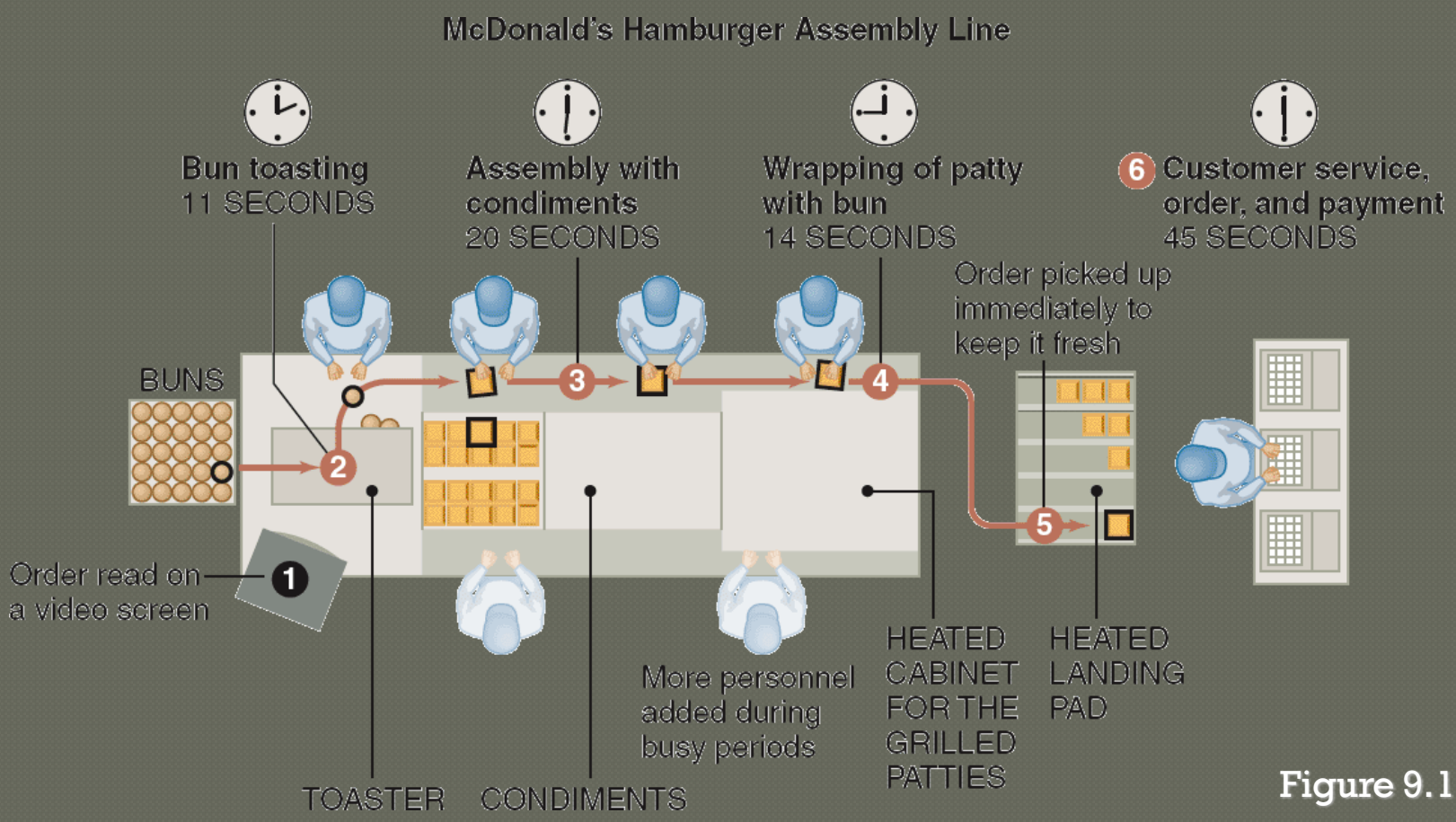


Figure 9.12

Disassembly Lines

- Disassembly is being considered in new product designs
- "Green" issues and recycling standards are important consideration
- Automotive disassembly is the 16th largest industry in the US

