Operations Management 2

Introduction

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Principles of Operations Management, 7e
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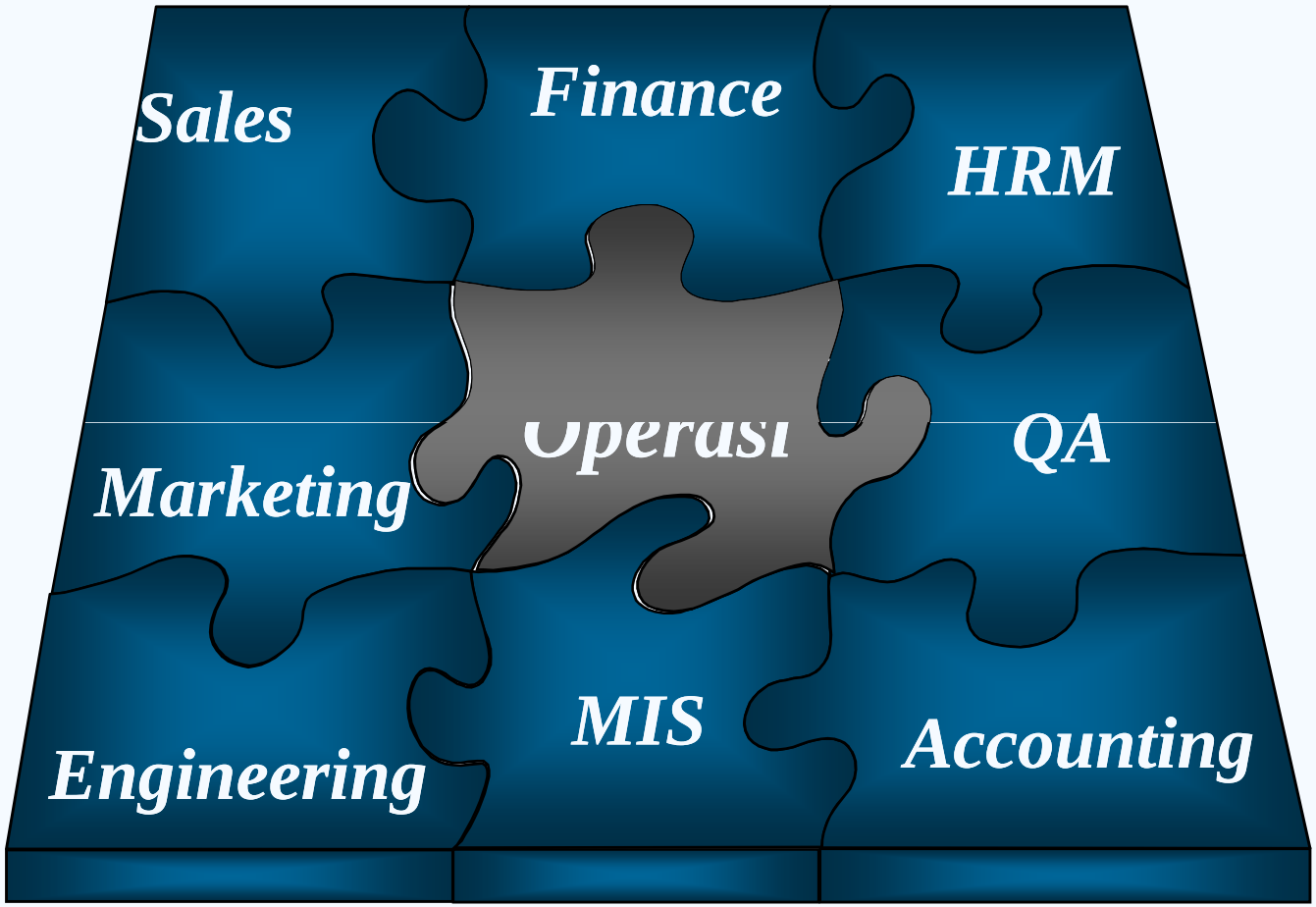
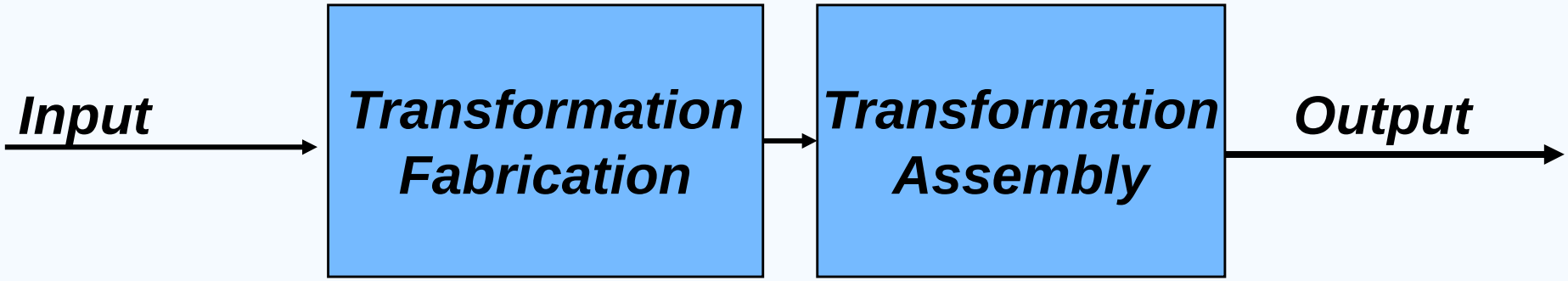
What is Operations Management? Defined

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

Model Organisasi



Proses Manajemen Produksi



Fabrication: *making the parts*

Assembly: *putting the parts together*

The Critical Decisions

- ***Design of goods and services***
  - ***What good or service should we offer?***
  - ***How should we design these products and services?***
- ***Managing quality***
  - ***How do we define quality?***
  - ***Who is responsible for quality?***

Table 1.2 (cont.)

The Critical Decisions

- ☑ **Process and capacity design**
  - ☑ **What process and what capacity will these products require?**
  - ☑ **What equipment and technology is necessary for these processes?**
- ☑ **Location strategy**
  - ☑ **Where should we put the facility?**
  - ☑ **On what criteria should we base the location decision?**

Table 1.2 (cont.)

The Critical Decisions

- ***Layout strategy***
  - ***How should we arrange the facility?***
  - ***How large must the facility be to meet our plan?***
- ***Human resources and job design***
  - ***How do we provide a reasonable work environment?***
  - ***How much can we expect our employees to produce?***

Table 1.2 (cont.)

The Critical Decisions

- ☑ *Supply chain management*
  - ☑ *Should we make or buy this component?*
  - ☑ *Who are our suppliers and who can integrate into our e-commerce program?*
- ☑ *Inventory, material requirements planning, and JIT*
  - ☑ *How much inventory of each item should we have?*
  - ☑ *When do we re-order?*

Table 1.2 (cont.)

The Critical Decisions

- ***Intermediate and short–term scheduling***
  - ***Are we better off keeping people on the payroll during slowdowns?***
  - ***Which jobs do we perform next?***
- ***Maintenance***
  - ***Who is responsible for maintenance?***
  - ***When do we do maintenance?***

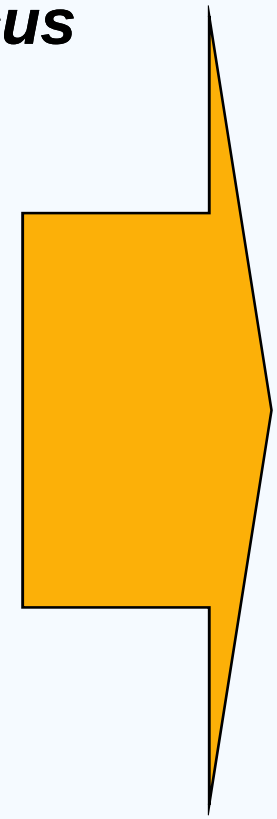
Table 1.2 (cont.)

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

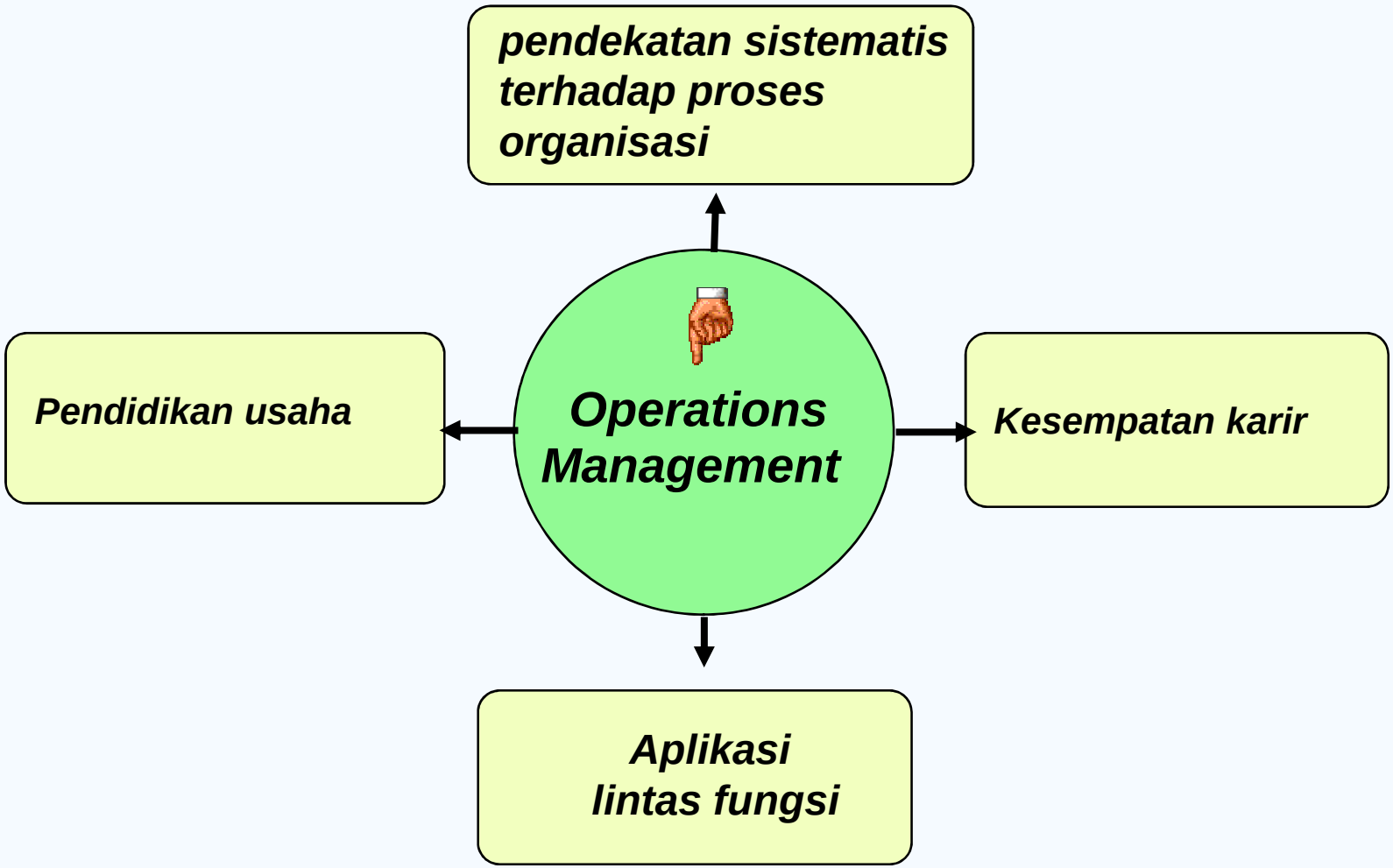
Figure 1.6

New Trends in OM

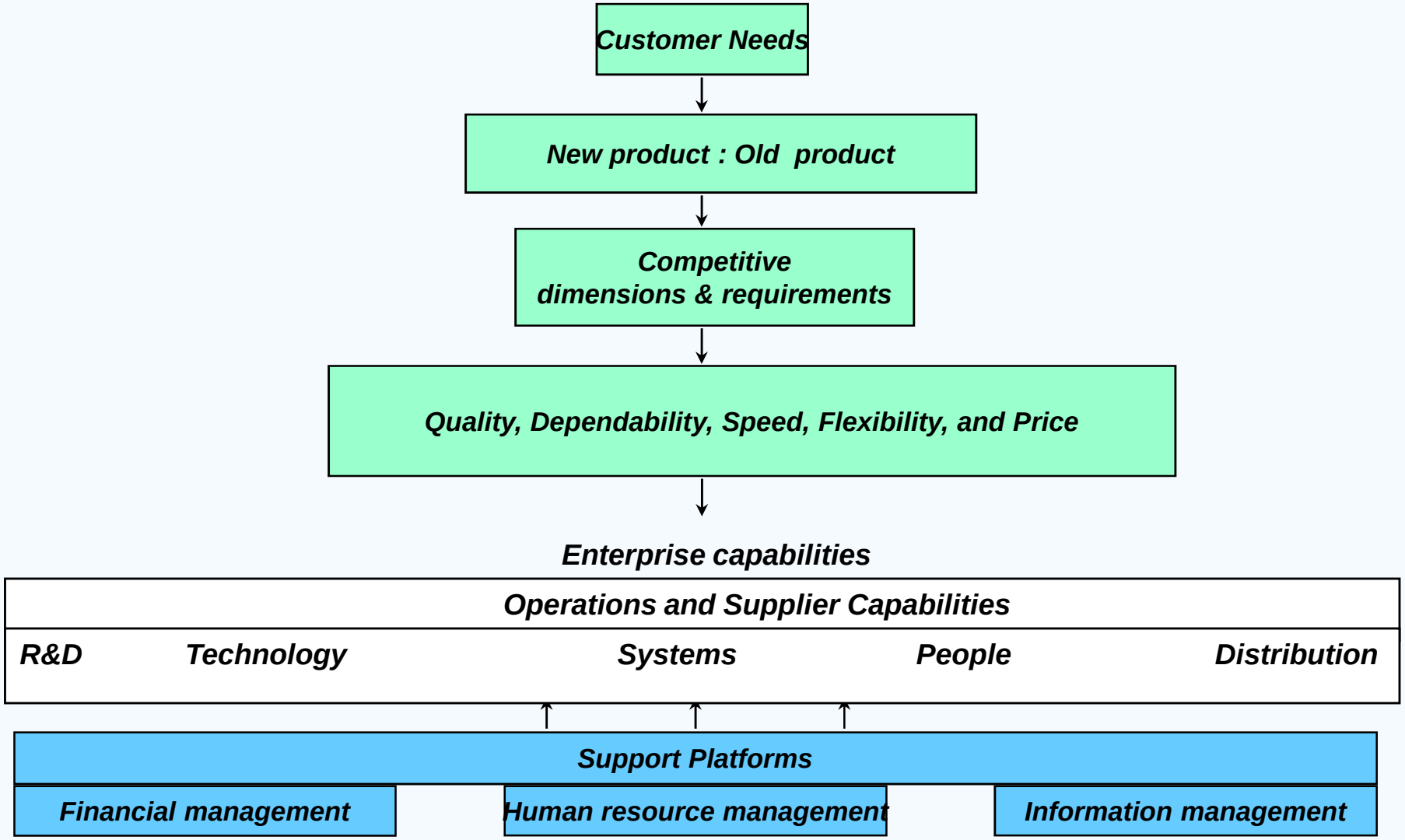
Past	→	Causes	→	Future
Low-cost focus	→	Environmental issues, ISO 14000, increasing disposal costs	→	Environmentally sensitive production, green manufacturing, recycled materials, remanufacturing
Ethics not at forefront	→	Businesses operate more openly; public and global review of ethics; opposition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

Figure 1.6

Why Study Operations Management?



Operations Strategy Framework



Pertemuan	Materi
1	Introduction to MO II **(Lucky)**
2	Operations Strategy in a Global Environment **(Lucky)**
3	Quality Function Deployment **(Heri)**
4	E-Commerce and Operations Management **(Lucky)**
5	Forecasting I **(Heri)**
6	Forecasting II **(Heri)**
7	Project Management **(Lucky)**
	UJIAN TENGAH SEMESTER
8	Aggregate Planning I **(Heri)**
9	Aggregate Planning II **(Heri)**
10	Outsourching **(Lucky)**
11	Capacity Planning **(Heri)**
12	Six Sigma **(Heri)**
13	Balance Scorecard I **(Lucky)**
14	Balance Scorecard II **(Lucky)**
	UJIAN AKHIR SEMESTER

Jadwal Kuliah

KELAS	HARI	RUANGAN
E	SENIN	A.18
C	SENIN	A.18
D,F	SELASA	A.15
A,B	SELASA	A.15

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Kontrak Kuliah

- *Kehadiran : Minimal 75%*
- *Nilai UTS dan UAS : 35%*
- *Tugas dan Quiz : 30%*
- *Nilai Tambahan : Partisipasi Kelas dan Absensi*
- *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.*

Operations Management

Operations Strategy in a Global Environment

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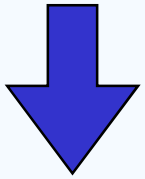
Reasons to Globalize

Reasons to Globalize

Tangible Reasons



Intangible Reasons

1. Mengurangi biaya (tenaga kerja, pajak, tarif, dll)
2. Meningkatkan rantai pasokan
3. Menyediakan barang dan jasa yang lebih baik
4. Memahami pasar
5. Belajar untuk meningkatkan operasi
6. Menarik dan mempertahankan bakat global

Reduce Costs

- ***Lokasi asing dengan tingkat upah yang lebih rendah dapat menurunkan biaya langsung dan tidak langsung***
  - ☑ ***Maquiladoras***
  - ☑ ***World Trade Organization (WTO)***
  - ☑ ***North American Free Trade Agreement (NAFTA)***
  - ☑ ***APEC, SEATO, MERCOSUR***
  - ☑ ***European Union (EU)***

Improve the Supply Chain

- ☑ ***Locating facilities closer to unique resources***
  - ☑ ***Auto design to California***
  - ☑ ***Athletic shoe production to China***
  - ☑ ***Perfume manufacturing in France***

Provide Better Goods and Services

- ☑ ***Objective and subjective characteristics of goods and services***
  - ☑ ***Pengiriman tepat waktu***
  - ☑ ***Variabel budaya***
  - ☑ ***Peningkatan layanan pelanggan***

Understand Markets

- ***Berinteraksi dengan pelanggan asing dan pemasok dapat menimbulkan peluang baru***
  - ☑ ***Ponsel desain dari Eropa***
  - ☑ ***Ponsel mode dari Jepang***

  - ☑ ***Memperpanjang siklus hidup produk***

Learn to Improve Operations

- ☑ ***Remain open to the free flow of ideas***
  - ☑ ***General Motors bermitra dengan produsen mobil Jepang untuk belajar***
  - ☑ ***Peralatan dan tata letak telah ditingkatkan menggunakan kompetensi ergonomis Skandinavia***

Attract and Retain Global Talent

- ☑ *Offer better employment opportunities*
  - ☑ *Baik pertumbuhan peluang dan isolasi terhadap pengangguran*
  - ☑ *Relokasi personil yang tidak dibutuhkan ke lokasi yang lebih makmur*
  - ☑ *Insentif bagi orang yang suka bepergian*

Cultural and Ethical Issues

- *Budaya bisa sangat berbeda*
- *Sikap bisa sangat berbeda terhadap*
  - *Tepat waktu*
  - *Makan siang istirahat*
  - *Lingkungan*
  - *Intelektual properti*
  - *Pencurian*
  - *Penyuapan*
  - *Pekerja anak*

You May Wish To Consider

- ☑ *National literacy rate*
- ☑ *Rate of innovation*
- ☑ *Rate of technology change*
- ☑ *Number of skilled workers*
- ☑ *Political stability*
- ☑ *Product liability laws*
- ☑ *Export restrictions*
- ☑ *Variations in language*
- ☑ *Work ethic*
- ☑ *Tax rates*
- ☑ *Inflation*
- ☑ *Availability of raw materials*
- ☑ *Interest rates*
- ☑ *Population*
- ☑ *Number of miles of highway*
- ☑ *Phone system*

Developing Missions and Strategies

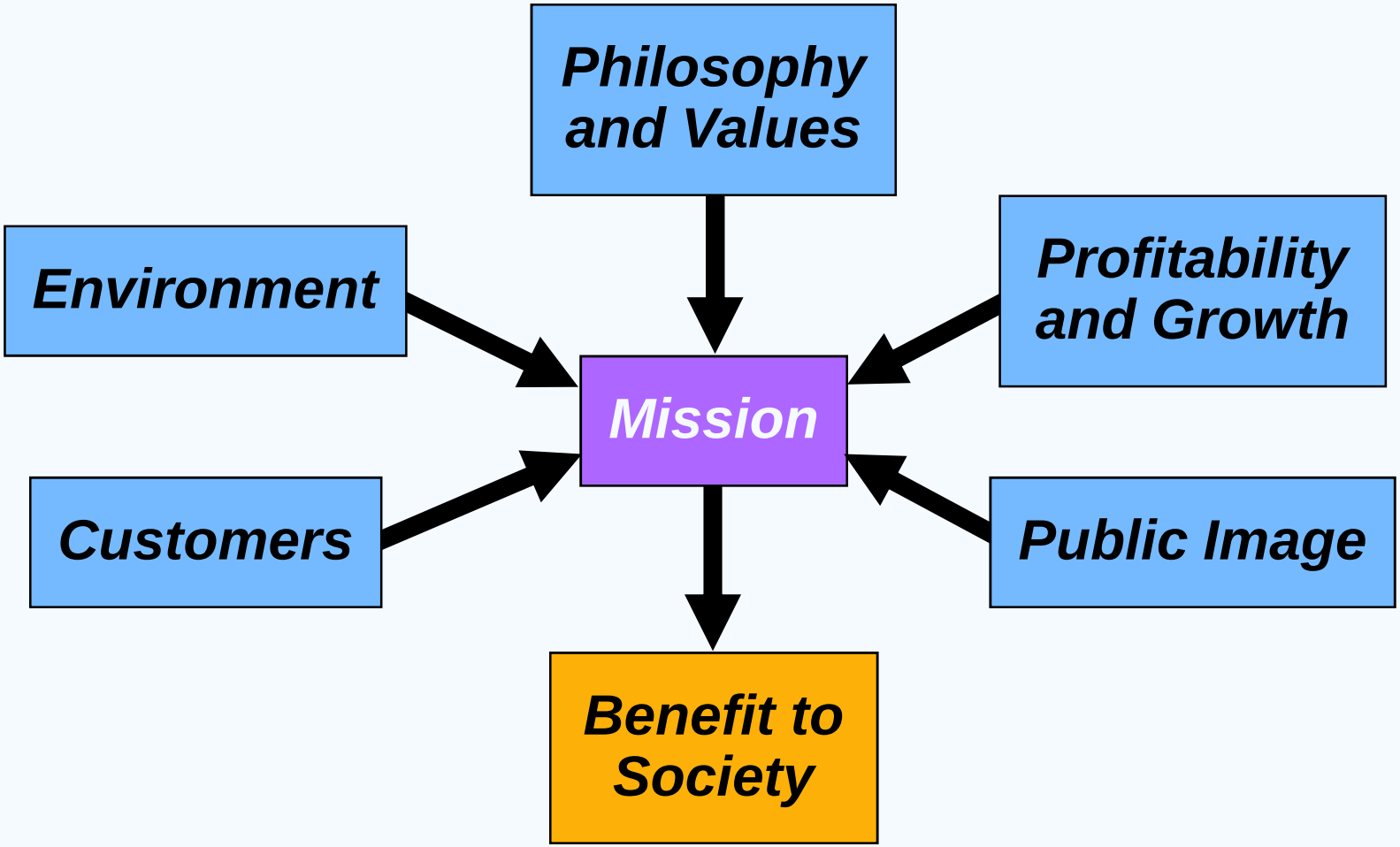
***Mission** statements tell an organization where it is going*