Assembly-Line Balancing

- ☑ Objective is to minimize the imbalance between machines or personnel while meeting required output
- ☑ Starts with the precedence relationships
  1. Determine cycle time
  2. Calculate theoretical minimum number of workstations
  3. Balance the line by assigning specific tasks to workstations

Human Resource Strategy

The objective of a human resource strategy is to manage labor and design jobs so people are effectively and efficiently utilized

1. People should be effectively utilized within the constraints of other operations management decisions
2. People should have a reasonable quality of work life in an atmosphere of mutual commitment and trust

Constraints on Human Resource Strategy

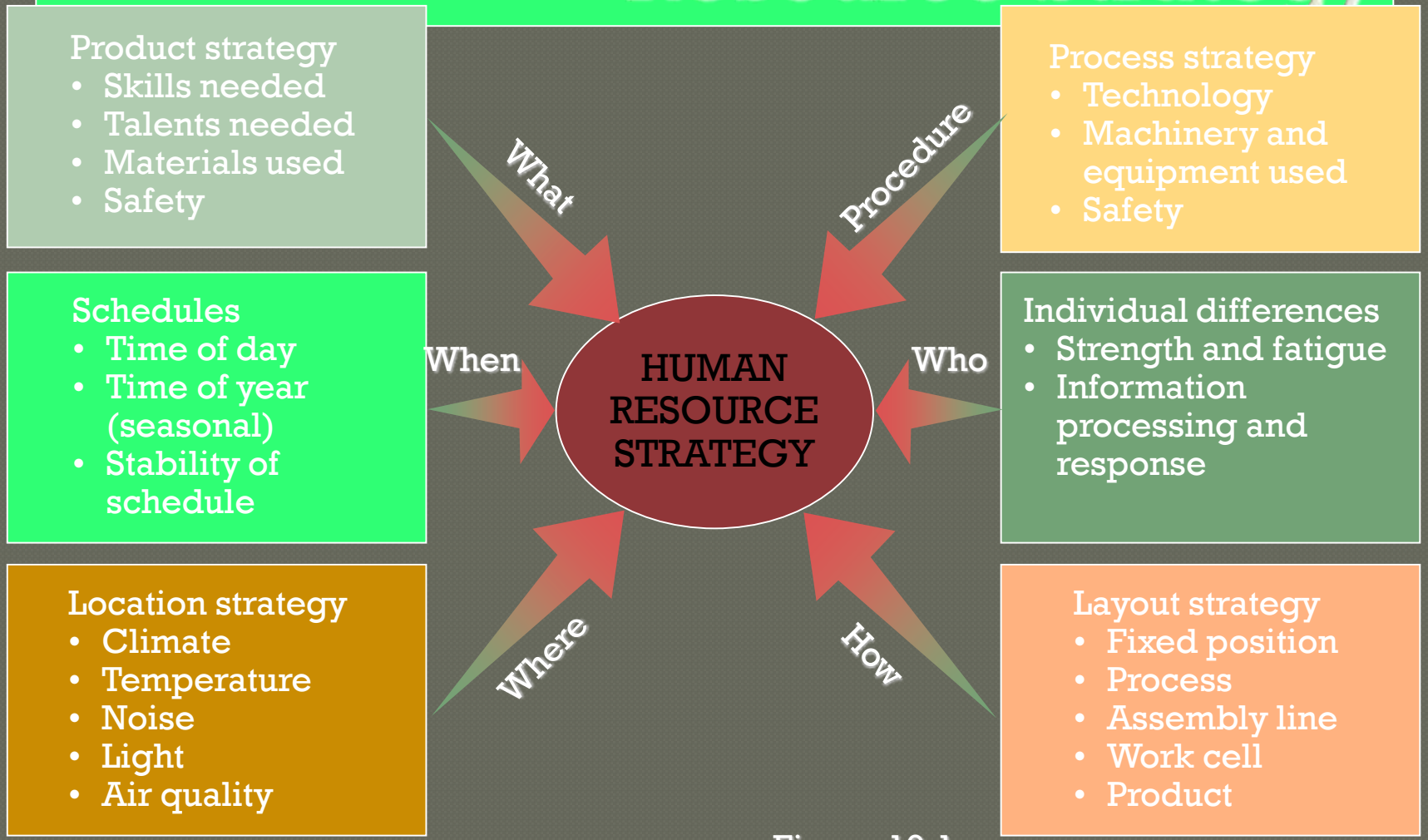


Figure 10.1

Job Design

- ☑ Specifying the tasks that constitute a job for an individual or a group
  1. Job specialization
  2. Job expansion
  3. Psychological components
  4. Self-directed teams
  5. Motivation and incentive systems
  6. Ergonomics and work methods
  7. Visual workplace

Labor Specialization

- ☑ The division of labor into unique tasks
- ☑ First suggested by Adam Smith in 1776
  1. Development of dexterity and faster learning
  2. Less loss of time
  3. Development of specialized tools
- ☑ Later Charles Babbage (1832) added another consideration
  4. Wages exactly fit the required skill

Job Expansion

- ☑ Adding more variety to jobs
- ☑ Intended to reduce boredom associated with labor specialization
  - ☑ Job enlargement
  - ☑ Job rotation
  - ☑ Job enrichment
  - ☑ Employee empowerment

Psychological Components of Job Design

Human resource strategy requires consideration of the psychological components of job design