The Strategy tells the organization how to get there

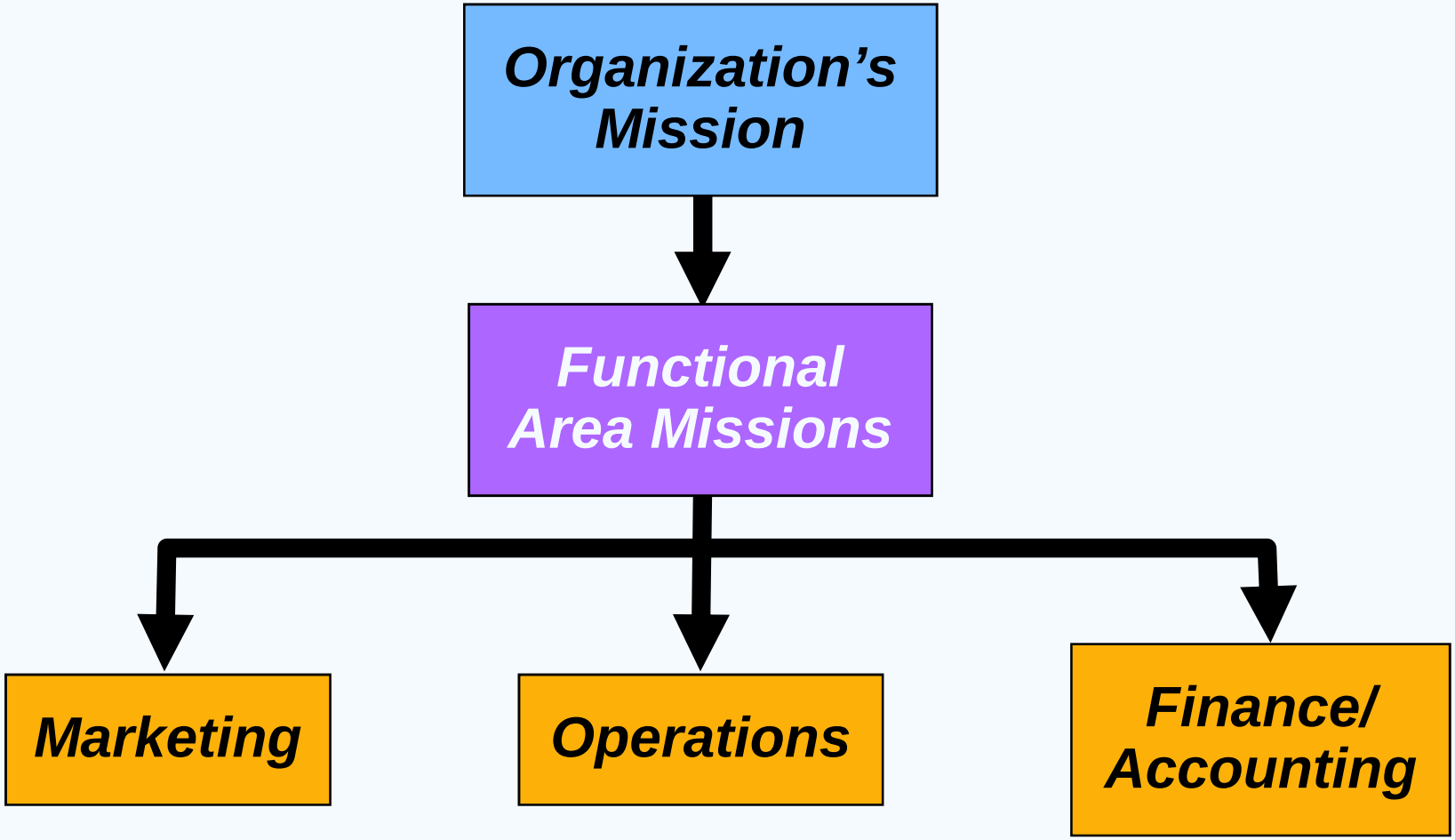
Mission

- ***Mission - where are you going?***
  - ***Organization's purpose for being***
  - ***Answers 'What do we provide society?'***
  - ***Provides boundaries and focus***

Factors Affecting Mission



Strategic Process



Strategy

- ☑ *Rencana aksi untuk mencapai misi*
- ☑ *Bidang fungsional memiliki strategi*
- ☑ *Strategi memanfaatkan peluang dan kekuatan, menetralkan ancaman, dan menghindari kelemahan*

Strategies for Competitive Advantage

- ☑ ***Differentiation – better, or at least different***
- ☑ ***Cost leadership – cheaper***
- ☑ ***Response – rapid response***

Competing on Differentiation

- ***Bersaing Diferensiasi***
- ***Keunikan dapat melampaui baik karakteristik fisik dan atribut layanan untuk mencakup segala sesuatu yang berdampak pada persepsi pelanggan pada nilai***

  - ☑ ***Safeskin gloves – leading edge products***
  - ☑ ***Walt Disney Magic Kingdom – experience differentiation***
  - ☑ ***Hard Rock Cafe – dining experience***

Competing on Cost

Provide the maximum value as perceived by customer. Does not imply low quality.

- ☑ ***Southwest Airlines – secondary airports, no frills service, efficient utilization of equipment***
- ☑ ***Wal-Mart – small overheads, shrinkage, distribution costs***
- ☑ ***Franz Colruyt – no bags, low light, no music, doors on freezers***

Competing on Response

- ☑ ***Flexibility is matching market changes in design innovation and volumes***
  - ☑ ***Institutionalization at Hewlett-Packard***
- ☑ ***Reliability is meeting schedules***
  - ☑ ***German machine industry***
- ☑ ***Timeliness is quickness in design, production, and delivery***
  - ☑ ***Johnson Electric, Bennigan's, Motorola***

Goods and Services and the 10 OM Decisions

Operations Decisions	Goods	Services
Goods and service design	Product is usually tangible	Product is not tangible
Quality	Many objective standards	Many subjective standards
Process and capacity design	Customers not involved	Customer may be directly involved Capacity must match demand

Table 2.1

Goods and Services and the 10 OM Decisions

Operations Decisions	Goods	Services
Location selection	Near raw materials and labor	Near customers
Layout design	Production efficiency	Enhances product and production
Human resources and job design	Technical skills, consistent labor standards, output based wages	Interact with customers, labor standards vary

Table 2.1

Goods and Services and the 10 OM Decisions

Operations Decisions	Goods	Services
Supply chain	Relationship critical to final product	Important, but may not be critical
Inventory	Raw materials, work-in-process, and finished goods may be held	Cannot be stored
Scheduling	Level schedules possible	Meet immediate customer demand

Table 2.1

Goods and Services and the 10 OM Decisions

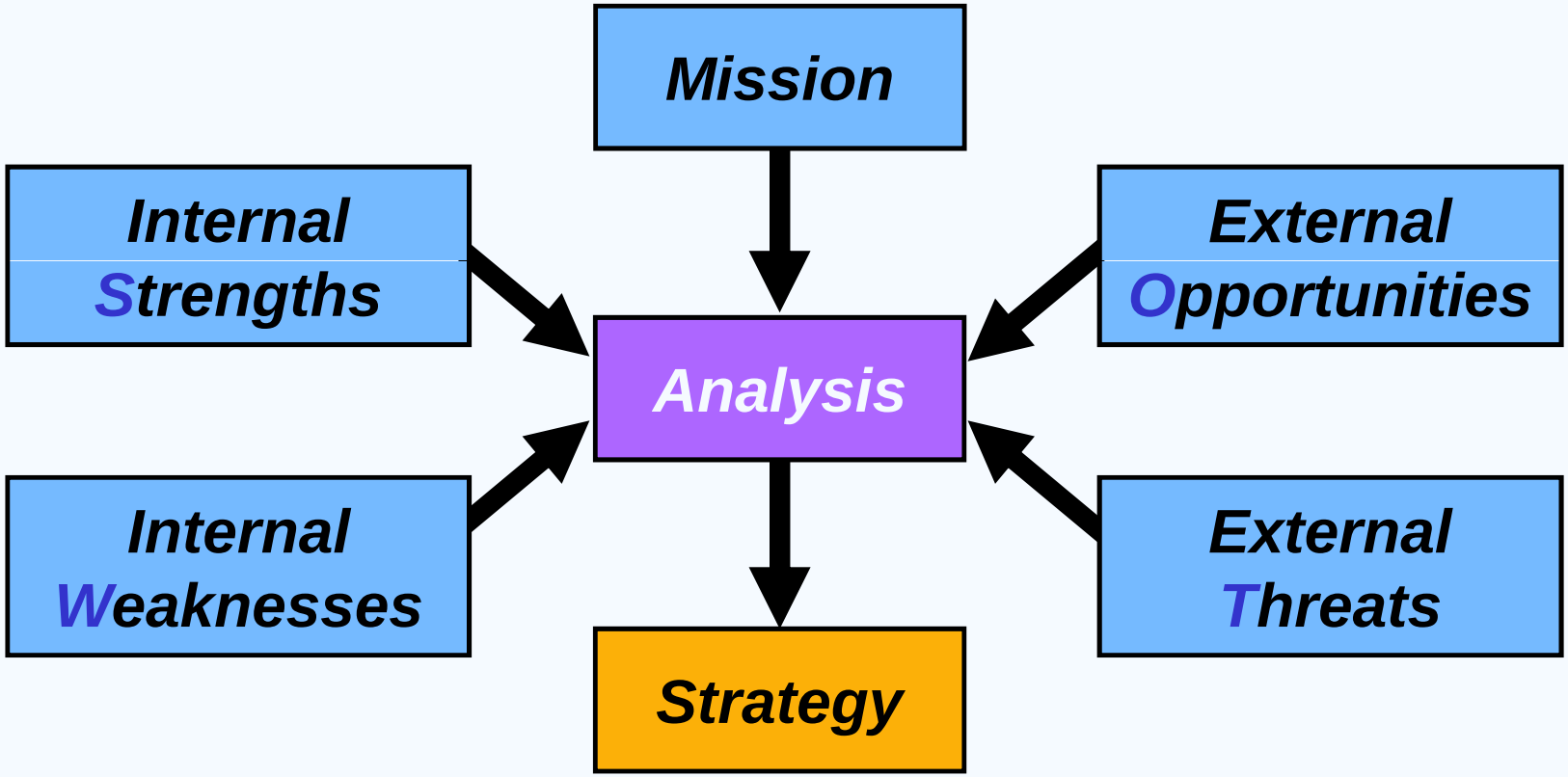
Operations Decisions	Goods	Services
Maintenance	Often preventive and takes place at production site	Often “repair” and takes place at customer’s site

Table 2.1

Dynamics of Strategic Change

- ☑ *Changes within the organization*
  - ☑ *Personnel*
  - ☑ *Finance*
  - ☑ *Technology*
  - ☑ *Product life*
- ☑ *Changes in the environment*

SWOT Analysis



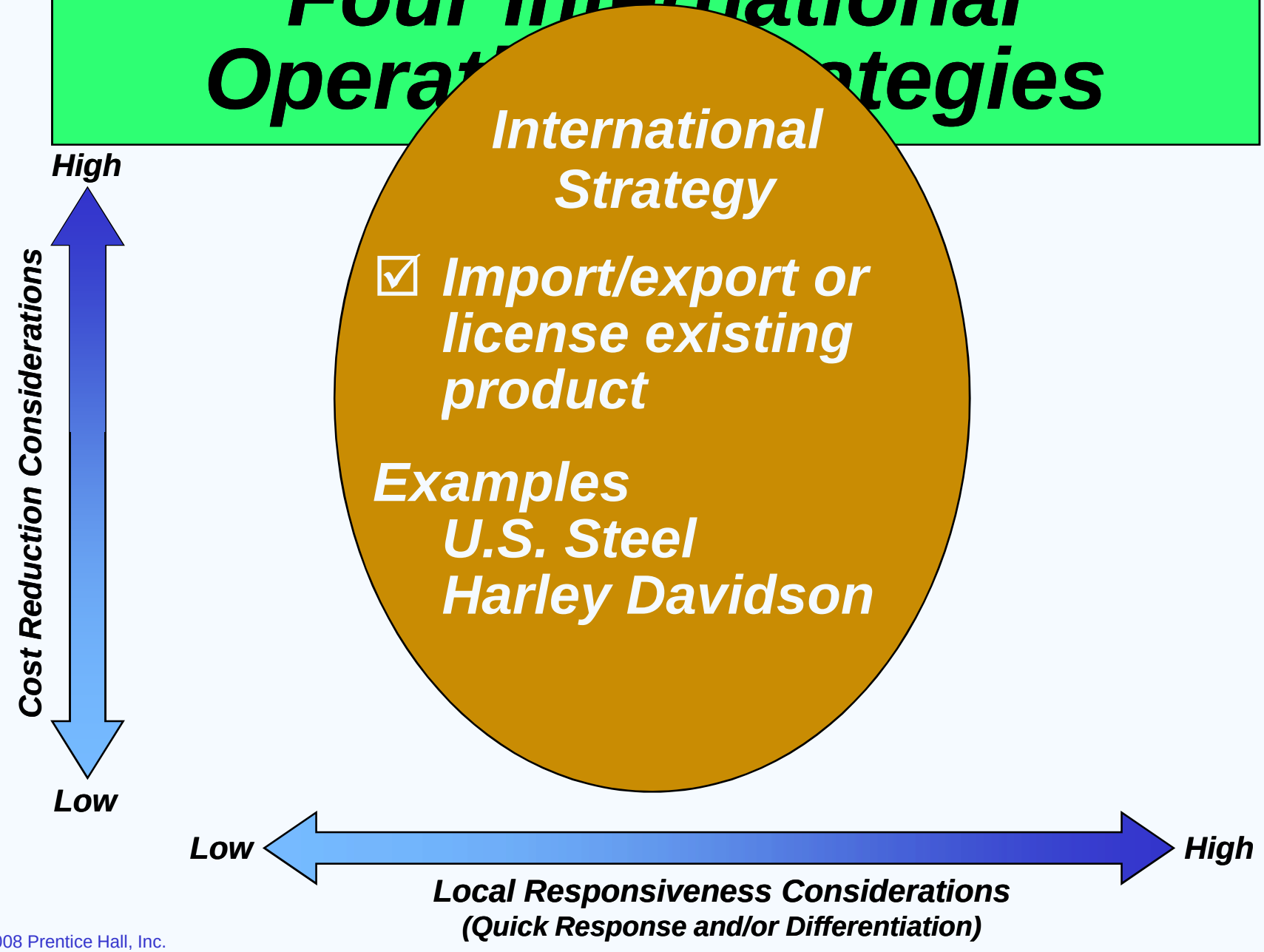
Critical Success Factors

Marketing	Finance/Accounting	Production/Operations
Service Distribution Promotion Channels of distribution Product positioning (image, functions)	Leverage Cost of capital Working capital Receivables Payables Financial control Lines of credit	

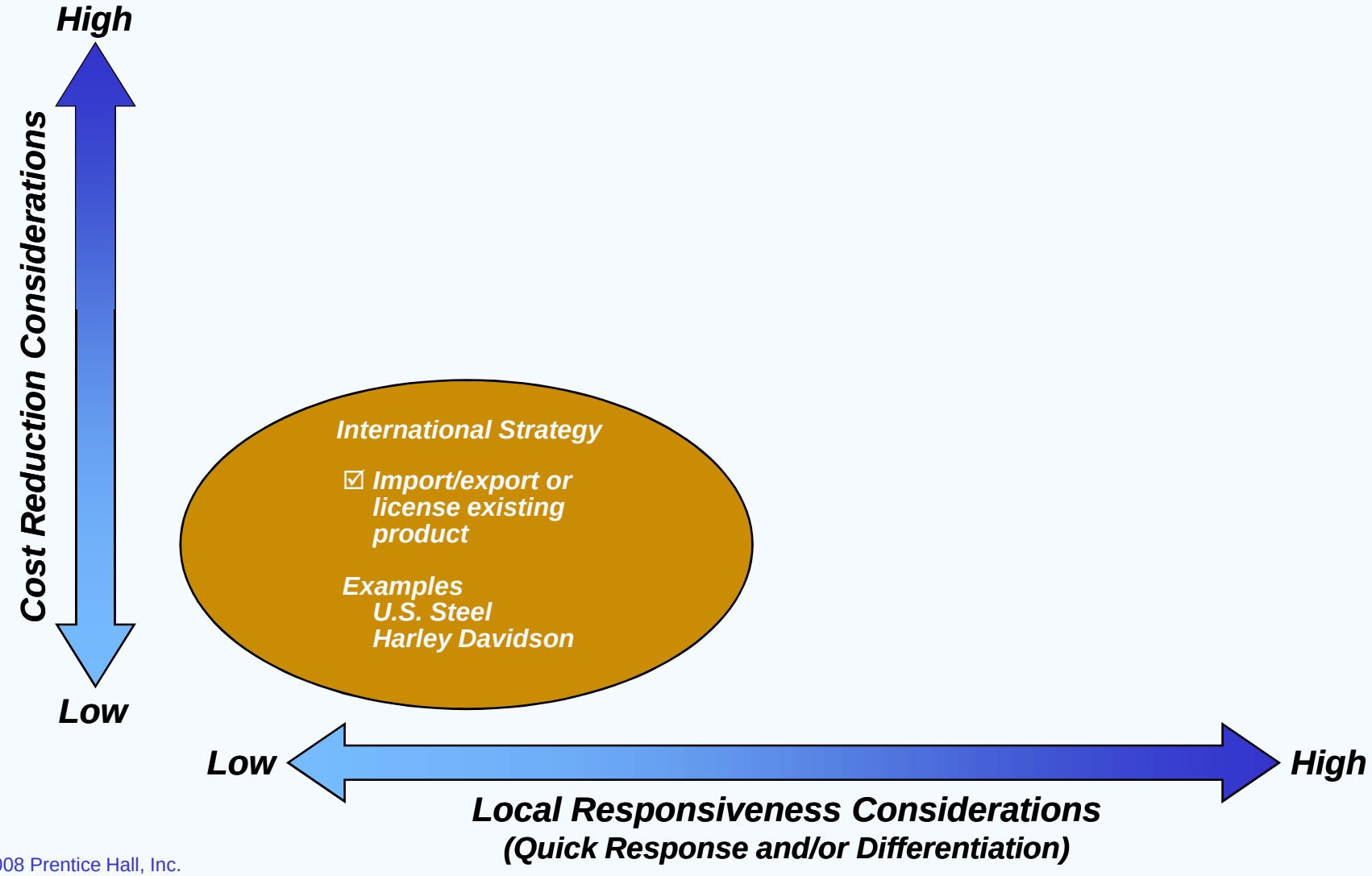
Decisions	Sample Options	Chapter
Product	Customized, or standardized	5
Quality	Define customer expectations and how to achieve them	6, S6
Process	Facility size, technology, capacity	7, S7
Location	Near supplier or near customer	8
Layout	Work cells or assembly line	9
Human resource	Specialized or enriched jobs	10, S10
Supply chain	Single or multiple suppliers	11, S11
Inventory	When to reorder, how much to keep on hand	12, 14, 16
Schedule	Stable or fluctuating production rate	13, 15
Maintenance	Repair as required or preventive maintenance	17

Figure 2.7

Four International Operat[illegible]tegies



Four International Operations Strategies



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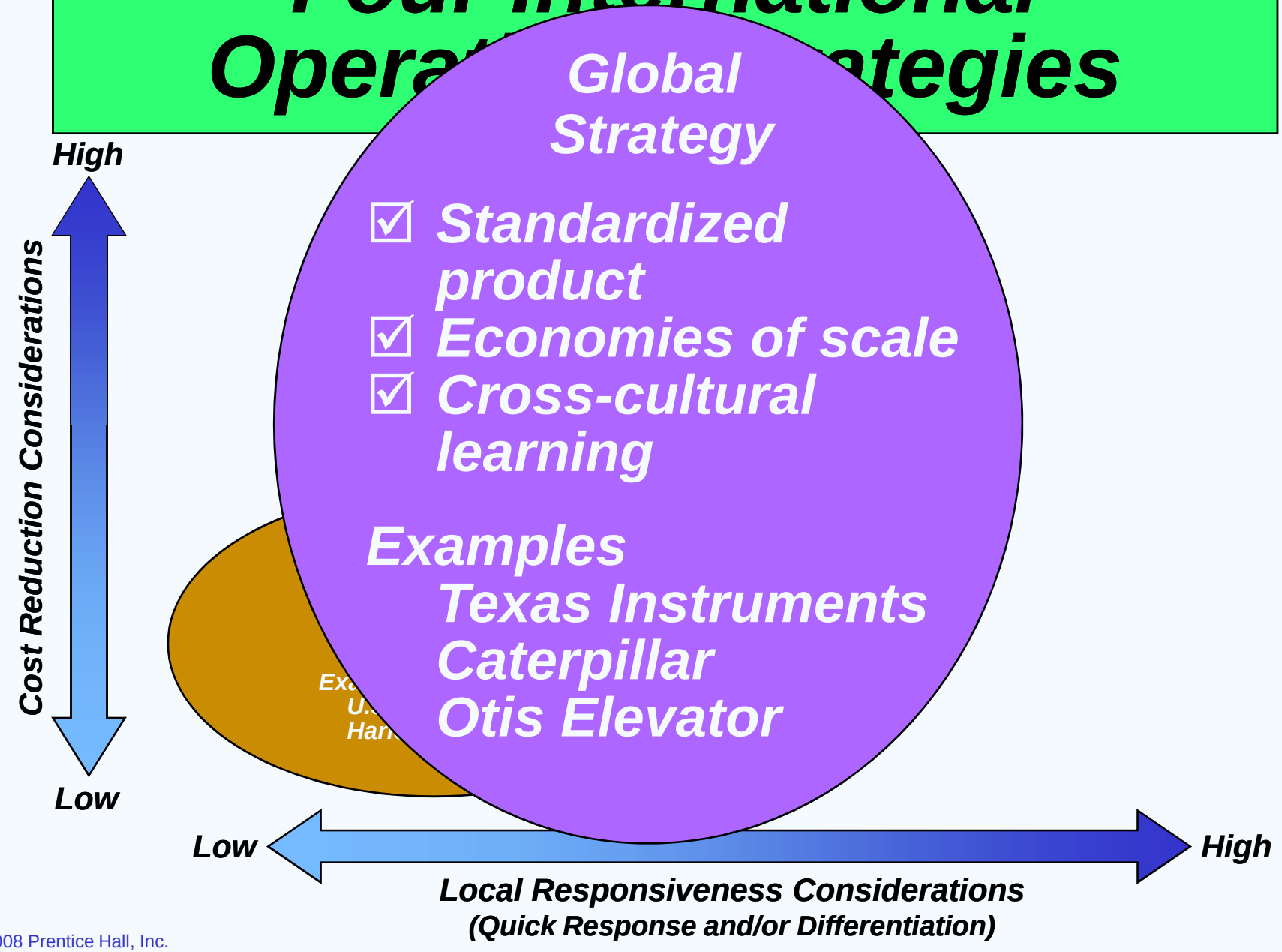
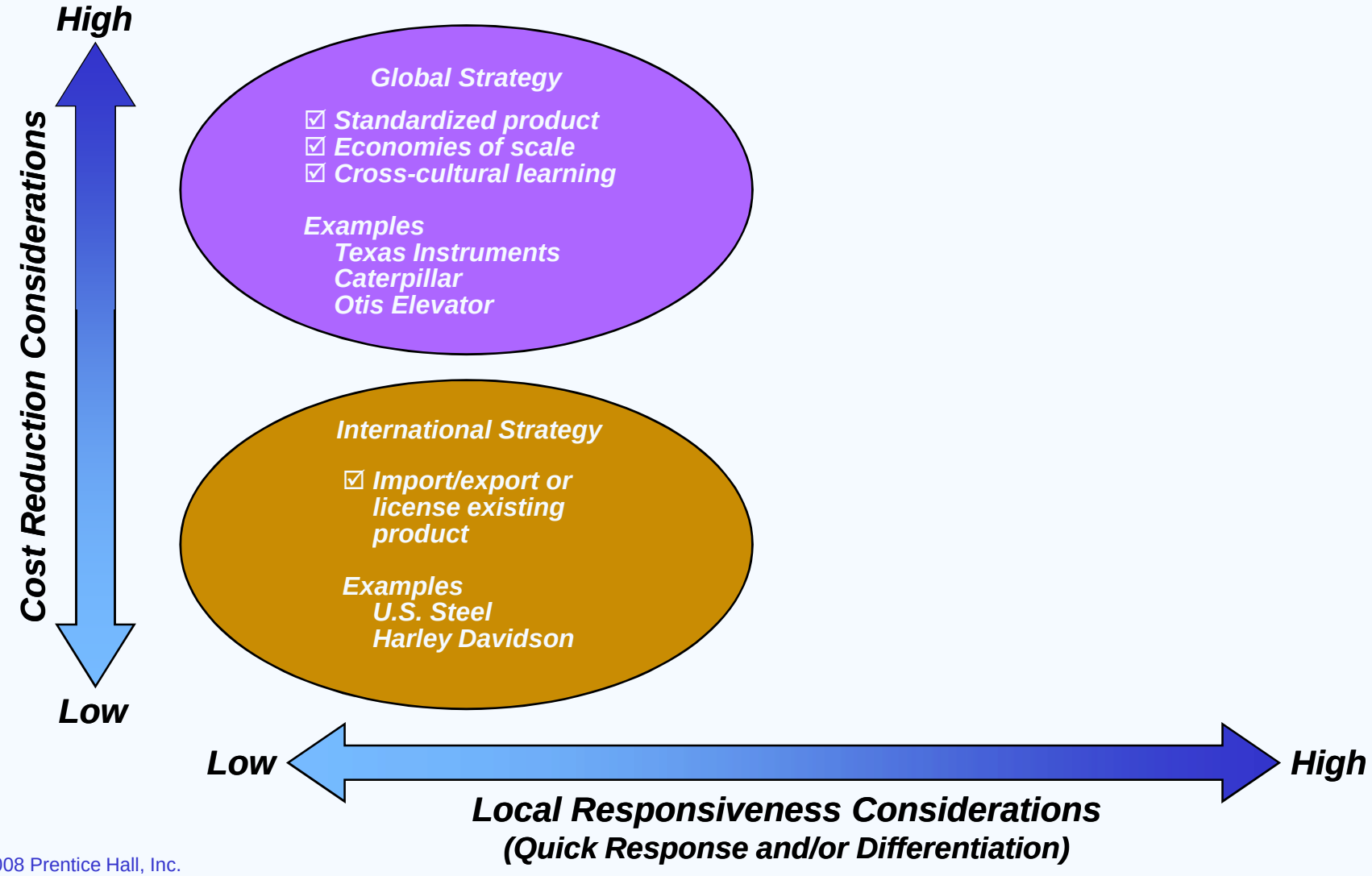
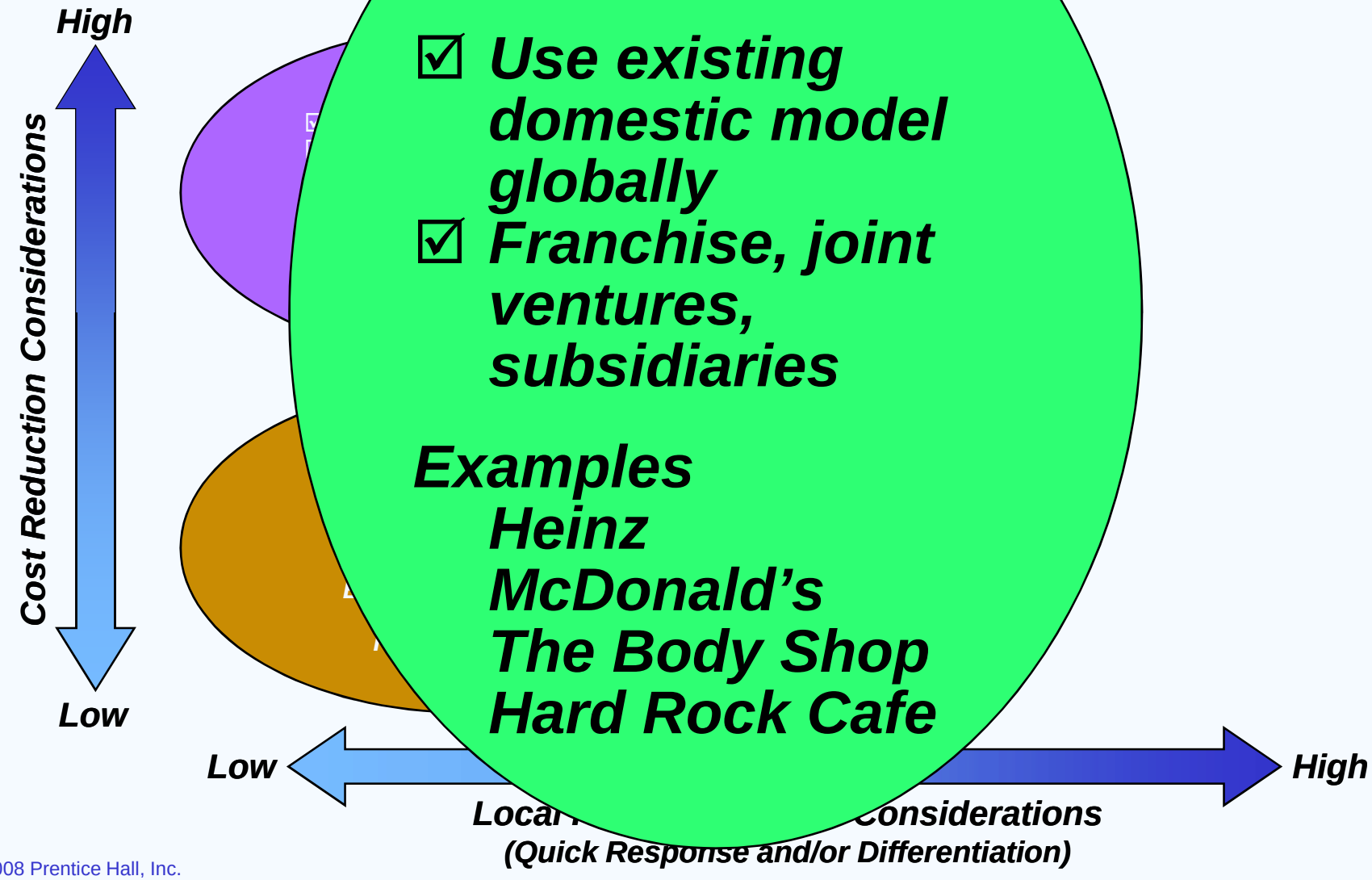


Four International Operations Strategies



Four ... tional Oper... gies



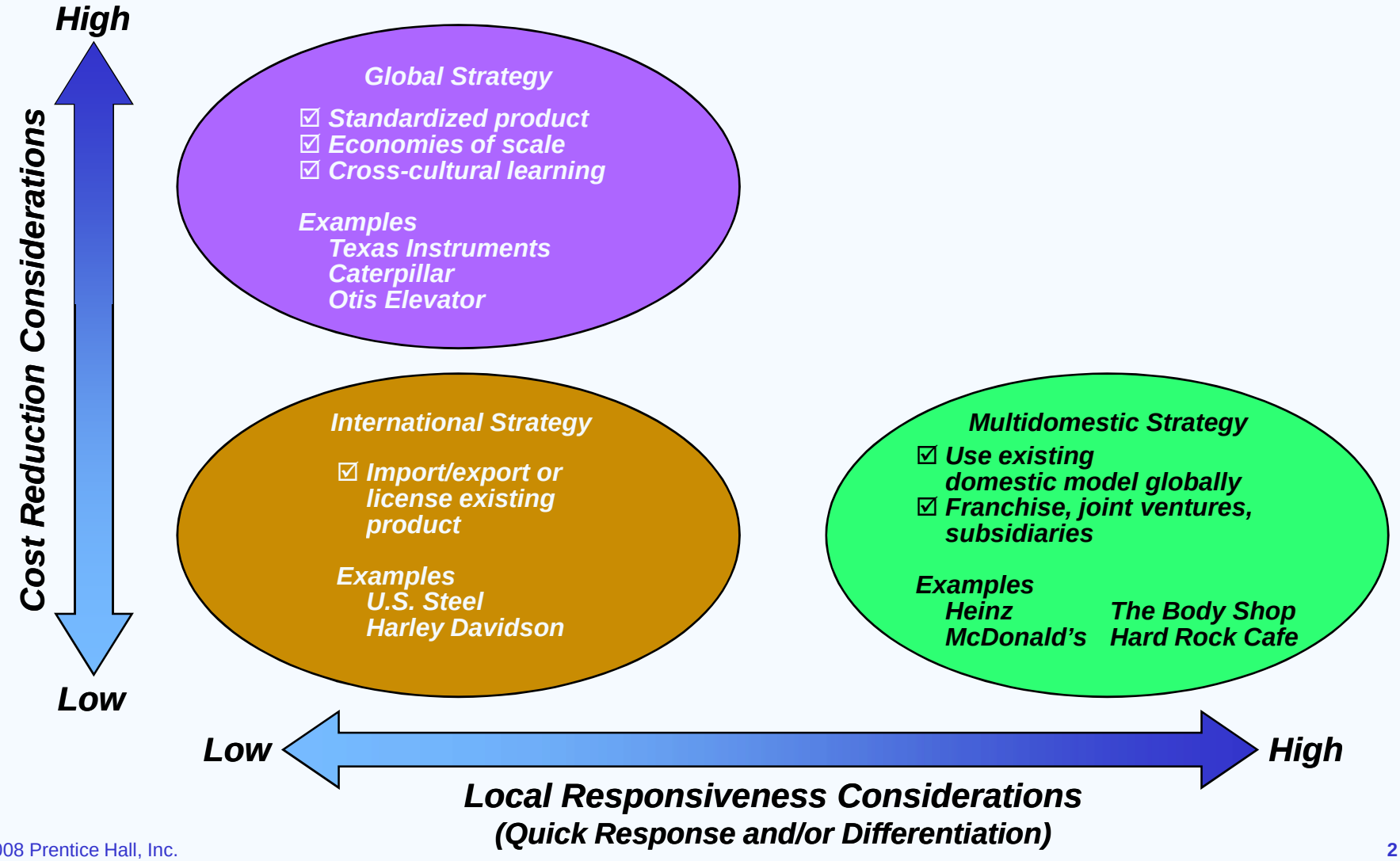
Multidomestic Strategy

- ☑ Use existing domestic model globally
- ☑ Franchise, joint ventures, subsidiaries

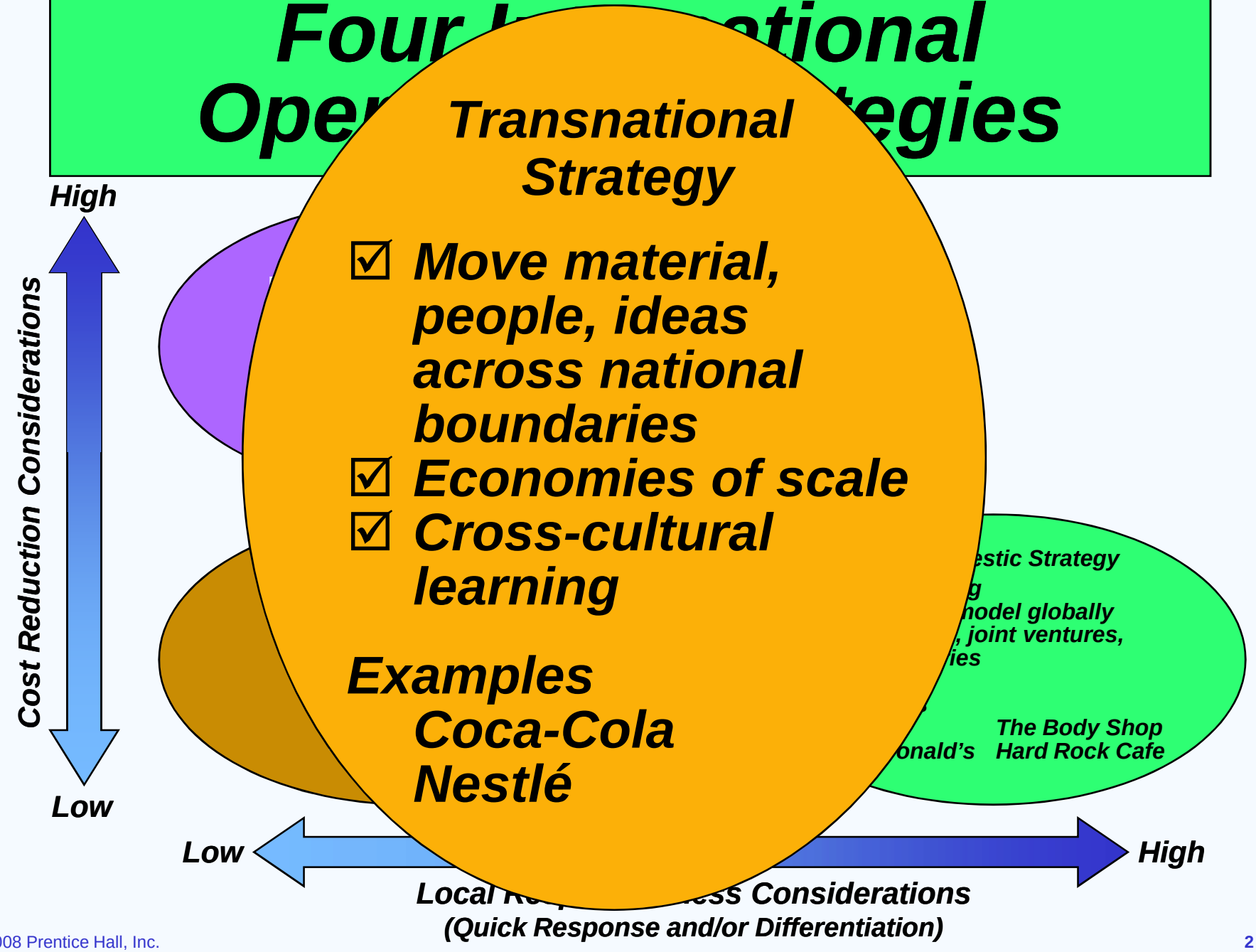
Examples

- Heinz
- McDonald's
- The Body Shop
- Hard Rock Cafe

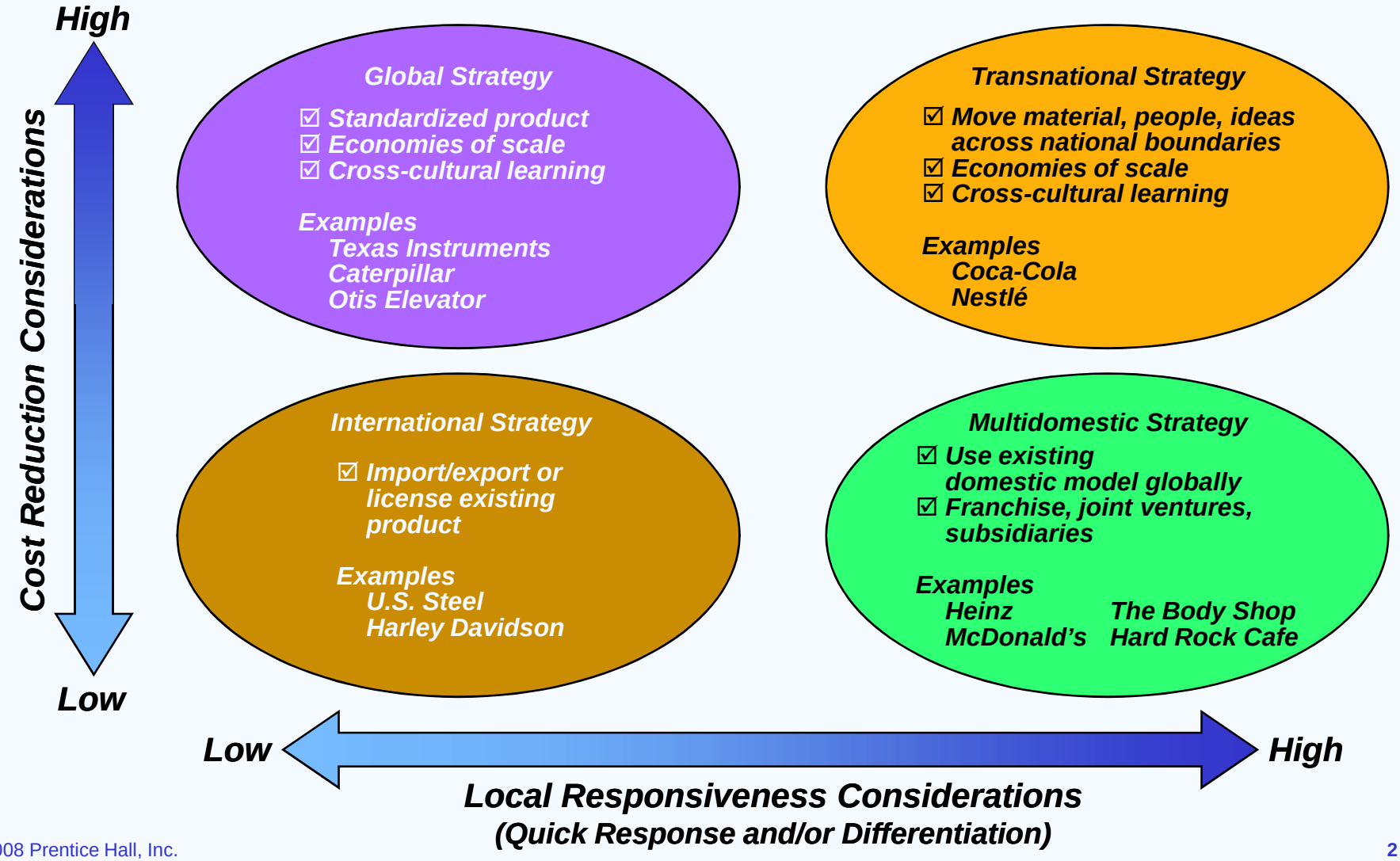
Four International Operations Strategies



Four International Operations Strategies



Four International Operations Strategies



Operations Management

E-Commerce and Operations Management

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The Internet

- ☑ *jaringan komputer Internasional*
- ☑ *Menghubungkan perusahaan dan orang di seluruh dunia*
- ☑ *Memungkinkan integrasi sistem informasi internal dan meningkatkan komunikasi antara organisasi-organisasi*
- ☑ *Ikatan bersama desain global, manufaktur, pengiriman, penjualan, dan after-service*

The Internet

- ☑ *Membentuk kembali pemikiran tentang bagaimana bisnis memberikan nilai kepada pelanggan*
- ☑ *Manfaat utama adalah kecepatan dan akses*
- ☑ *Kendaraan Penting untuk perubahan dalam Manajemen Operasi*
- ☑ *Intranet adalah jaringan internal tidak tersedia bagi pengguna eksternal*
- ☑ *Tumbuh setiap hari dengan lebih dari 300 juta domain terdaftar di seluruh dunia*

Electronic Commerce

- ☑ *E-commerce (or e-business) – the use of the internet to buy and sell products and services and exchange information*
- ☑ *Low cost rapid exchanges*
- ☑ *A whole new way of doing business*

> *"… all about cycle time, speed, globalization, enhanced productivity, reaching new customers and sharing knowledge across institutions for competitive advantage."*
>
> *Louis Gerstner*
> *Former Chairman, IBM*

E-Commerce Definitions

- ☑ ***Business-to-business (B2B) – Both sides of the transaction are businesses, non-profit organizations, or governments***
- ☑ ***Business-to-consumer (B2C) – Transactions in which buyers are individual consumers***
- ☑ ***Consumer-to-consumer (C2C) – Consumers sell directly to each other***
- ☑ ***Consumer-to-business (C2B) – Individuals sell services or goods to businesses***

E-Commerce Transactions

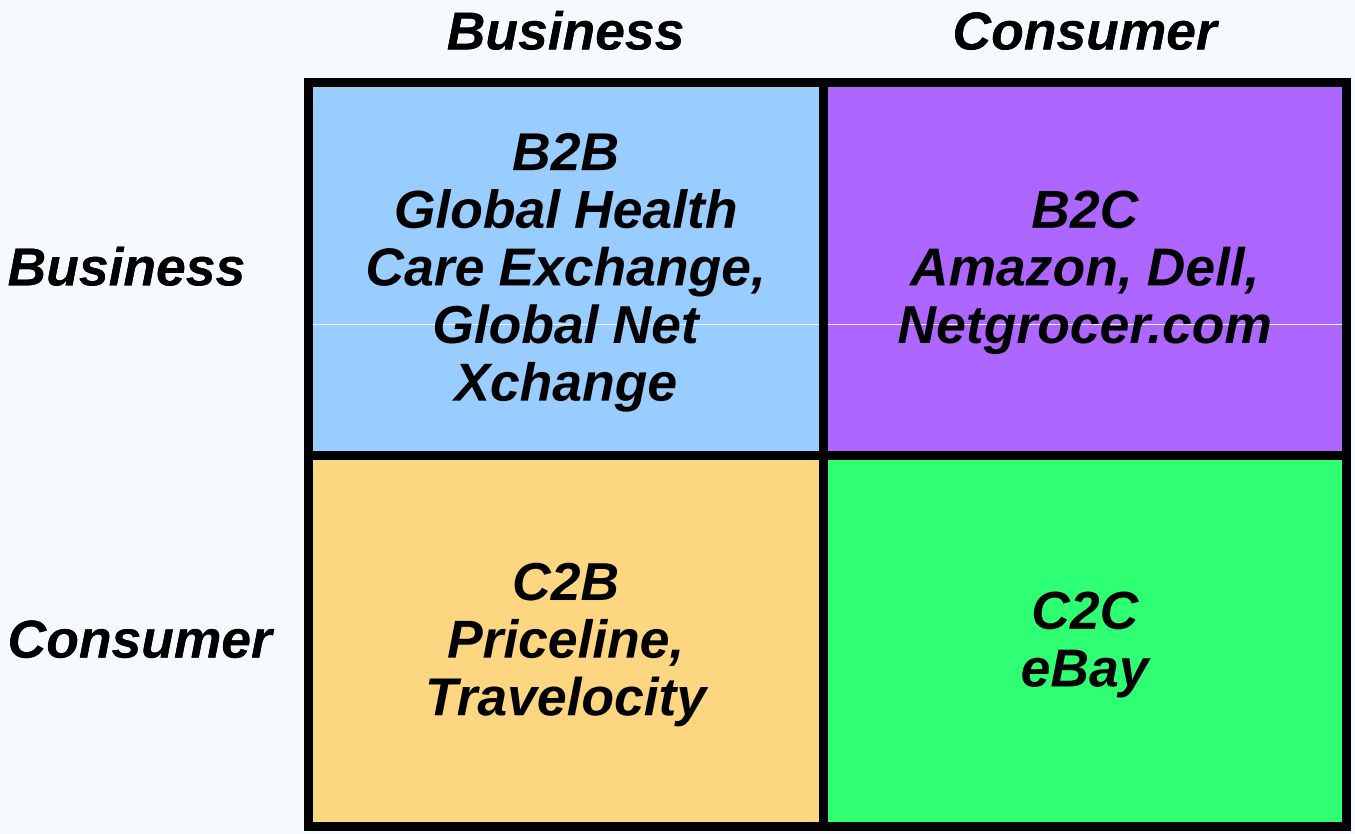

Figure S11.1

Economics of E-Commerce

- ☑ *Biaya pertukaran informasi yang dikurangi drastis*
- ☑ *Hambatan untuk masuk lebih rendah*
- ☑ *Kendala waktu hampir hilang*
- ☑ *Informasi dan komunikasi murah dan mudah*

Types of Information

- ☑ *Product — drawings, specifications, video, or simulation demonstrations, prices*
- ☑ *Production Processes — capacities, commitments, product plans*
- ☑ *Transportation — carrier availability, lead times, costs*
- ☑ *Inventory — inventory tracking, levels, costs, and location*

Table S11.1

Types of Information

- ☑ ***Suppliers — product catalog, quality history, lead times, terms, and conditions***
- ☑ ***Supply Chain Alliances — key contact, partners' roles and responsibilities, schedules***
- ☑ ***Supply Chain Process and Performance — process descriptions, performance measures such as quality and delivery***

Table S11.1

Types of Information

- ☑ *Competitor — benchmarking, product offerings, market share*
- ☑ *Sales and Marketing — point of sale (POS) data entry, promotions, pricing, discounts*
- ☑ *Customer — sales history and forecasts*
- ☑ *Costs — market indexes, auction results*

Table S11.1

Benefits and Limitations

Benefits of E-Commerce

- ☑ *Peningkatan, informasi rendah biaya yang membuat pembeli dan penjual lebih berpengetahuan memiliki kekuatan inheren untuk menurunkan biaya*
- ☑ *Biaya masuk yang lebih rendah meningkatkan berbagi informasi*
- ☑ *Tersedia 24 jam sehari, hampir setiap tempat di dunia, memungkinkan transaksi nyaman bagi mereka yang peduli*