Job Design Continuum

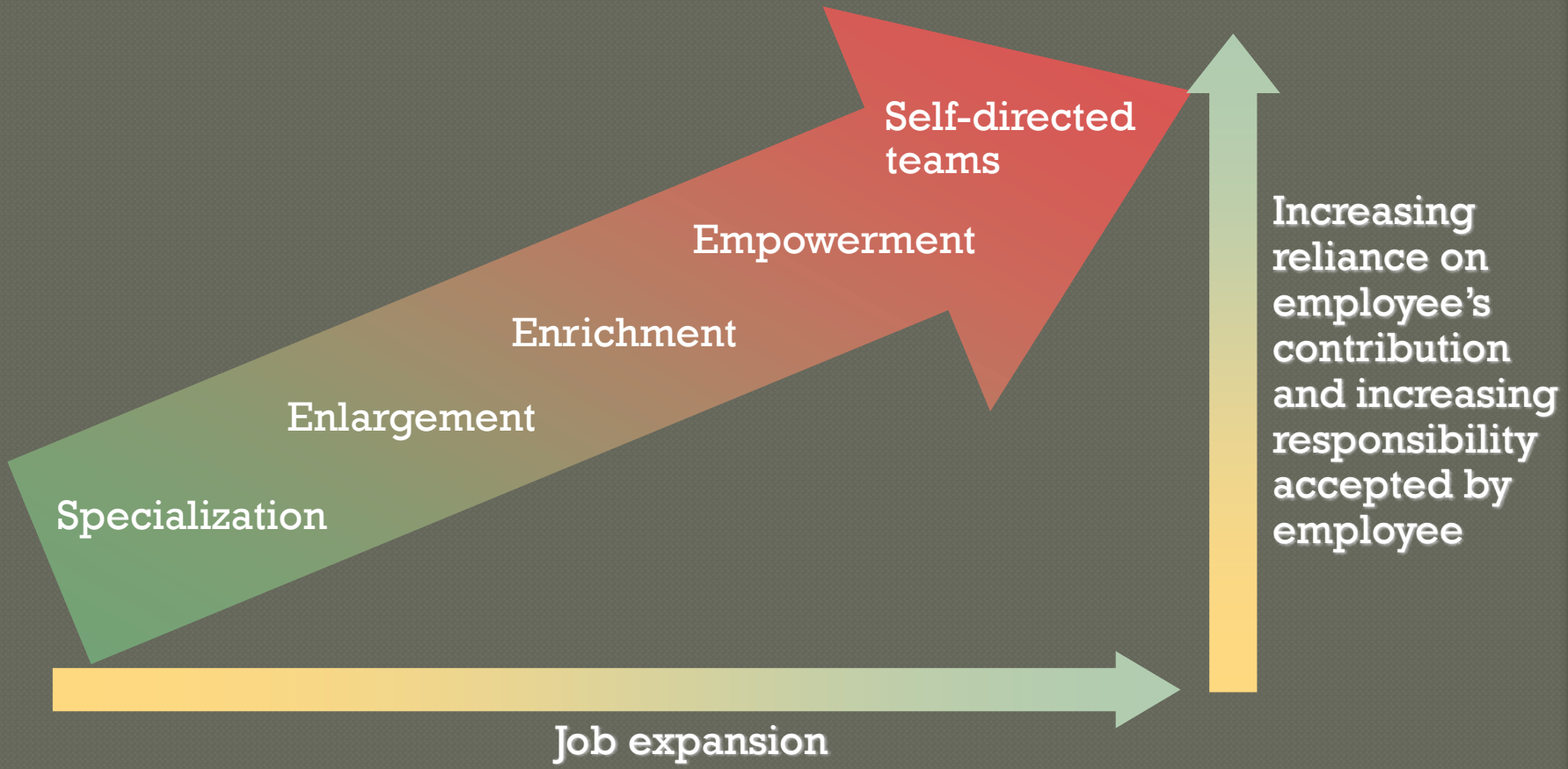


Figure 10.3

Self-Directed Teams

- ☑ Group of empowered individuals working together to reach a common goal
- ☑ May be organized for long-term or short-term objectives
- ☑ Effective because
  - ☑ Provide employee empowerment
  - ☑ Ensure core job characteristics
  - ☑ Meet individual psychological needs

Self-Directed Teams

To maximize effectiveness, managers should

- ☑ Ensure those who have legitimate contributions are on the team
- ☑ Provide management support
- ☑ Ensure the necessary training
- ☑ Endorse clear objectives and goals
- ☑ Financial and non-financial rewards
- ☑ Many teams have definite life cycles

Benefits of Teams and Expanded Job Designs

- ☑ Improved quality of work life
- ☑ Improved job satisfaction
- ☑ Increased motivation
- ☑ Allows employees to accept more responsibility
- ☑ Improved productivity and quality
- ☑ Reduced turnover and absenteeism

Limitations of Job Expansion

1. Higher capital cost
2. Individuals may prefer simple jobs
3. Higher wages rates for greater skills
4. Smaller labor pool
5. Increased accident rates
6. Current technology may not lend itself to job expansion

Motivation and Incentive Systems

- ☑ Bonuses - cash or stock options
- ☑ Profit-sharing - profits for distribution to employees
- ☑ Gain sharing - rewards for improvements
- ☑ Incentive plans - typically based on production rates
- ☑ Knowledge-based systems - reward for knowledge or skills

Ergonomics and Work Methods

- ☑ Ergonomics is the study of the interface between man and machine
  - ☑ Often called human factors
- ☑ Operator input to machines
- ☑ Feedback to operators

Ergonomics and Work Methods

- ☑ The work environment
  - ☑ Illumination/Tata cahaya
  - ☑ Noise/Tata suara
  - ☑ Temperature and Humidity
  - ☑ Kebersihan dan kesehatan
  - ☑ Keamanan dan keselamatan
  - ☑ Warna
  - ☑ Lay out
  - ☑ Music