Table S11.2

Benefits and Limitations

- ☑ *Ketersediaan memperluas pasar untuk kedua pembeli dan penjual*
- ☑ *Mengurangi biaya pembuatan, pengolahan, mendistribusikan, menyimpan, dan mengambil informasi berbasis kertas*
- ☑ *Mengurangi biaya komunikasi*
- ☑ *komunikasi Kaya dibanding kertas tradisional dan komunikasi telepon karena klip video, suara, dan demonstrasi*

Table S11.2

Benefits and Limitations

- ☑ *pengiriman Cepat produk digital seperti gambar, dokumen, dan software*
- ☑ *Peningkatan fleksibilitas lokasi. (Artinya, memungkinkan beberapa proses untuk ditempatkan di mana saja komunikasi elektronik dapat dibentuk, dan memungkinkan orang untuk berbelanja dan bekerja dari rumah.)*

Table S11.2

Benefits and Limitations

Limitations of E-Commerce

- ☑ *Kurangnya sistem keamanan, kehandalan, dan standar*
- ☑ *Kurangnya privasi*
- ☑ *Beberapa transaksi masih agak lambat*
- ☑ *Mengintegrasikan e-commerce perangkat lunak dengan perangkat lunak yang ada dan database masih merupakan tantangan*

Table S11.2

Benefits and Limitations

- ☑ *Kurangnya kepercayaan dalam (1) integritas mereka di ujung lain dari suatu transaksi, (2) integritas dari transaksi itu sendiri, dan (3) uang elektronik yang hanya bit dan byte*

Security and risk are major factors in E-commerce

Table S11.2

Product Design

- ☑ *Mudah berbagi pengetahuan dan informasi memungkinkan siklus biaya yang lebih rendah lebih cepat dan desain yang dapat melibatkan peserta dalam lokasi yang beragam*
- ☑ *Data produk dapat dikelola melalui Internet*
- ☑ *Rekayasa perubahan dan manajemen konfigurasi dapat diperpanjang sepanjang rantai pasokan*

Collaborative Project Management

- ☑ ***Perangkat lunak manajemen proyek memungkinkan untuk membangun situs intranet untuk berbagi dokumen dan mempertahankan laporan status***
- ☑ ***Intranet juga dapat digunakan untuk perpustakaan dokumen***

E-Procurement

- ☑ *Purchasing or order release communicated over the Internet*
- ☑ *Online catalogs allow quicker cost comparisons and bidding processes*
- ☑ *Catalogs can be provided by*
  - ☑ *Vendors*
  - ☑ *Intermediaries*
  - ☑ *Buyers*

Online Catalogs

- ☑ *Vendor catalogs provide quick and easy access to the entire product line*
- ☑ *Available to anyone with Internet access*
- ☑ *Quick and easy to customize and adjust*
- ☑ *Reduced paper trails reduce purchasing costs*

Online Catalogs

- ☑ *Katalog Perantara memfasilitasi pembeli dan penjual bertemu*
- ☑ *Pembeli dapat menemukan beberapa penjual di satu situs*
- ☑ *Pembeli berfokus pada pertukaran memungkinkan kelompok perusahaan bergabung bersama untuk membeli dalam jumlah yang lebih besar dan lebih efisien daripada jika mereka bekerja secara independen*

Internet Trading Exchanges

Retail goods — setup by Sears and France's Carrefour; called GlobalNetXchange for retailers (gnx.com)

Health care products — set up by Johnson & Johnson, GE Medical systems, Baxter International, Abbott Laboratories, and Medtronic Inc; called the Global Heath Care Exchange (ghx.com)

Table S11.3

Medical Supply Chain

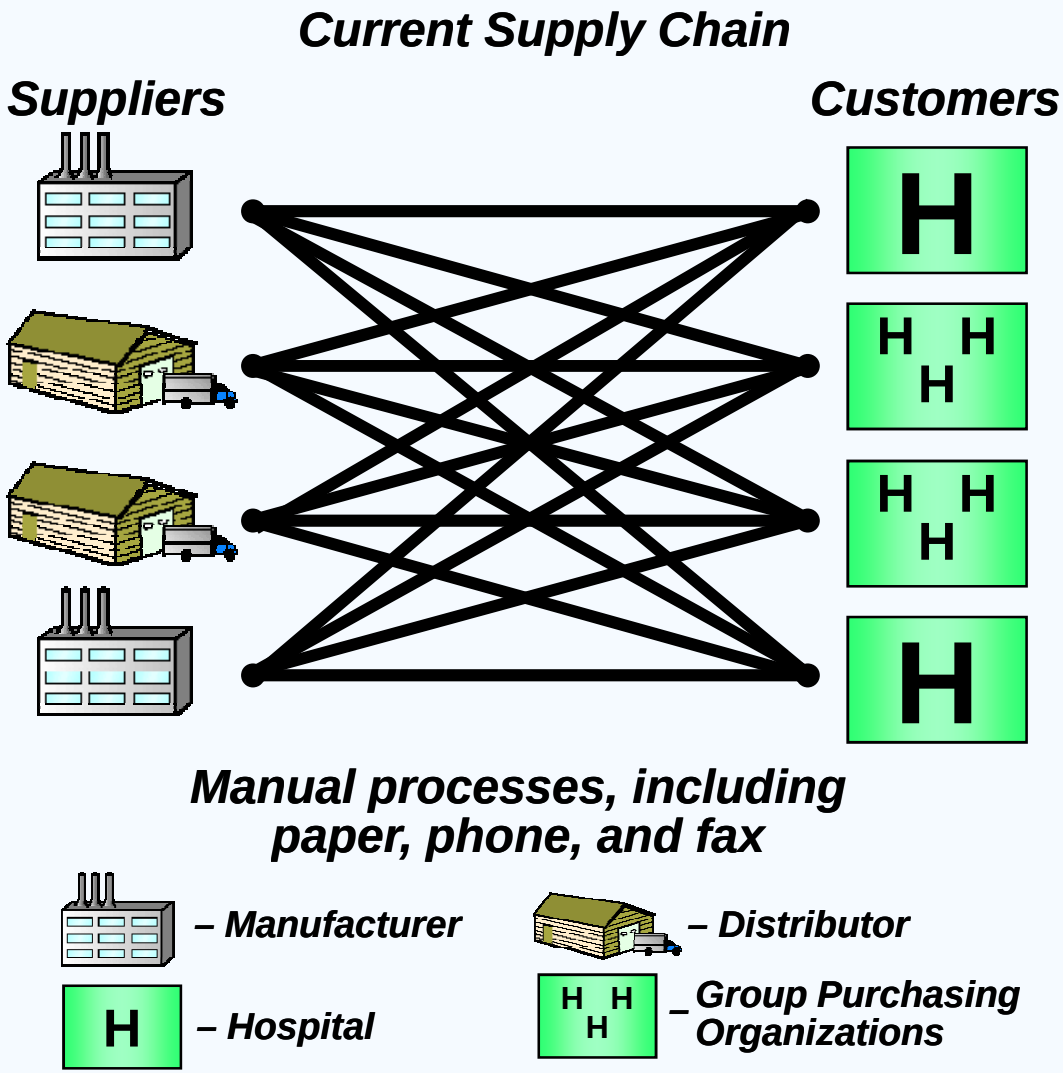

Figure S11.2

Medical Supply Chain

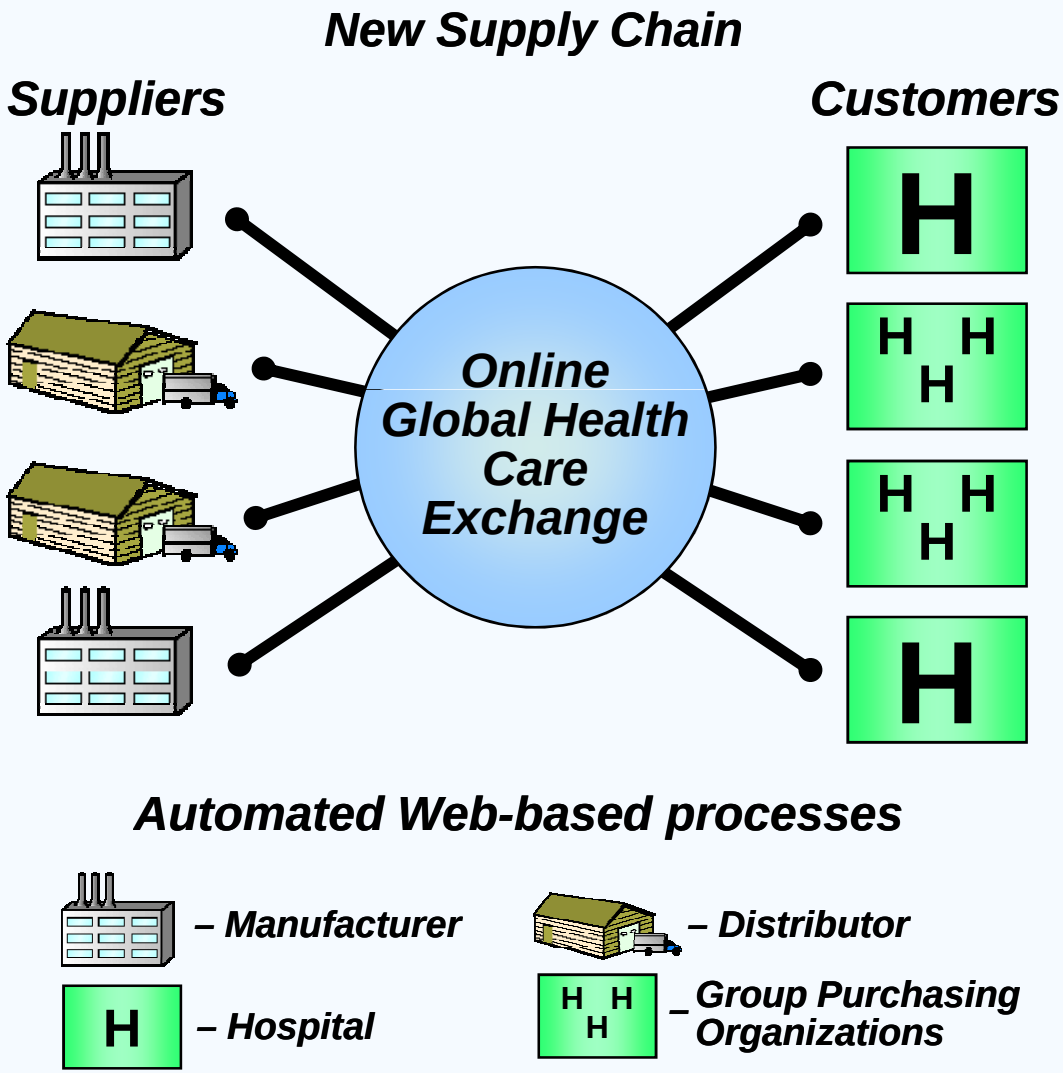

Figure S11.2

E-Procurement

- ☑ *Request For Quotes and Bid Packaging*
  - ☑ *Database of history improves vendor selection*
  - ☑ *Electronic files speed decisions*
  - ☑ *System is faster and less expensive*
- ☑ *Internet Outsourcing*
  - ☑ *Outsourcing support systems like payroll, accounting, human resources, and travel*

E-Procurement

- ☑ *Online Auctions*
  - ☑ *Maintained by buyers, sellers, or intermediaries*
  - ☑ *May be used to sell excess raw material or discontinued or excess inventory*
  - ☑ *Low cost and increased access to buyers*

Inventory Tracking

- ***Technologies like bar code scanners, radio frequency, electronic communications can be ¤sed by almost any firm to track inventory in transit, on the shop floor, or in a warehouse***

Inventory Reduction

- ☑ *Warehousing for E-Commerce*
  - ☑ *Managed by a logistics vendor*
  - ☑ *Pass-through facility rather than storage*
- ☑ *Just-in-Time Delivery for E-Commerce*
  - ☑ *E-commerce can improve communication and coordination*
  - ☑ *E-commerce service companies manage complex transactions*

Scheduling and Logistics Improvements

- ☑ *Coordinated Pickup and Delivery*
  - ☑ *Unified view of data*
  - ☑ *Shipments can be merged in transit*
  - ☑ *Reduced inventory and delays mean lower costs*
- ☑ *Logistics Cost Reduction*
  - ☑ *Carriers with unused capacity can find loads through Internet sites*
  - ☑ *Logistics efficiency improves and costs are reduced*

Operations Management

Project Management

PowerPoint presentation to accompany
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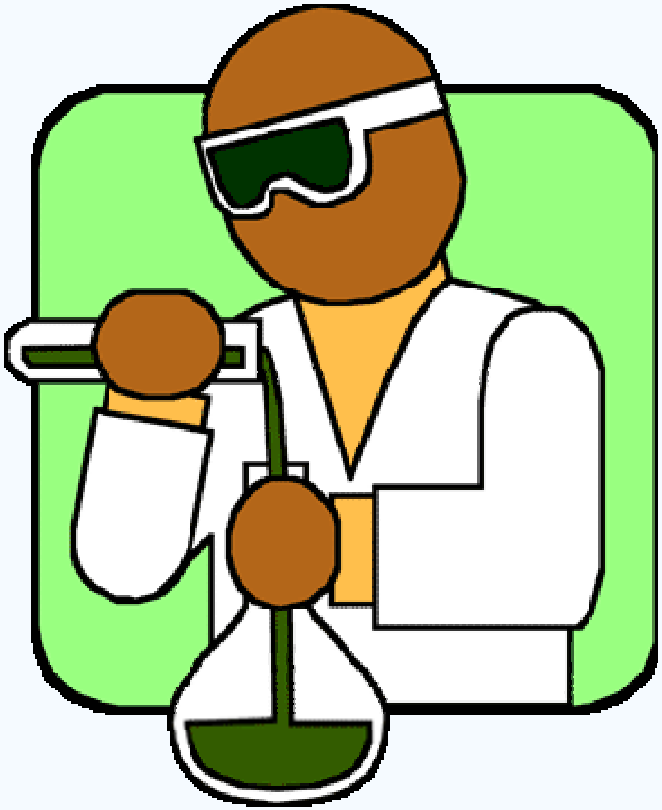
Project Characteristics

- ☑ ***Single unit***
- ☑ ***Many related activities***
- ☑ ***Difficult production planning and inventory control***
- ☑ ***General purpose equipment***
- ☑ ***High labor skills***

Examples of Projects

☑ ***Building Construction***



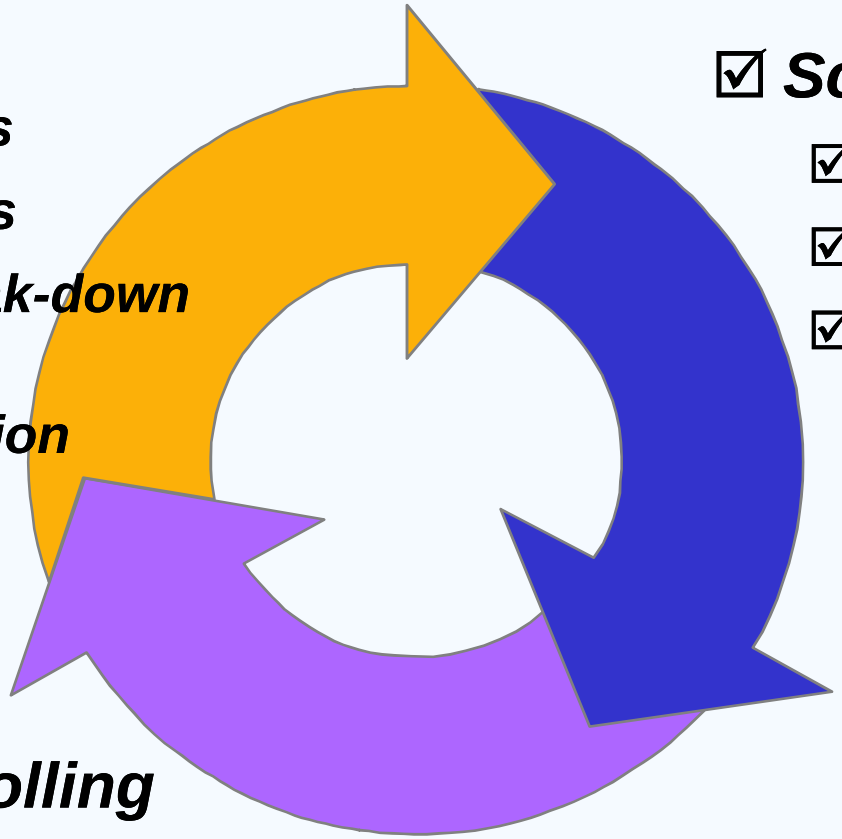
☑ ***Research Project***

Management of Projects

1. ***Planning*** *- goal setting, defining the project, team organization*
2. ***Scheduling*** *- relates people, money, and supplies to specific activities and activities to each other*
3. ***Controlling*** *- monitors resources, costs, quality, and budgets; revises plans and shifts resources to meet time and cost demands*

Project Management Activities

- ☑ *Planning*
  - ☑ *Objectives*
  - ☑ *Resources*
  - ☑ *Work break-down schedule*
  - ☑ *Organization*
- ☑ *Scheduling*
  - ☑ *Project activities*
  - ☑ *Start & end times*
  - ☑ *Network*



- ☑ *Controlling*
  - ☑ *Monitor, compare, revise, action*

Project Planning, Scheduling, and Controlling

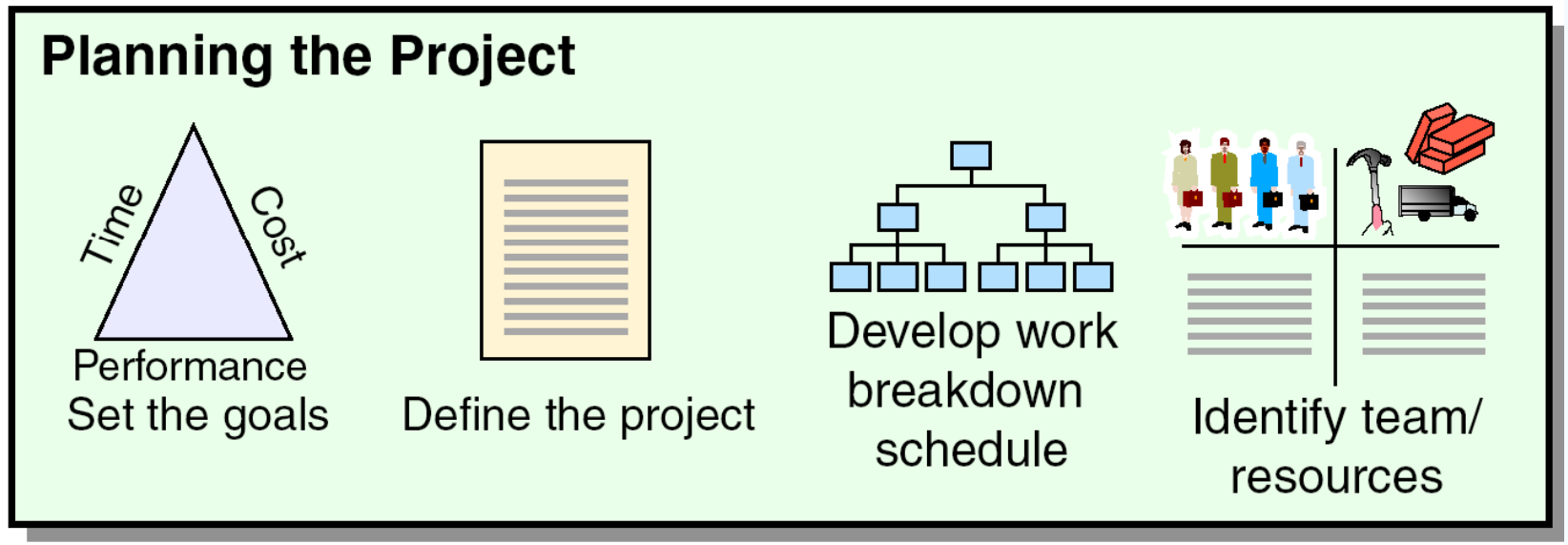


Figure 3.1

Before project	*Start of project*	*During project*
	Timeline	

Project Planning, Scheduling, and Controlling

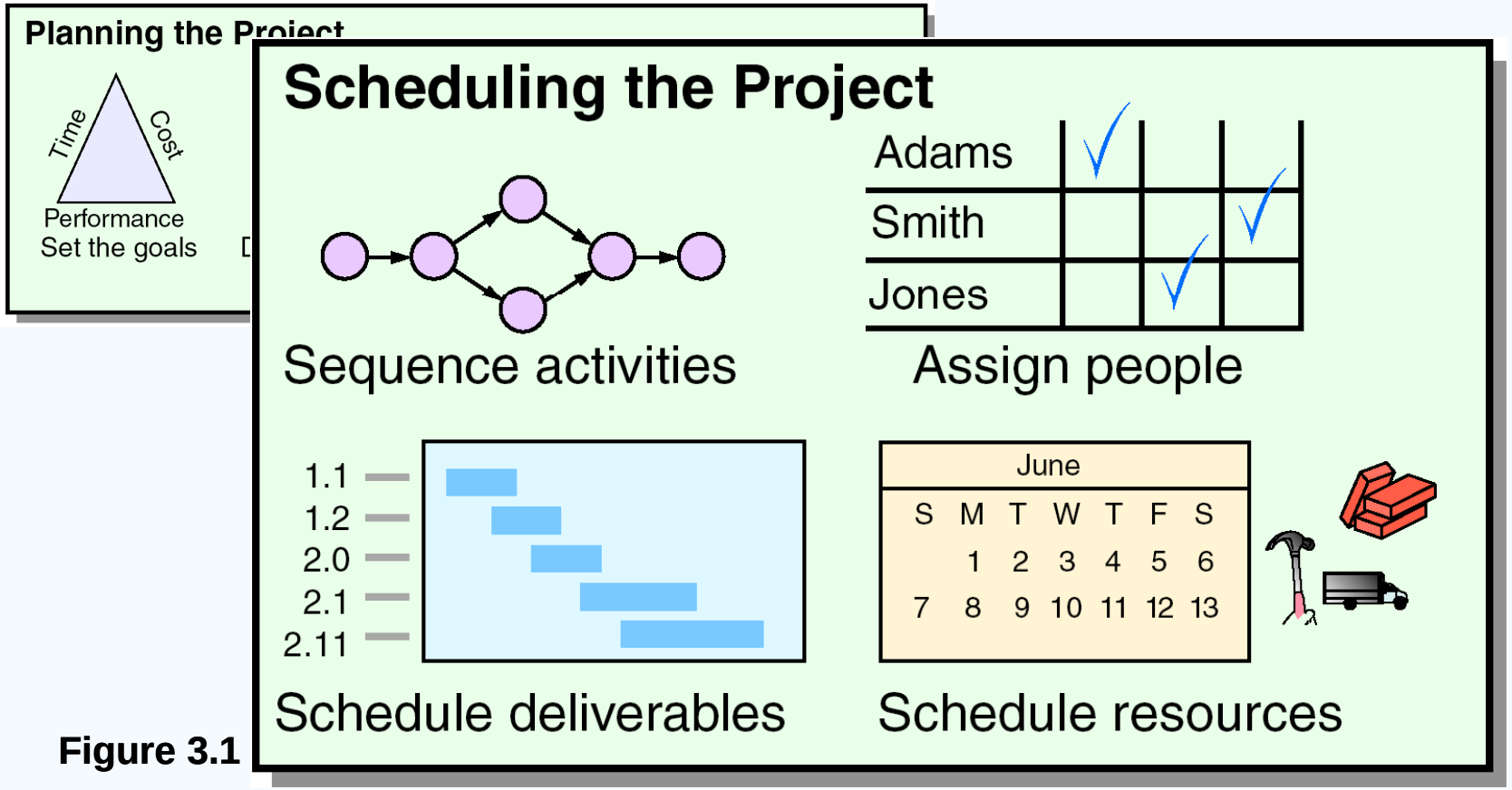


Figure 3.1

Before project	*Start of project*	*During project*
	Timeline	

Project Planning, Scheduling, and Controlling

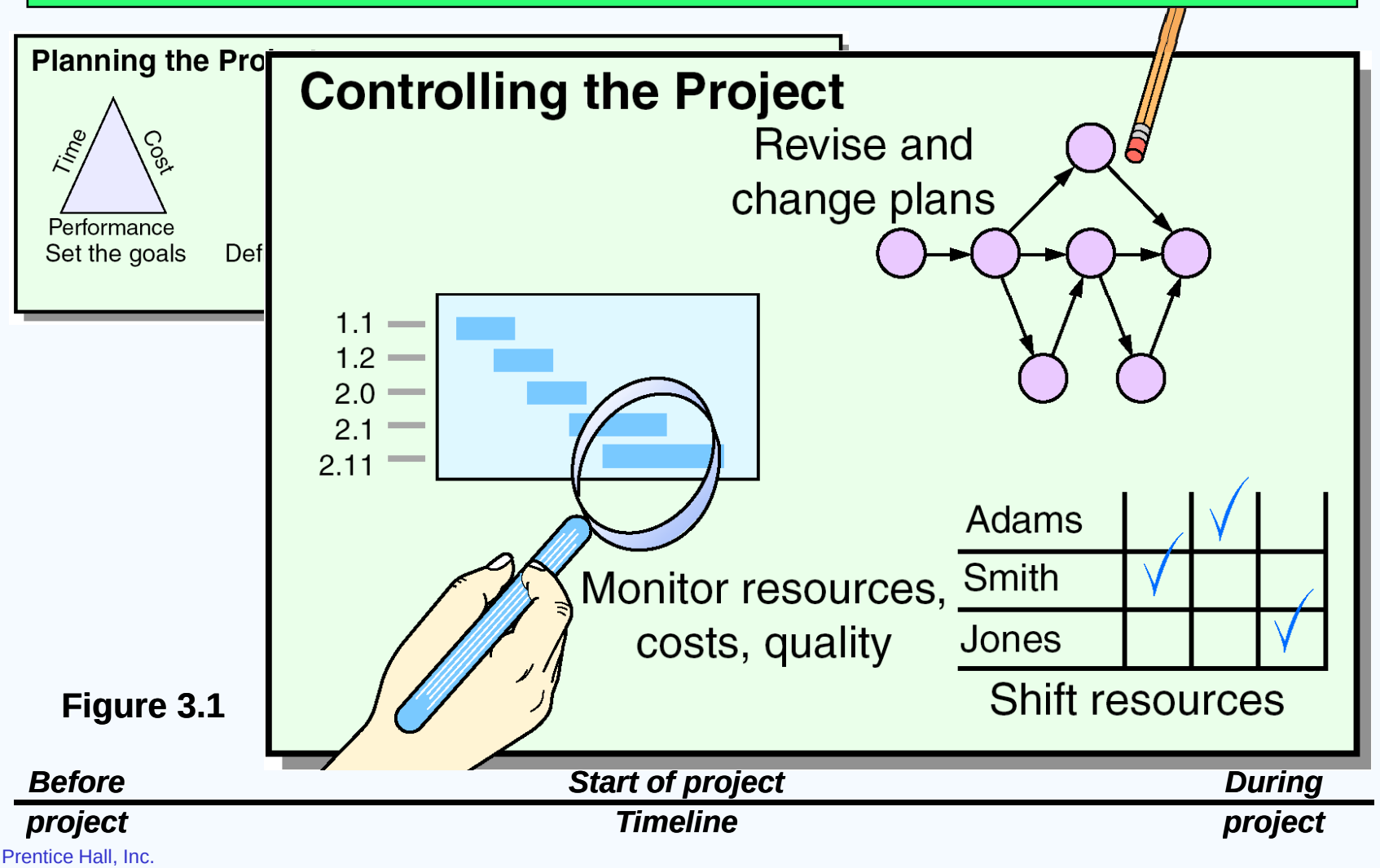


Figure 3.1

Project Planning, Scheduling, and Controlling

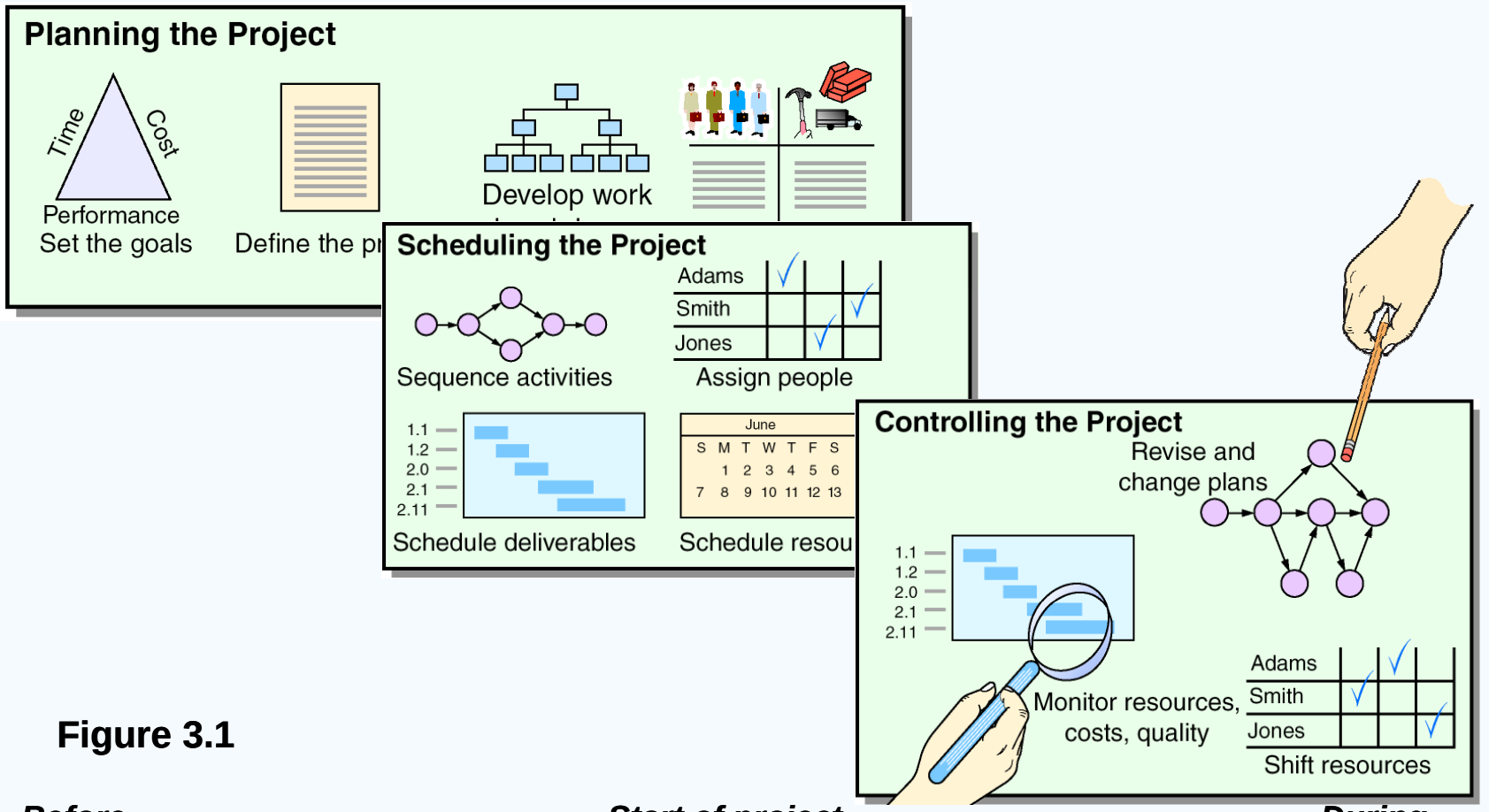


Figure 3.1

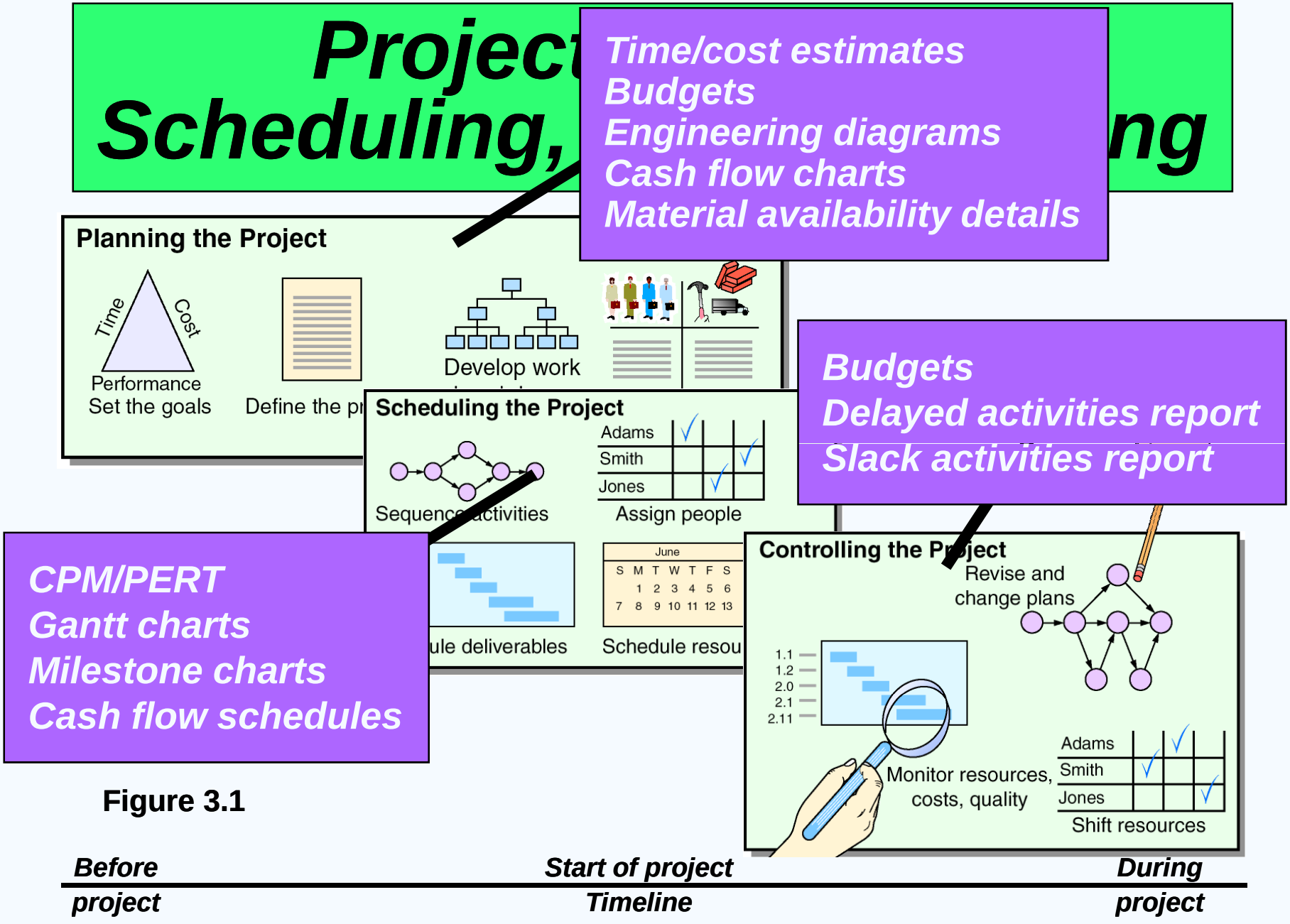
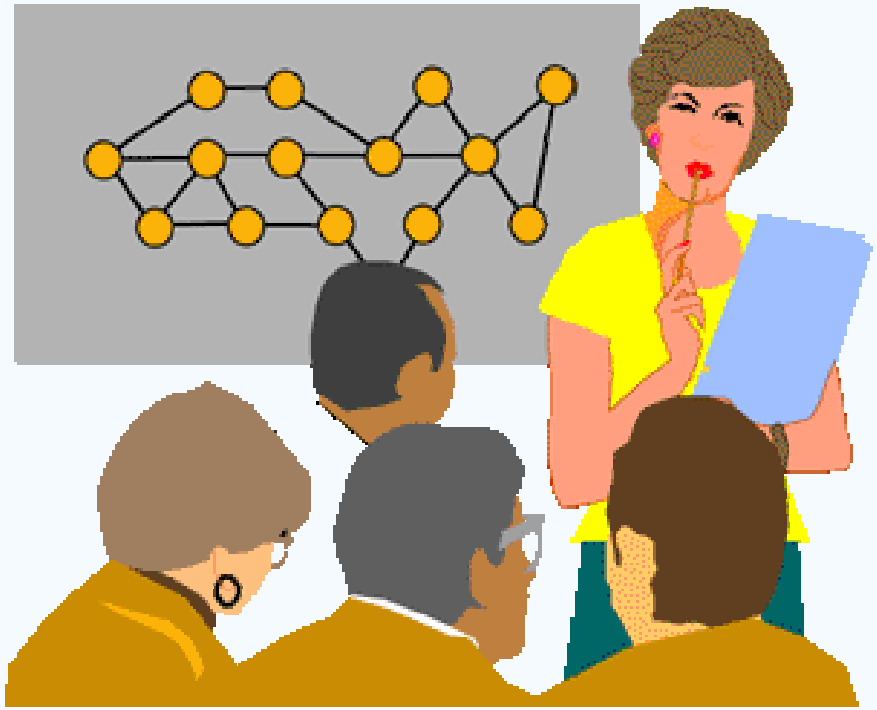


Figure 3.1

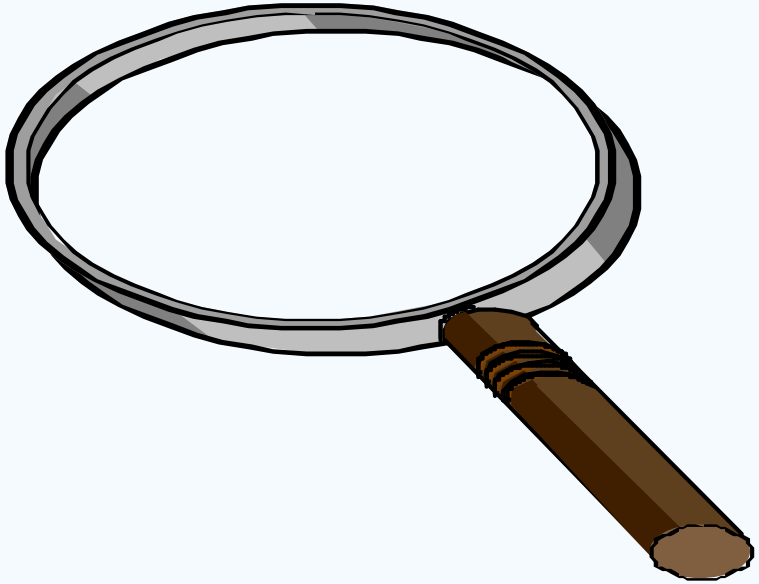
Project Planning

- ☑ *Establishing objectives*
- ☑ *Defining project*
- ☑ *Creating work breakdown structure*
- ☑ *Determining resources*
- ☑ *Forming organization*



Project Organization

- ☑ *Often temporary structure*
- ☑ *Uses specialists from entire company*
- ☑ *Headed by project manager*
  - ☑ *Coordinates activities*
  - ☑ *Monitors schedule and costs*
- ☑ *Permanent structure called 'matrix organization'*



A Sample Project Organization

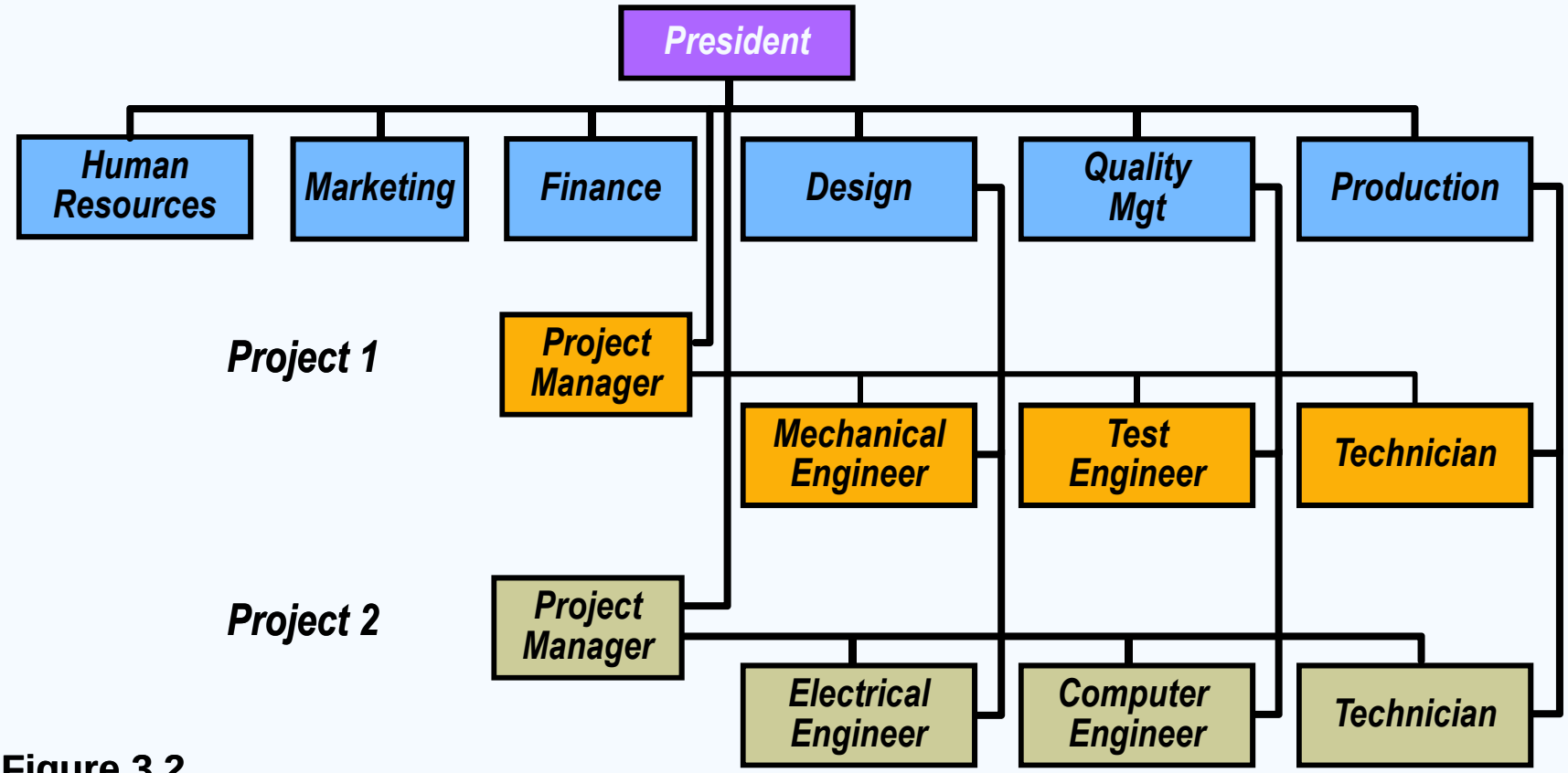
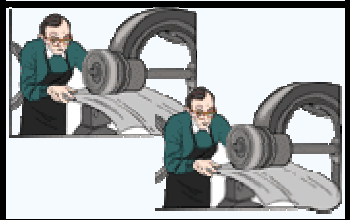
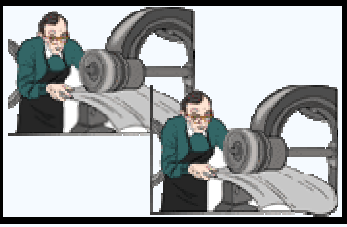


Figure 3.2

Project Organization Works Best When

1. *Pekerjaan dapat didefinisikan dengan tujuan spesifik dan batas waktu*
2. *Pekerjaan ini unik atau agak asing bagi organisasi yang ada*
3. *Pekerjaan mengandung tugas-tugas kompleks yang saling terkait yang memerlukan keterampilan khusus*
4. *Proyek ini sementara tetapi penting untuk organisasi*
5. *Proyek melibatkan seluruh lini organisasi*

Matrix Organization

	Marketing	Operations	Engineering	Finance
Project 1				
Project 2				
Project 3				
Project 4				

The Role of the Project Manager

Sangat terlihat

Bertanggung jawab untuk memastikan bahwa:

- ☑ ***Semua kegiatan yang diperlukan sudah selesai dalam rangkaian dan tepat waktu***
- ☑ ***Proyek ini sesuai anggaran***
- ☑ ***Proyek itu memenuhi tujuan kualitas***
- ☑ ***Orang-orang yang ditugaskan untuk proyek tersebut menerima motivasi, arah, dan informasi***

The Role of the Project Manager

Sangat terlihat
Bertanggung jaw

- ☑ ***Semua kegiatan***
  selesai dalam r
- ☑ ***Proyek ini sesu***
- ☑ ***Proyek itu mem***
- ☑ ***Orang-orang yang ditugaskan untuk proyek tersebut menerima motivasi, arah, dan informasi***

Project managers should be:

- ☑ ***Good coaches***
- ☑ ***Good communicators***
- ☑ ***Able to organize activities from a variety of disciplines***

Ethical Issues

- ☑ ***Bid rigging – divulging confidential information to give some bidders an unfair advantage***
- ☑ ***"Low balling" contractors – try to "buy" the project by bidding low and hope to renegotiate or cut corners***
- ☑ ***Bribery – particularly on international projects***
- ☑ ***Expense account padding***
- ☑ ***Use of substandard materials***
- ☑ ***Compromising health and safety standards***
- ☑ ***Withholding needed information***
- ☑ ***Failure to admit project failure at close***

Project Scheduling

- ☑ *Mengidentifikasi hubungan antar kegiatan*
- ☑ *Mengurutkan kegiatan*
- ☑ *Menentukan waktu aktivitas & biaya*
- ☑ *Memperkirakan kebutuhan bahan & pekerja*
- ☑ *Menentukan kegiatan kritis*

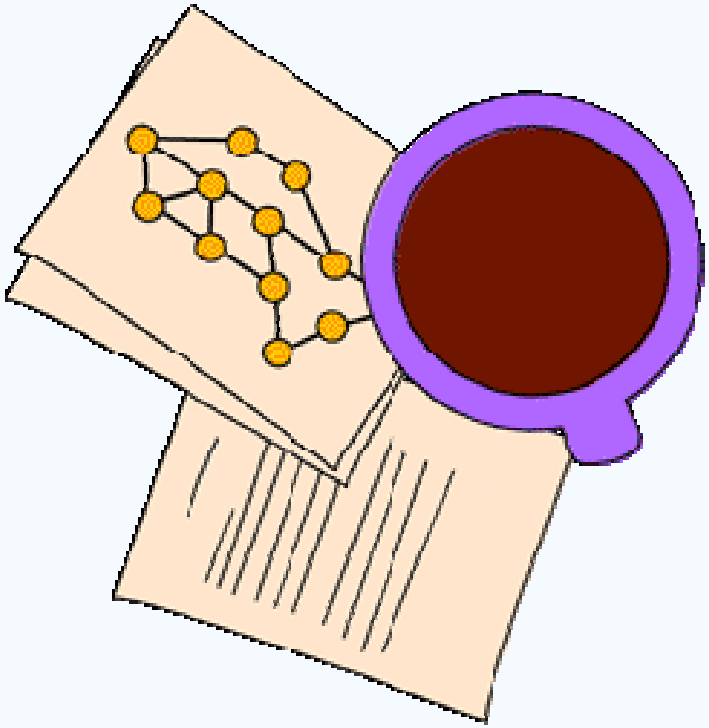
Purposes of Project Scheduling

1. *Menunjukkan hubungan masing-masing kegiatan kepada orang lain dan untuk keseluruhan proyek*
2. *Mengidentifikasi hubungan didahulukan/prioritas di antara kegiatan*
3. *Mendorong pengaturan waktu yang realistis dan perkiraan biaya untuk setiap kegiatan*
4. *Membantu membuat lebih baik menggunakan orang, uang, dan sumber daya materi dengan mengidentifikasi hambatan penting dalam proyek*