Job Design and Keyboards

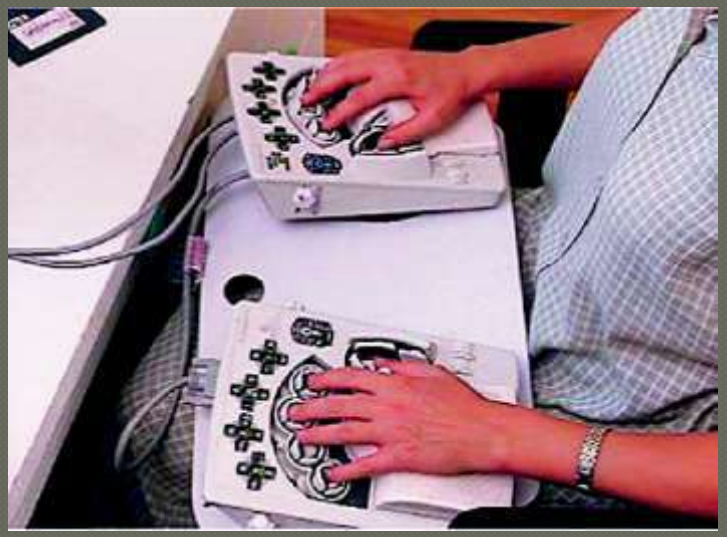


Figure 10.4

Levels of Illumination

Task Condition	Type of Task or Area	Illumination Level	Type of Illumination
Small detail, extreme accuracy	Sewing, inspecting dark materials	100	Overhead ceiling lights and desk lamp
Normal detail, prolonged periods	Reading, parts assembly, general office work	20-50	Overhead ceiling lights
Good contrast, fairly large objects	Recreational facilities	5-10	Overhead ceiling lights
Large objects	Restaurants, stairways, warehouses	2-5	Overhead ceiling lights

Table 10.2

Decibel Levels

Environment Noises	Common Noise Sources	Decibels	
	Jet takeoff (200 ft)	120	
Electric furnace area	Pneumatic hammer	100	Very annoying
Printing press plant	Subway train (20 ft)	90	
	Pneumatic drill (50 ft)	80	Ear protection required if exposed for 8 or more hours
Inside sports car (50 mph)	Vacuum cleaner (10 ft)	70	
Near freeway	Speech (1 ft)	60	Intrusive
Private business office			
Light traffic (100 ft)	Large transformer (200 ft)	50	Quiet
Minimum levels, Chicago residential areas at night		40	
Studio (speech)	Soft whisper (5 ft)	30	Very quiet