Scheduling Techniques

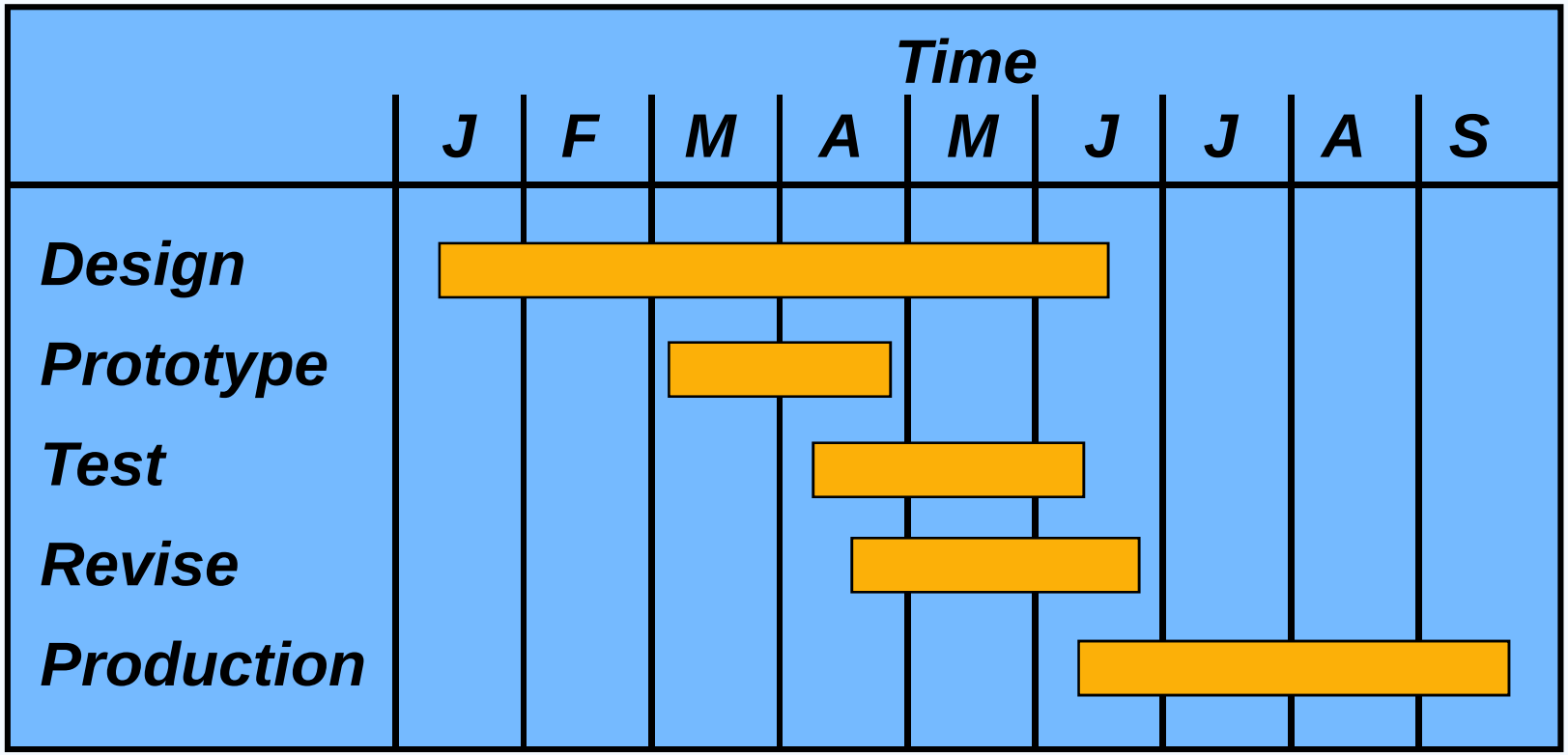
1. Pastikan bahwa semua kegiatan direncanakan
2. Urutan kinerja dicatat
3. estimasi waktu Kegiatan dicatat
4. Waktu proyek secara keseluruhan dikembangkan

Project Management Techniques



- ☑ *Gantt chart*
- ☑ *Critical Path Method (CPM)*
- ☑ *Program Evaluation and Review Technique (PERT)*

A Simple Gantt Chart



Service For A Delta Jet

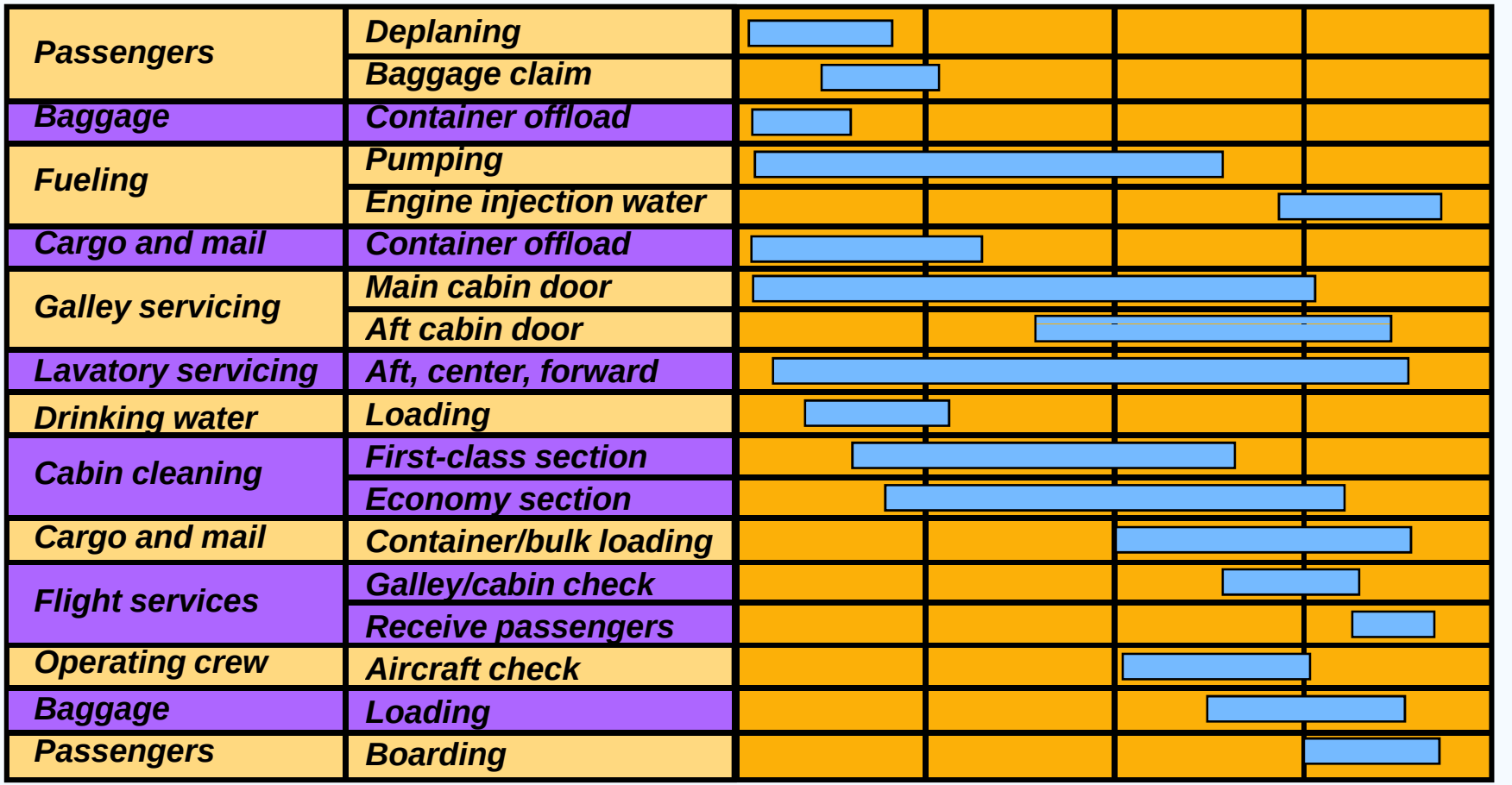


Figure 3.4

Project Control Reports

- ☑ *Detil biaya untuk masing-masing tugas*
- ☑ *kurva Program kerja total*
- ☑ *tabel Biaya distribusi*
- ☑ *biaya Fungsional dan ringkasan waktu*
- ☑ *Bahan baku dan prakiraan pengeluaran*
- ☑ *laporan Varians*
- ☑ *laporan analisis Waktu*
- ☑ *laporan status Pekerjaan*

PERT and CPM

- ☑ *Network techniques*
- ☑ *Developed in 1950's*
  - ☑ *CPM by DuPont for chemical plants (1957)*
  - ☑ *PERT by Booz, Allen & Hamilton with the U.S. Navy, for Polaris missile (1958)*
- ☑ *Consider precedence relationships and interdependencies*
- ☑ *Each uses a different estimate of activity times*

Questions PERT & CPM Can Answer

1. *kapan seluruh proyek akan selesai?*
2. *Apa kegiatan penting atau tugas dalam proyek?*
3. *Mana kegiatan noncritical?*
4. *Berapa probabilitas proyek akan selesai pada waktu tertentu?*

Questions PERT & CPM Can Answer

5. *Apakah proyek sesuai jadwal, di belakang jadwal, atau lebih cepat dari jadwal?*
6. *Apakah uang yang dihabiskan sama dengan, kurang dari, atau lebih besar dari anggaran?*
7. *Apakah sumber daya yang ada cukup tersedia untuk menyelesaikan proyek tepat waktu?*
8. *Jika proyek harus selesai dalam waktu yang lebih singkat, bagaimana cara untuk mencapai hal ini dengan biaya minimal?*

Advantages of PERT/CPM

1. *Terutama berguna ketika penjadwalan dan pengendalian proyek-proyek besar*
2. *konsep Langsung dan bukan matematis yang kompleks*
3. *Jaringan grafis membantu hubungan antara kegiatan proyek*
4. *Jalur Kritis dan analisis pengenduran waktu membantu menentukan kegiatan yang perlu diawasi ketat*

Advantages of PERT/CPM

5. *dokumentasi Proyek dan grafis menunjukkan siapa yang bertanggung jawab untuk berbagai kegiatan*
6. *Berlaku untuk berbagai proyek*
7. *Berguna dalam memantau tidak hanya jadwal namun juga biaya*

Limitations of PERT/CPM

1. *Kegiatan proyek harus jelas, independen, dan stabil dalam hubungan mereka*
2. *hubungan Precedence harus ditentukan dan dihubungkan bersama-sama*
3. *Estimasi waktu cenderung subyektif dan manajer dapat berpotensi membuat kecurangan*
4. *Ada bahaya dari terlalu banyak penekanan ditempatkan pada jalur terpanjang atau kritis,*

Project Management Software

- ☑ *There are several popular packages for managing projects*
  - ☑ *Primavera*
  - ☑ *MacProject*
  - ☑ *Pertmaster*
  - ☑ *VisiSchedule*
  - ☑ *Time Line*
  - ☑ *Microsoft Project*

Operations Management

Quality Function Deployment

The Problem

- Engineers and customers often speak different languages
- What the customer wants is translated into technical specifications
- What is actually wanted by the customer can be lost through out the R&D and Production Process

The Solution

- QFD [Quality function deployment]
- Customer driven planning process
  - Continual focus on the customer guides:
    - Design process
    - Design of production systems
    - Research and development
    - Manufacturing
    - Marketing

History of QFD

- Developed 1960s in Japan
- First Industrial application
  - Mitsubishi's Kobe shipyard
- Toyota developed the concept further shortly after.
  - In use since 1977 at Toyota
- Xerox and Ford initiated use of QFD in 1986
- Today used successfully by:
  - GM, Motorola, Kodak, IBM, Procter&Gamble

Toyota's Success

- January 1977 to October 1979
  - 20% reduction of start-up cost on a new model van
- By 1982
  - Start-up cost reduced by 38%
- At 1984 comparing the baseline to 1977
  - Start-up cost reduced by 61%

Creative Definitions of QFD

- A systematic way of documenting and breaking down customer needs into manageable and actionable detail.
- A planning methodology that organizes relevant information to facilitate better decision making.
- A way of reducing the uncertainty involved in product and process design.
- A technique that promotes cross-functional teamwork.
- A methodology that gets the right people together, early, to work efficiently and effectively to meet customers' needs.

Four characters of QFD:

1.

- QFD is a quality system that implements elements of Systems Thinking (viewing the development process as a system) and Psychology (understanding customer needs, what 'value' is, and how customers or end users become interested, choose, and are satisfied, etc.).

2.

- QFD is a quality method of good Knowledge (how do we know the needs of the customer? how do we decide what features to include? and to what level of performance?)

3.

- QFD is a quality system for strategic competitiveness; it maximizes positive quality that adds value; it seeks out spoken and unspoken customer requirements, translate them into technical requirements, prioritize them and directs us to optimize those features that will bring the greatest competitive advantage.

4.

- Quality Function Deployment (QFD) is the only comprehensive quality system aimed specifically at satisfying the customer throughout the development and business process -- end to end.

How To Build a House of Quality

- Six Steps
  1. Identify customer requirements
  2. Identify technical requirements
  3. Relate the customer requirements to the technical requirements
  4. Conduct an evaluation of competing products or services
  5. Evaluate technical requirements and develop targets
  6. Determine which technical requirements to deploy in the remainder of the production / delivery process

Operations Management

Forecasting

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What is Forecasting?

- ☑ *Process of predicting a future event*
- ☑ *Underlying basis of all business decisions*
  - ☑ *Production*
  - ☑ *Inventory*
  - ☑ *Personnel*
  - ☑ *Facilities*

Forecasting Time Horizons

- ☑ ***Short-range forecast***
  - ☑ ***Up to 1 year, generally less than 3 months***
  - ☑ ***Purchasing, job scheduling, workforce levels, job assignments, production levels***
- ☑ ***Medium-range forecast***
  - ☑ ***3 months to 3 years***
  - ☑ ***Sales and production planning, budgeting***
- ☑ ***Long-range forecast***
  - ☑ ***3^+ years***
  - ☑ ***New product planning, facility location, research and development***

Distinguishing Differences

- ☑ ***Medium/long range*** ***forecasts berkaitan dg permasalahan yg lebih menyeluruh dan mendukung keputusan manajemen yg berkaitan dg perencanaan produk, pabrik dan proses***
- ☑ ***Short-term*** ***forecasting biasanya menerapkan metode yg berbeda dibandingkan peramalan jk panjang***
- ☑ ***Short-term*** ***forecasts tend to be more accurate than longer-term forecasts***

Influence of Product Life Cycle

Introduction – Growth – Maturity – Decline

- ☑ *Introduction and growth require longer forecasts than maturity and decline*
- ☑ *As product passes through life cycle, forecasts are useful in projecting*
  - ☑ *Staffing levels*
  - ☑ *Inventory levels*
  - ☑ *Factory capacity*

Product Life Cycle

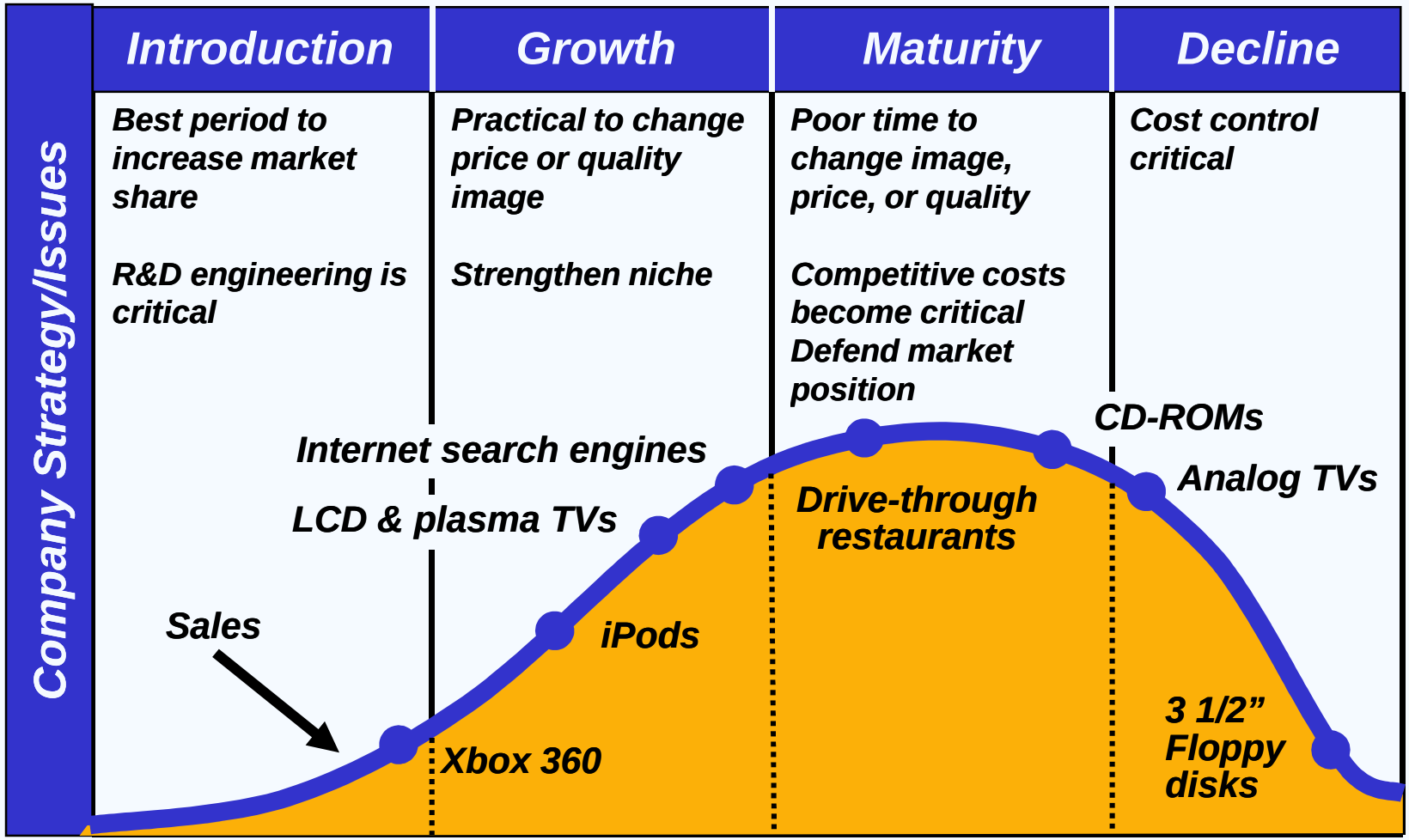


Figure 2.5

Types of Forecasts

- ☑ *Economic forecasts*
  - ☑ *Address business cycle – inflation rate, money supply, housing starts, etc.*
- ☑ *Technological forecasts*
  - ☑ *Predict rate of technological progress*
  - ☑ *Impacts development of new products*
- ☑ *Demand forecasts*
  - ☑ *Predict sales of existing products and services*

Strategic Importance of Forecasting

- ☑ ***Human Resources – Hiring, training, laying off workers***
- ☑ ***Capacity – Capacity shortages can result in undependable delivery, loss of customers, loss of market share***
- ☑ ***Supply Chain Management – Good supplier relations and price advantages***

Seven Steps in Forecasting

- ☑ *Determine the use of the forecast*
- ☑ *Select the items to be forecasted*
- ☑ *Determine the time horizon of the forecast*
- ☑ *Select the forecasting model(s)*
- ☑ *Gather the data*
- ☑ *Make the forecast*
- ☑ *Validate and implement results*

The Realities!

- ☑ ***Forecasts are seldom perfect***
- ☑ ***Most techniques assume an underlying stability in the system***
- ☑ ***Product family and aggregated forecasts are more accurate than individual product forecasts***

Forecasting Approaches

Qualitative Methods

- ☑ *Used when situation is vague and little data exist*
  - ☑ *New products*
  - ☑ *New technology*
- ☑ *Involves intuition, experience*
  - ☑ *e.g., forecasting sales on Internet*

Forecasting Approaches

Quantitative Methods

- ☑ *Used when situation is 'stable' and historical data exist*
  - ☑ *Existing products*
  - ☑ *Current technology*
- ☑ *Involves mathematical techniques*
  - ☑ *e.g., forecasting sales of color televisions*

Overview of Qualitative Methods

- ☑ *Jury of executive opinion*
  - ☑ *Pendapat sekumpulan kecil manajer atau pakar tingkat tinggi dipadukan dg model statistik*
- ☑ *Delphi method*
  - ☑ *Terdiri dr decision maker,karyawan,dan responden.*

Overview of Qualitative Methods

- ☑ *Sales force composite*
  - ☑ *Estimates from individual salespersons are reviewed for reasonableness, then aggregated*
- ☑ *Consumer Market Survey*
  - ☑ *Ask the customer*

Jury of Executive Opinion

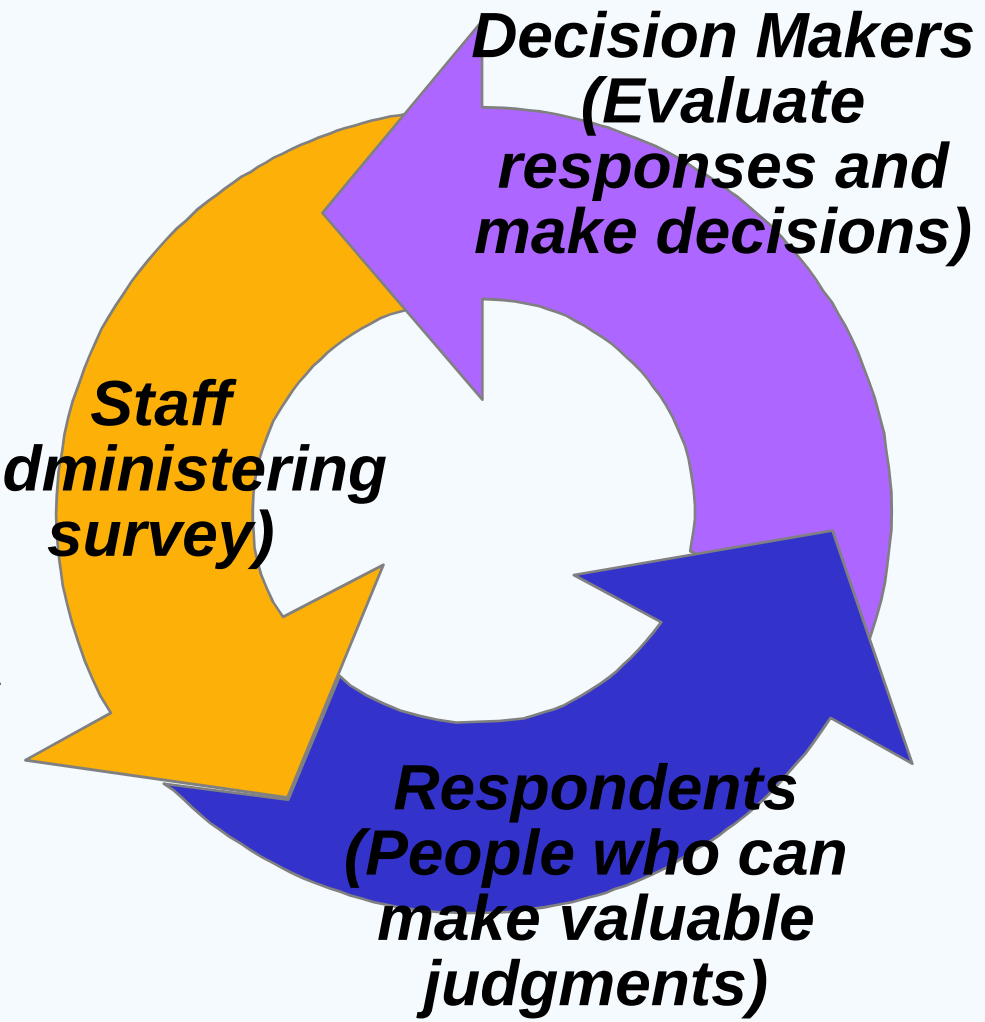
- ☑ *Involves small group of high-level experts and managers*
- ☑ *Group estimates demand by working together*
- ☑ *Combines managerial experience with statistical models*
- ☑ *Relatively quick*
- ☑ *'Group-think' disadvantage*

Sales Force Composite

- ☑ *Each salesperson projects his or her sales*
- ☑ *Combined at district and national levels*
- ☑ *Sales reps know customers' wants*
- ☑ *Tends to be overly optimistic*

Delphi Method

- ☑ *Iterative group process, continues until consensus is reached*
- ☑ *3 types of participants*
  - ☑ *Decision makers*
  - ☑ *Staff*
  - ☑ *Respondents*



Consumer Market Survey

- ☑ *Ask customers about purchasing plans*
- ☑ *What consumers say, and what they actually do are often different*
- ☑ *Sometimes difficult to answer*

Overview of Quantitative Approaches

1. Naive approach
2. Moving averages
3. Exponential smoothing
4. Trend projection

} Time-Series Models

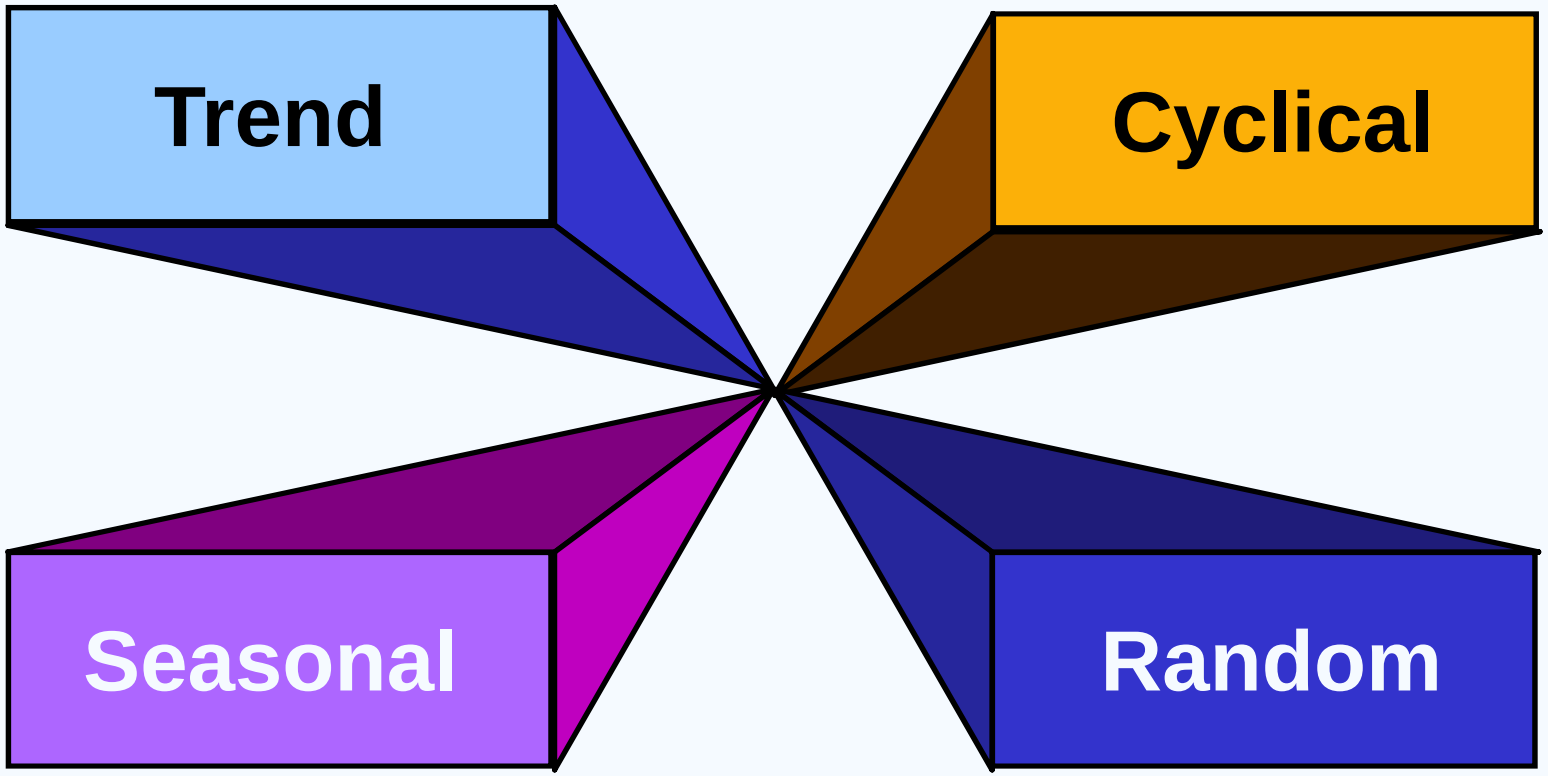
5. Linear regression

} Associative Model

Time Series Forecasting

- ☑ ***Set of evenly spaced numerical data***
  - ☑ ***Obtained by observing response variable at regular time periods***
- ☑ ***Forecast based only on past values, no other variables important***
  - ☑ ***Assumes that factors influencing past and present will continue influence in future***

Time Series Components



Components of Demand

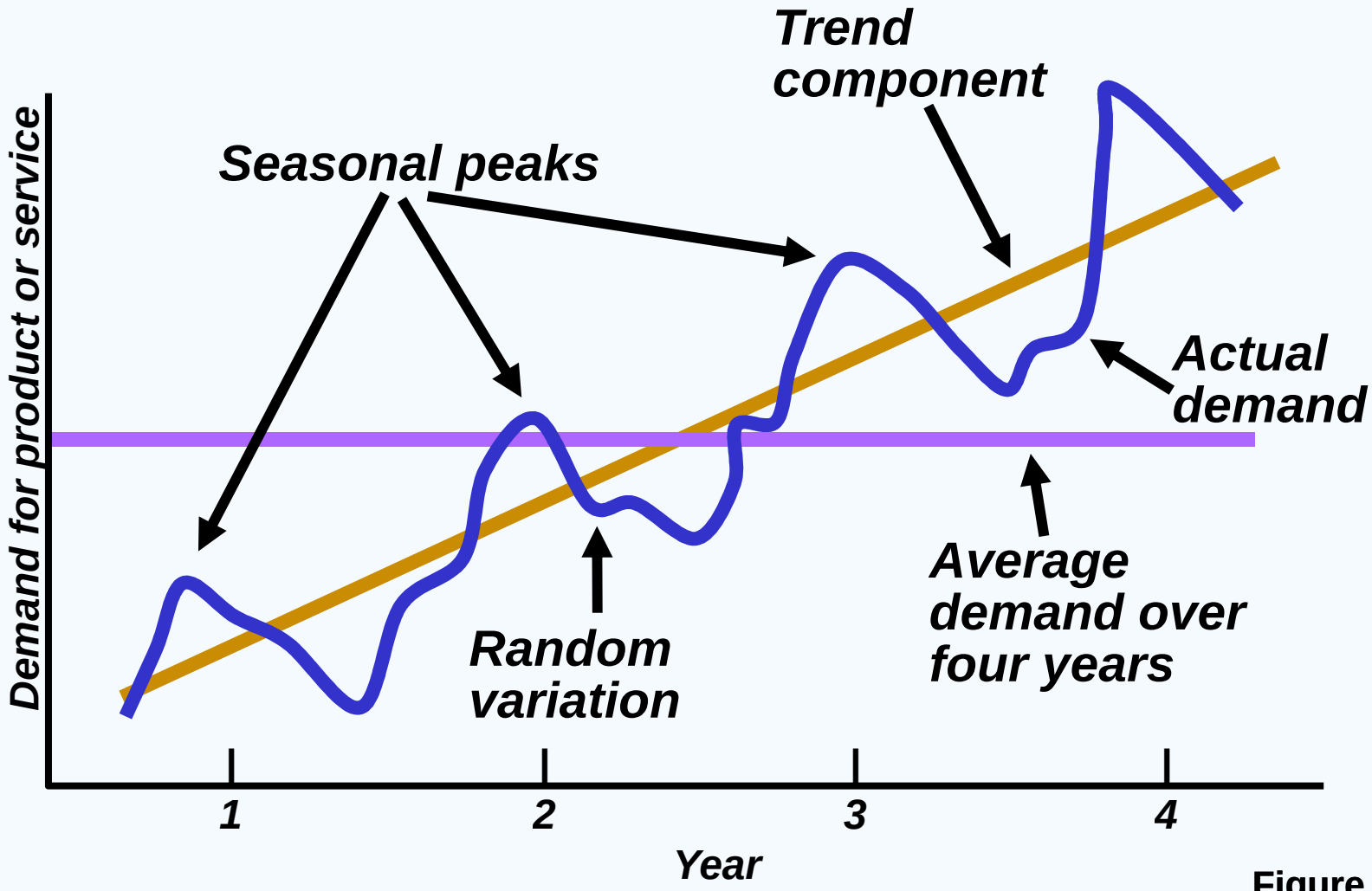
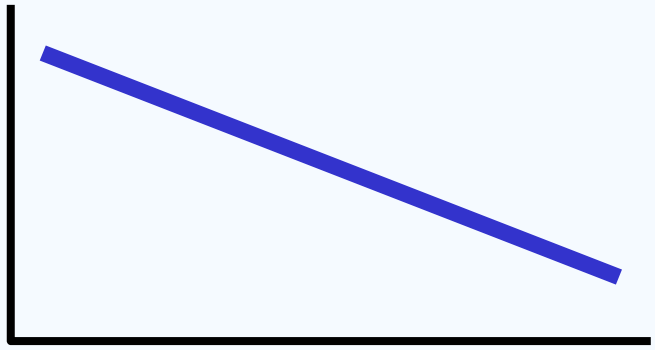


Figure 4.1

Trend Component

- ☑ *Persistent, overall upward or downward pattern*
- ☑ *Changes due to population, technology, age, culture, etc.*
- ☑ *Typically several years duration*



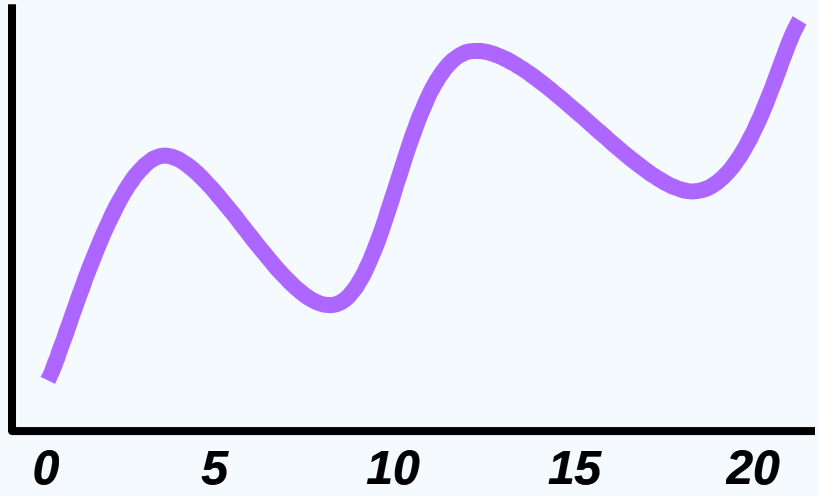
Seasonal Component

- ☑ *Regular pattern of up and down fluctuations*
- ☑ *Due to weather, customs, etc.*
- ☑ *Occurs within a single year*

Period	*Length*	*Number of Seasons*
Week	*Day*	7
Month	*Week*	4-4.5
Month	*Day*	28-31
Year	*Quarter*	4
Year	*Month*	12
Year	*Week*	52

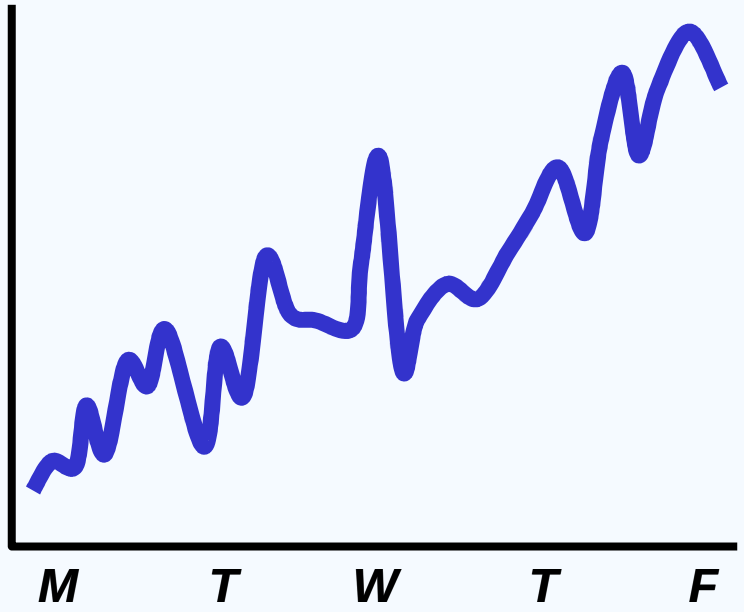
Cyclical Component

- ☑ *Repeating up and down movements*
- ☑ *Affected by business cycle, political, and economic factors*
- ☑ *Multiple years duration*
- ☑ *Often causal or associative relationships*



Random Component

- ☑ *Erratic, unsystematic, 'residual' fluctuations*
- ☑ *Due to random variation or unforeseen events*
- ☑ *Short duration and nonrepeating*



Naive Approach

- ☑ *Assumes demand in next period is the same as demand in most recent period*
  - ☑ *e.g., If January sales were 68, then February sales will be 68*
- ☑ *Sometimes cost effective and efficient*
- ☑ *Can be good starting point*

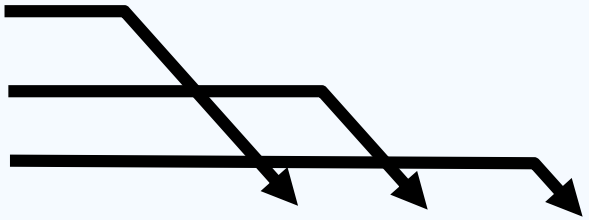
Moving Average Method

- ☑ *MA is a series of arithmetic means*
- ☑ *Used if little or no trend*
- ☑ *Used often for smoothing*
  - ☑ *Provides overall impression of data over time*

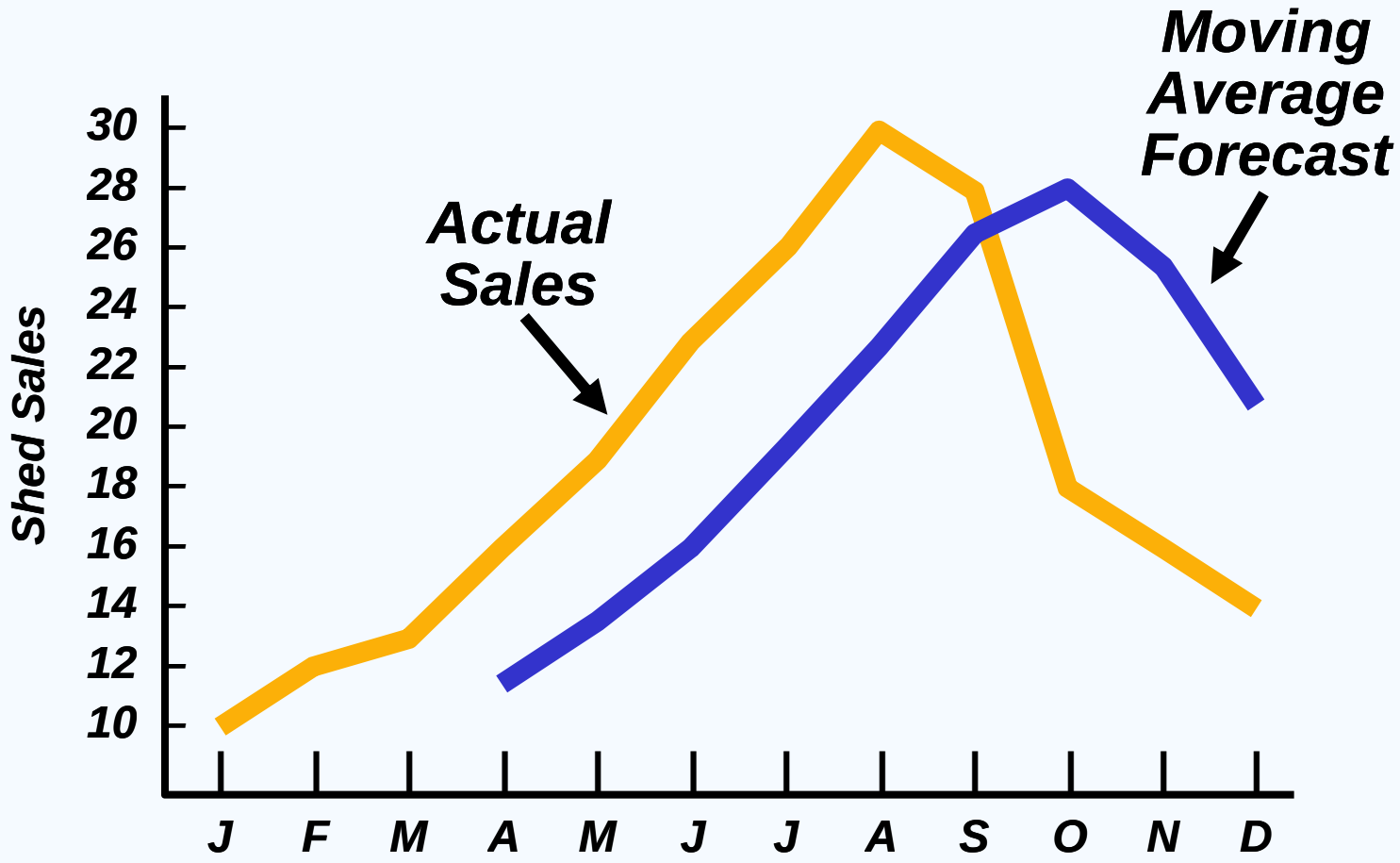
$$\text{Moving average} = \frac{\sum \text{demand in previous } n \text{ periods}}{n}$$

Moving Average Example

Month	Actual Shed Sales	3-Month Moving Average
January	10	
February	12	
March	13	
April	16	(10 + 12 + 13)/3 = 11 $^{2}/_{3}$
May	19	(12 + 13 + 16)/3 = 13 $^{2}/_{3}$
June	23	(13 + 16 + 19)/3 = 16
July	26	(16 + 19 + 23)/3 = 19 $^{1}/_{3}$



Graph of Moving Average



Weighted Moving Average

- ☑ *Used when trend is present*
  - ☑ *Older data usually less important*
- ☑ *Weights based on experience and intuition*

$$\text{Weighted moving average} = \frac{\sum (\text{weight for period } n) \times (\text{demand in period } n)}{\sum \text{weights}}$$

Weigl

Weights Applied	Period
3	Last month
2	Two months ago
1	Three months ago
6	Sum of weights

Month	Actual Shed Sales	3-Month Weighted Moving Average
January	10	
February	12	
March	13	
April	16	[(3 x 13) + (2 x 12) + (10)]/6 = $12^1/_6$
May	19	[(3 x 16) + (2 x 13) + (12)]/6 = $14^1/_3$
June	23	[(3 x 19) + (2 x 16) + (13)]/6 = 17
July	26	[(3 x 23) + (2 x 19) + (16)]/6 = $20^1/_2$

Potential Problems With Moving Average

- ☑ *Increasing n smooths the forecast but makes it less sensitive to changes*
- ☑ *Do not forecast trends well*
- ☑ *Require extensive historical data*

Moving Average And Weighted Moving Average

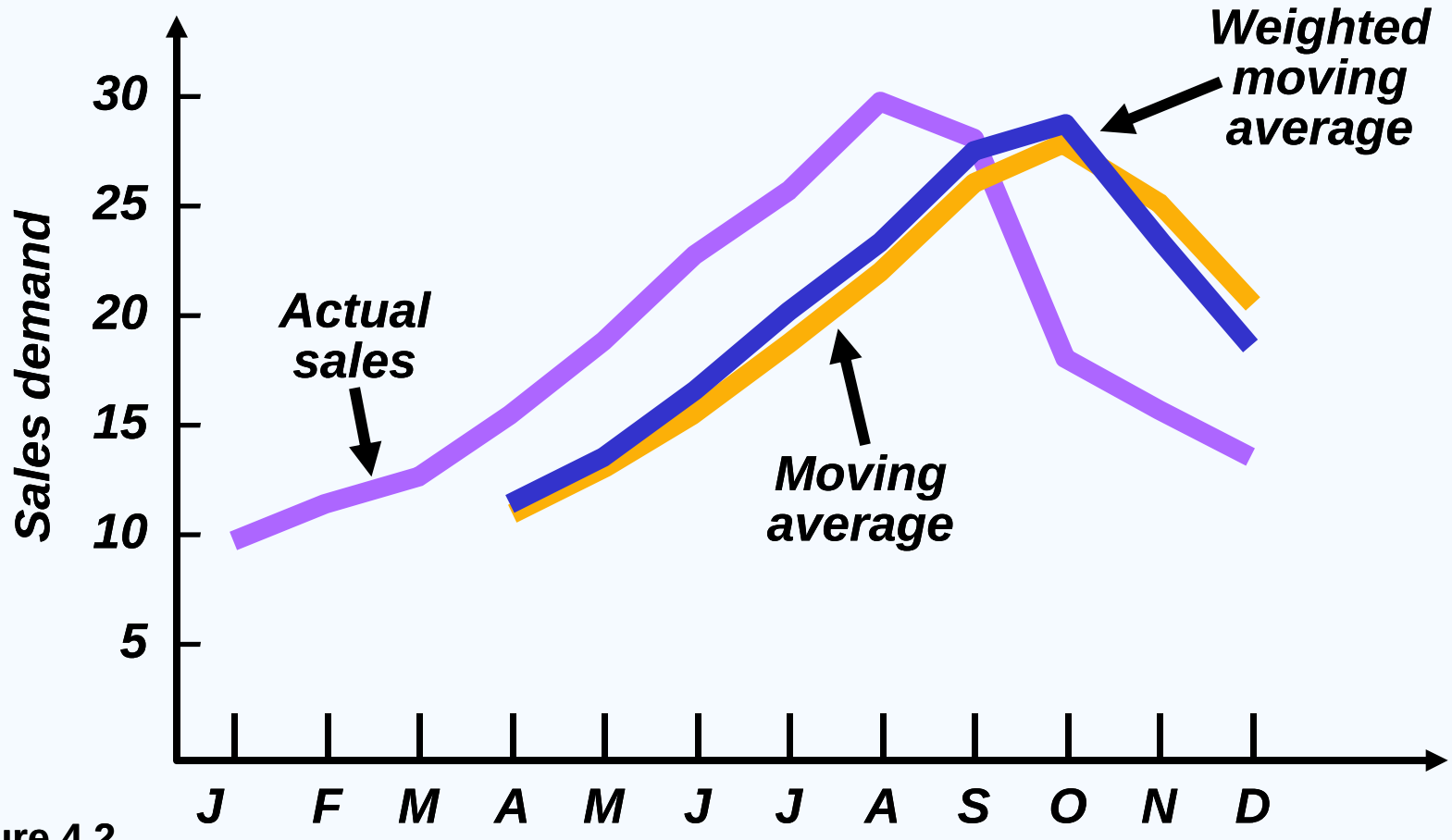


Figure 4.2

Exponential Smoothing

- ☑ *Form of weighted moving average*
  - ☑ *Weights decline exponentially*
  - ☑ *Most recent data weighted most*
- ☑ *Requires smoothing constant* (α)
  - ☑ *Ranges from 0 to 1*
  - ☑ *Subjectively chosen*
- ☑ *Involves little record keeping of past data*

Exponential Smoothing

New forecast = Last period's forecast
+ α (Last period's actual demand
– Last period's forecast)

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

where F_t = *new forecast*

F_{t-1} = *previous forecast*

α = *smoothing (or weighting) constant* ($0 \leq \alpha \leq 1$)

Exponential Smoothing Example

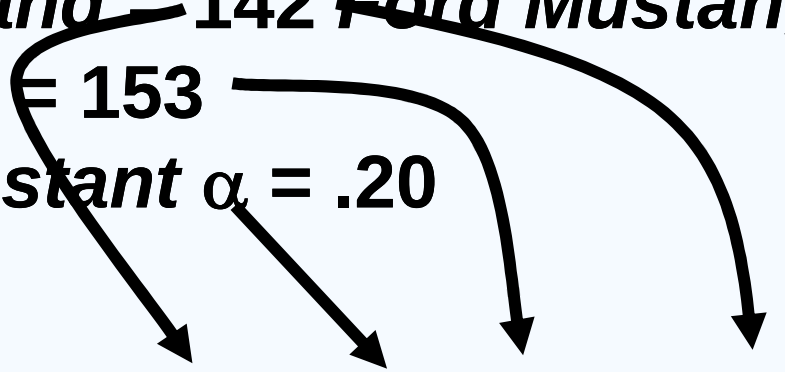
Predicted demand* = 142 *Ford Mustangs
***Actual demand* = 153**
***Smoothing constant* α = .20**