Table 10.3


Google


J.W.T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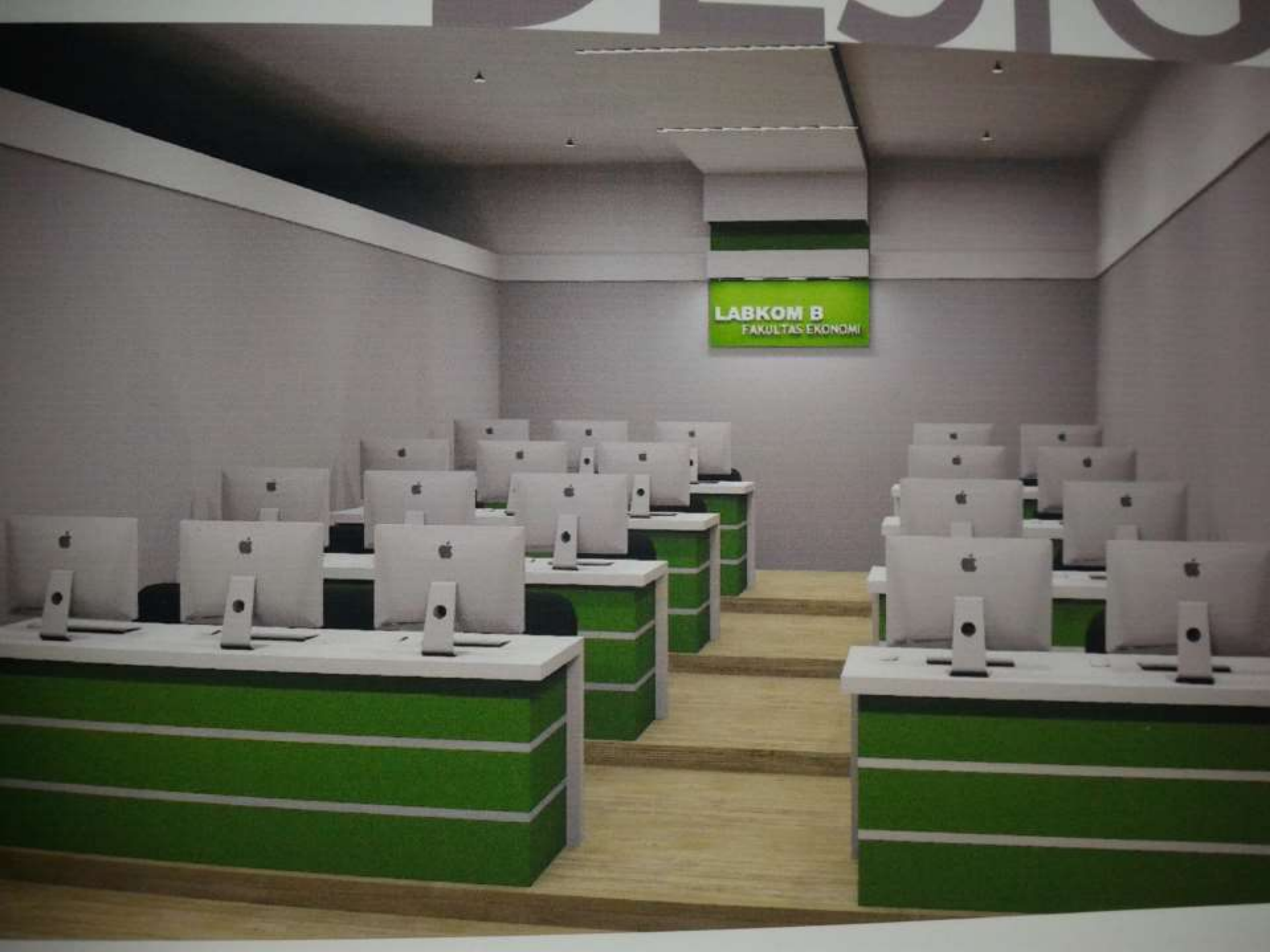
LABKOM B
FAKULTAS EKONOMI


12

Tugas 1

1. Apa yang dimaksud dengan daur hidup produk ?
2. Jelaskan masing-masing tahap dalam daur hidup produk !
3. Jelaskan langkah-langkah dalam QFD !
4. Mengapa banyak perusahaan menganggap penting perancangan produk baru ?
5. Jelaskan langkah-langkah dalam pengembangan produk !
6. Apakah perusahaan harus selalu meluncurkan produk baru ke pasar ?
7. Apa perbedaan antara barang dan jasa dalam proses pengembangannya ?

Catatan : tugas dikumpulkan paling lambat pada tanggal 30 September 2013, jawaban masing-masing mahasiswa harus ditulis tangan pada kertas folio bergaris.

Tugas 2

1. Jelakan mengapa pemilihan lokasi dapat menunjang keunggulan bersaing perusahaan !
2. Sebagai seorang konsultan, Anda diminta untuk menentukan lokasi sebuah perusahaan yang akan didirikan di Kota Tasikmalaya. Berikan alasan baik secara kuantitatif maupun kualitatif dalam penentuan lokasi perusahaan yang akan Anda sarankan.? (Jenis usaha perusahaan anda tentukan sendiri, boleh perusahaan jasa ataupun manufaktur)

- Tugas dikumpulkan paling lambat pada 7 Oktober 2013.
- Tugas dikerjakan secara individu dan harus ditulis tangan.