Exponential Smoothing Example

Predicted demand = 142 Ford Mustangs

Actual demand = 153

Smoothing constant α = .20



New forecast = 142 + .2(153 – 142)

Exponential Smoothing Example

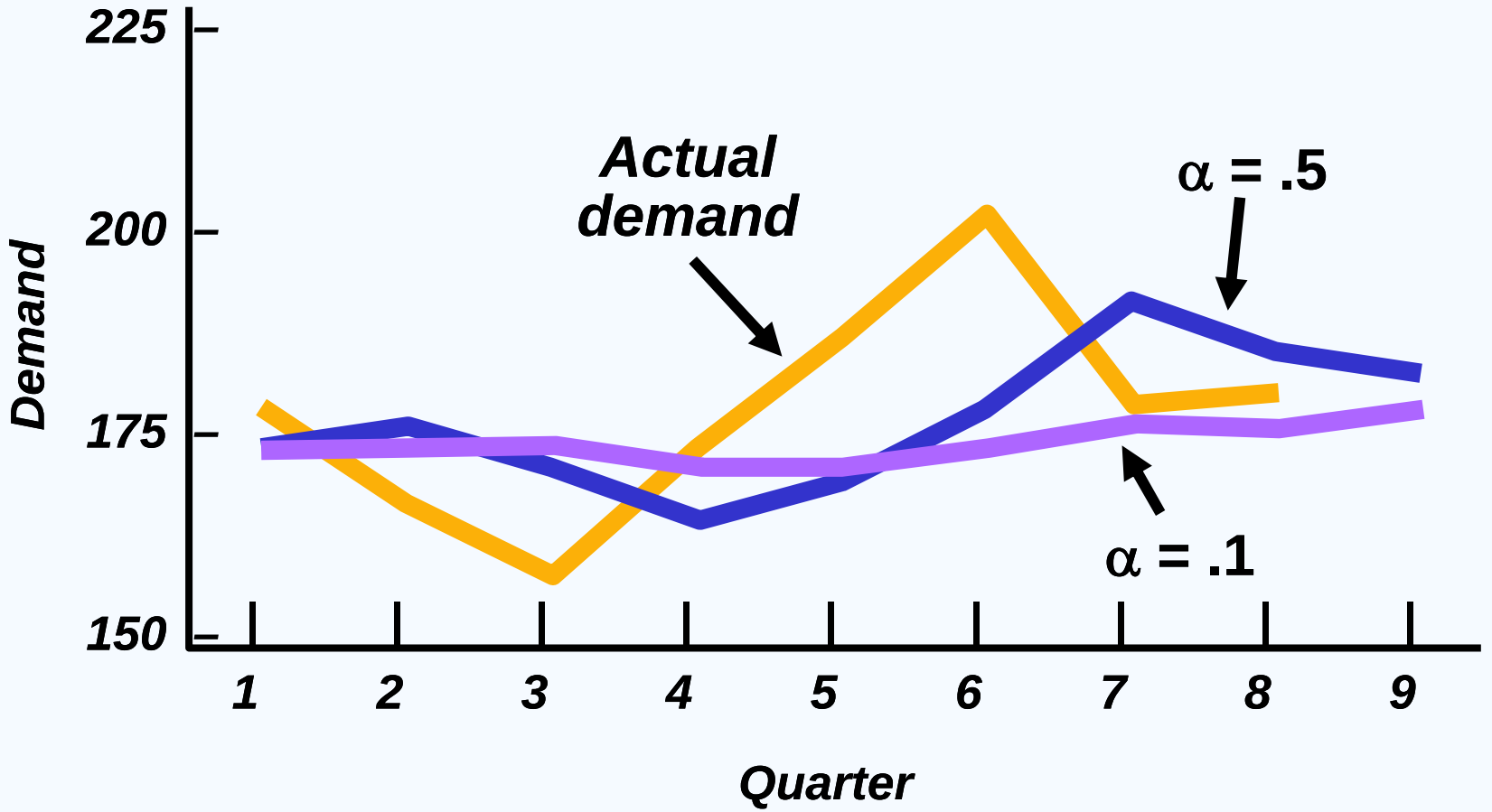
Predicted demand* = 142 *Ford Mustangs
***Actual demand* = 153**
***Smoothing constant* α = .20**

$$\textit{New forecast} = 142 + .2(153 - 142)$$
$$= 142 + 2.2$$
$$= 144.2 \approx 144 \text{ cars}$$

Effect of Smoothing Constants

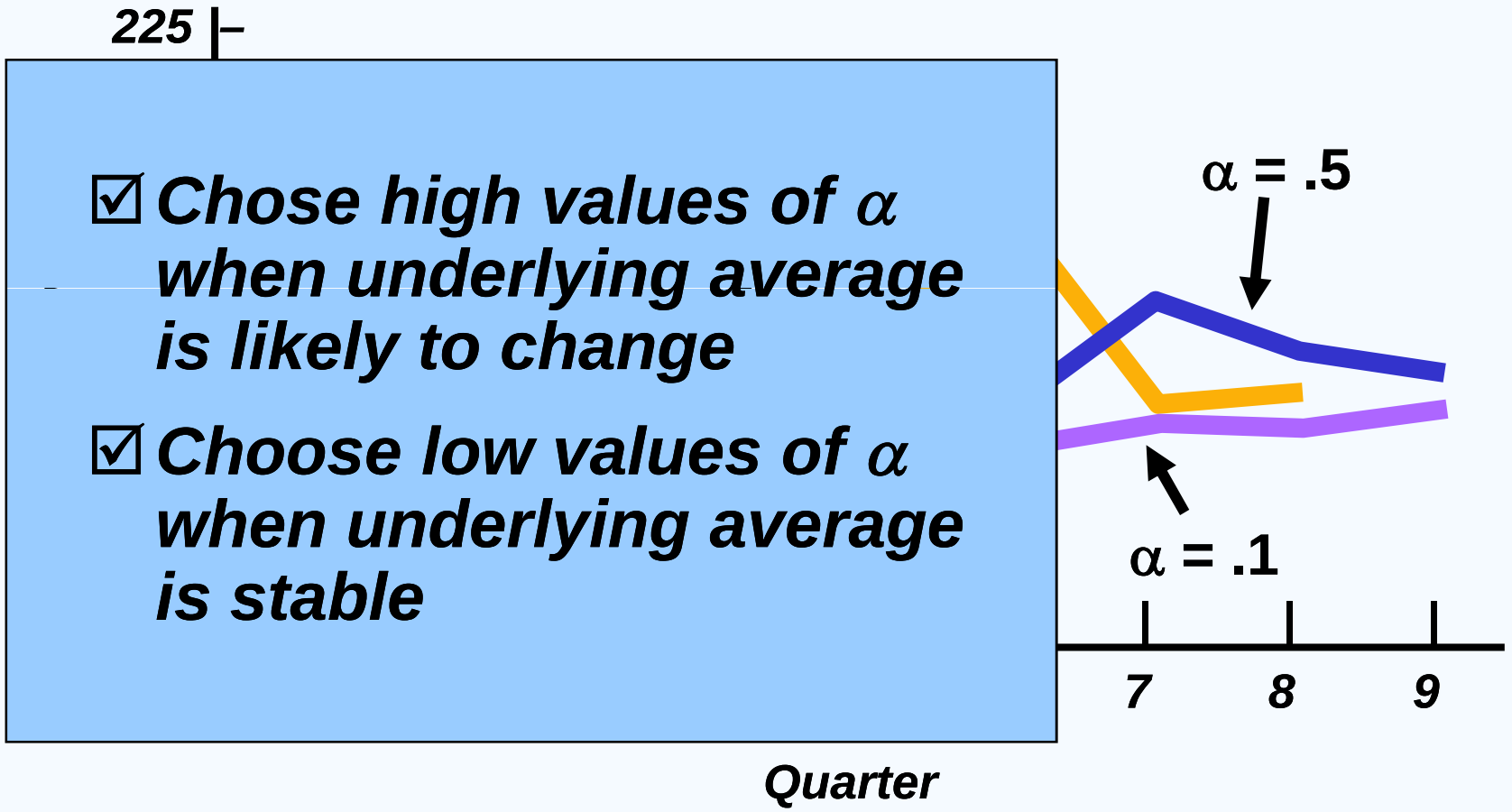
Smoothing Constant	Weight Assigned to: Most Recent Period (α)	2nd Most Recent Period $\alpha(1 - \alpha)$	3rd Most Recent Period $\alpha(1 - \alpha)^2$	4th Most Recent Period $\alpha(1 - \alpha)^3$	5th Most Recent Period $\alpha(1 - \alpha)^4$
$\alpha = .1$	.1	.09	.081	.073	.066
$\alpha = .5$	.5	.25	.125	.063	.031

Impact of Different α



Impact of Different α

- ☑ Chose high values of α when underlying average is likely to change
- ☑ Choose low values of α when underlying average is stable



Choosing α

The objective is to obtain the most accurate forecast no matter the technique

We generally do this by selecting the model that gives us the lowest forecast error

$$\text{Forecast error} = \text{Actual demand} - \text{Forecast value}$$

$$= A_t - F_t$$

Common Measures of Error

Mean Absolute Deviation (*MAD*)

$$MAD = \frac{\sum |Actual - Forecast|}{n}$$

Mean Squared Error (*MSE*)

$$MSE = \frac{\sum (Forecast\ Errors)^2}{n}$$

Common Measures of Error

Mean Absolute Percent Error (*MAPE*)

$$MAPE = \frac{\sum_{i=1}^{n} 100|Actual_i - Forecast_i|/Actual_i}{n}$$

Contoh Kasus

Selama 8 kuartal terakhir, Pelabuhan Baltimore membongkar muat sejumlah besar gandum dari kapal. Manajer operasi pelabuhan ingin menguji penggunaan metode penghalusan eksponensial untuk melihat seberapa baik teknik ini bekerja dalam memprediksikan tonase gandum yang dibongkar muat. Ia menebak bahwa peramalan bongkar muat pada kuartal pertamaadalah 175 ton. Dua nilai α diuji, yaitu 0,1 dan 0,5.

Solusi

Kuartal	Tonase	Peramalan α = 0,1
1	180	**175**
2	168	175 + 0,1 (180-175) = 175,5
3	159	175,5 + 0,1 (168 – 175,5) = 174,75
4	175	174,75 + 0,1 (159 – 174,75) = 173,18
5	190	173,18 + 0,1 (175 – 173,18) = 173,36
6	205	173,36 + 0,1 (190 – 173,36) = 175,02
7	180	175,02+ 0,1 (205 – 175,02) = 178,02
8	182	178,02 + 0,1 (180– 178,02) = 178,22
9		178,22+ 0,1 (182 – 178,22) = 178,22

Comparison of Forecast Error

Quarter	Actual Tonnage Unloaded	Rounded Forecast with $\alpha = .10$	Absolute Deviation for $\alpha = .10$	Rounded Forecast with $\alpha = .50$	Absolute Deviation for $\alpha = .50$
1	180	175	5.00	175	5.00
2	168	175.5	7.50	177.50	9.50
3	159	174.75	15.75	172.75	13.75
4	175	173.18	1.82	165.88	9.12
5	190	173.36	16.64	170.44	19.56
6	205	175.02	29.98	180.22	24.78
7	180	178.02	1.98	192.61	12.61
8	182	178.22	3.78	186.30	4.30
			82.45		98.62

Comparison of Forecast

$$MAD = \frac{\sum |deviations|}{n}$$

For $\alpha = .10$

$= 82.45/8 = 10.31$

For $\alpha = .50$

$= 98.62/8 = 12.33$

				Rounded Forecast with $\alpha = .50$	Absolute Deviation for $\alpha = .50$
				175	5.00
				177.50	9.50
				172.75	13.75
				165.88	9.12
				170.44	19.56
				180.22	24.78
				192.61	12.61
8	182	178.22	3.78	186.30	4.30
			82.45		98.62

Menghitung MSE

Kuartal	Tonase	Peramalan (pembulatan)	Kesalahan	Kuadrat Kesalahan
1	180	175	5	25
2	168	176	-8	64
3	159	175	-16	256
4	175	173	2	2
5	190	173	17	289
6	205	175	30	900
7	180	178	2	4
8	182	178	4	16
Jumlah Kuadrat Kesalahan				1.558

Comparison of Forecast

$$MSE = \frac{\sum (\text{forecast errors})^2}{n}$$

For $\alpha = .10$

$= 1{,}526.54/8 = 190.82$

For $\alpha = .50$

$= 1{,}561.91/8 = 195.24$

					Rounded Forecast with $\alpha = .50$	Absolute Deviation for $\alpha = .50$
					175	5.00
					177.50	9.50
					172.75	13.75
					165.88	9.12
					170.44	19.56
					180.22	24.78
					192.61	12.61
8	182	178.22	3.78		186.30	4.30
			82.45			98.62
		MAD	10.31			12.33

Menghitung MAPE

Kuartal	Tonase	Peramalan	Kesalahan	Kesalahan / Persen	
1	180	175	5	(5/180) x 100 %	2,77%
2	168	176	-8	(8/168) x 100 %	4,76%
3	159	175	-16	(16/159) x 100 %	10.06%
4	175	173	2	(2/175) x 100 %	1,14%
5	190	173	17	(17/190) x 100 %	8,95%
6	205	175	30	(30/205) x 100 %	14,63%
7	180	178	2	(2/180) x 100 %	1,11%
8	182	178	4	(4/182) x 100 %	2,20%
Jumlah % kesalahan					45,62%

Comparison of Forecast

$$MAPE = \frac{\sum_{i=1}^{n} 100|deviation_i|/actual_i}{n}$$

For $\alpha = .10$

$= 44.75/8 = 5.59\%$

For $\alpha = .50$

$= 54.05/8 = 6.76\%$

					ed st 0	Absolute Deviation for $\alpha = .50$
						5.00
					0	9.50
					5	13.75
					8	9.12
					4	19.56
					2	24.78
					1	12.61
8	182	178.22	3.78	186.30		4.30
			82.45			98.62
		MAD	10.31			12.33
		MSE	190.82			195.24

Comparison of Forecast Error

Quarter	Actual Tonnage Unloaded	Rounded Forecast with $\alpha = .10$	Absolute Deviation for $\alpha = .10$	Rounded Forecast with $\alpha = .50$	Absolute Deviation for $\alpha = .50$
1	180	175	5.00	175	5.00
2	168	175.5	7.50	177.50	9.50
3	159	174.75	15.75	172.75	13.75
4	175	173.18	1.82	165.88	9.12
5	190	173.36	16.64	170.44	19.56
6	205	175.02	29.98	180.22	24.78
7	180	178.02	1.98	192.61	12.61
8	182	178.22	3.78	186.30	4.30
			82.45		98.62
		MAD	10.31		12.33
		MSE	190.82		195.24
		MAPE	5.59%		6.76%

Trend Projections

Fitting a trend line to historical data points to project into the medium to long-range

Linear trends can be found using the least squares technique

$$\hat{y} = a + bx$$

where $\hat{y}$ = computed value of the variable to be predicted (dependent variable)

a = y-axis intercept

b = slope of the regression line

x = the independent variable

Least Squares Method

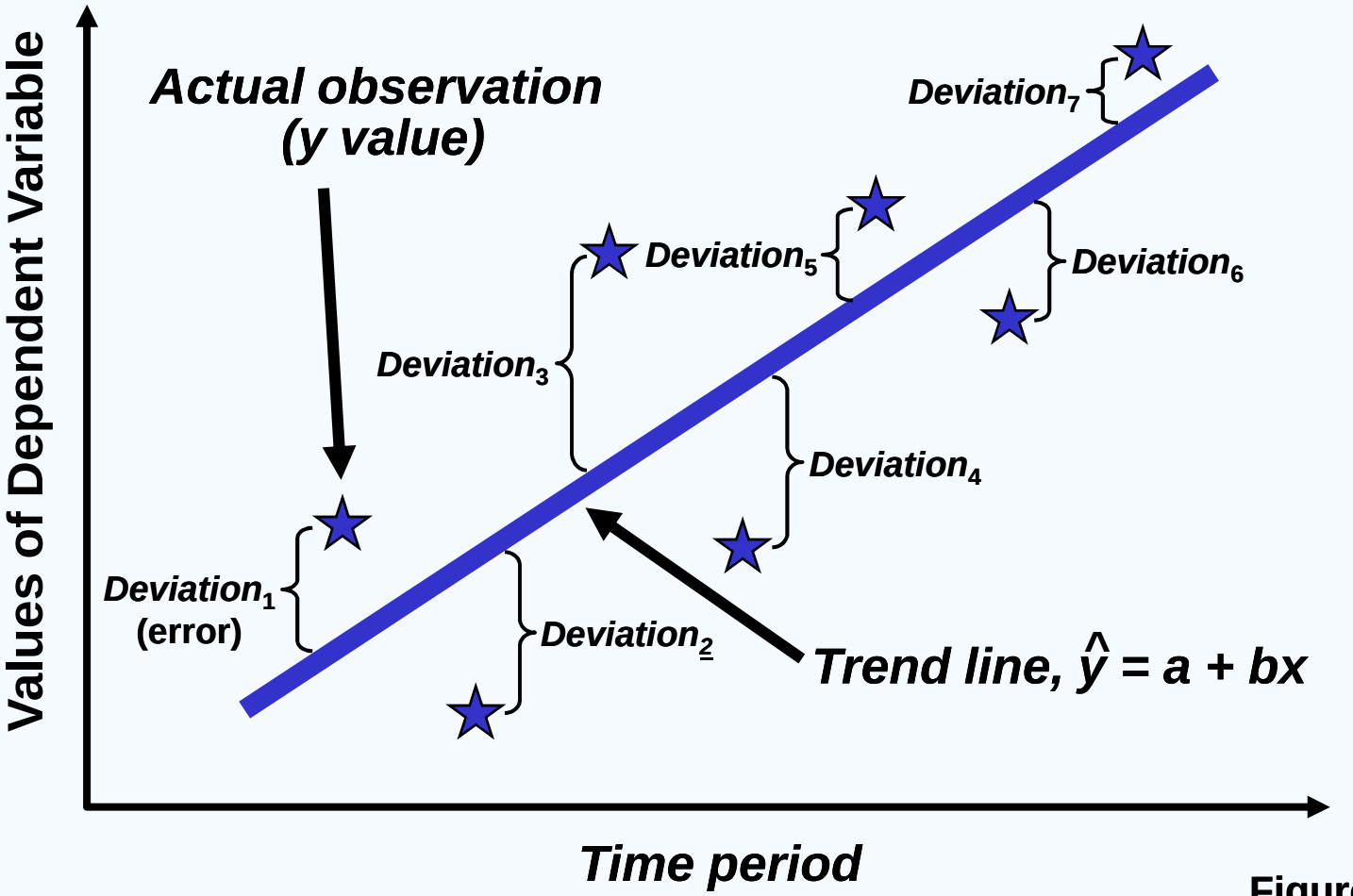


Figure 4.4

Least Squares Method

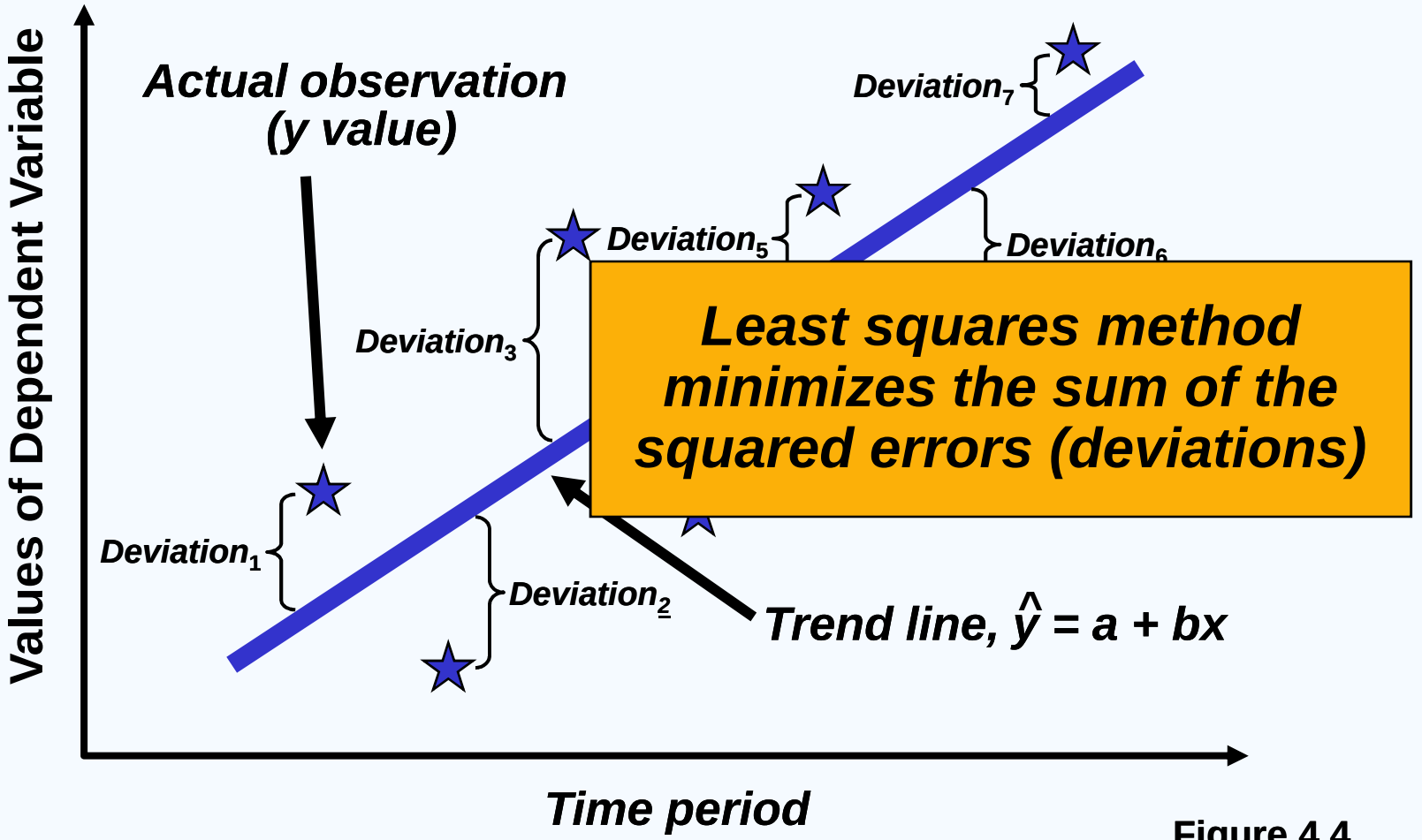


Figure 4.4

Least Squares Method

Equations to calculate the regression variables

$$\hat{y} = a + bx$$

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2}$$

$$a = \bar{y} - b\bar{x}$$

Least Squares Example

Year	Time Period (x)	Electrical Power Demand	x^2	xy
2001	1	74	1	74
2002	2	79	4	158
2003	3	80	9	240
2004	4	90	16	360
2005	5	105	25	525
2005	6	142	36	852
2007	7	122	49	854
	$\sum x = 28$	$\sum y = 692$	$\sum x^2 = 140$	$\sum xy = 3{,}063$
	$\bar{x} = 4$	$\bar{y} = 98.86$		

$$b = \frac{\sum xy - n\bar{x}\bar{y}}{\sum x^2 - n\bar{x}^2} = \frac{3{,}063 - (7)(4)(98.86)}{140 - (7)(4^2)} = 10.54$$

$$a = \bar{y} - b\bar{x} = 98.86 - 10.54(4) = 56.70$$

Least Squares Example

Year	Time Period (x)	Electrical Power Demand	x^2	xy
1999	1	74	1	74
2000	2	79	4	158
2001	3	80	9	240
2002	4	90	16	360
2003	5	105	25	525
2004	6	142	36	852
2005	7	122	49	854
	$\Sigma x = 28$	$\Sigma y = 692$	$\Sigma x^2 = 140$	$\Sigma xy = 3{,}063$
	$\bar{x} = 4$	$\bar{y} = 98.86$		

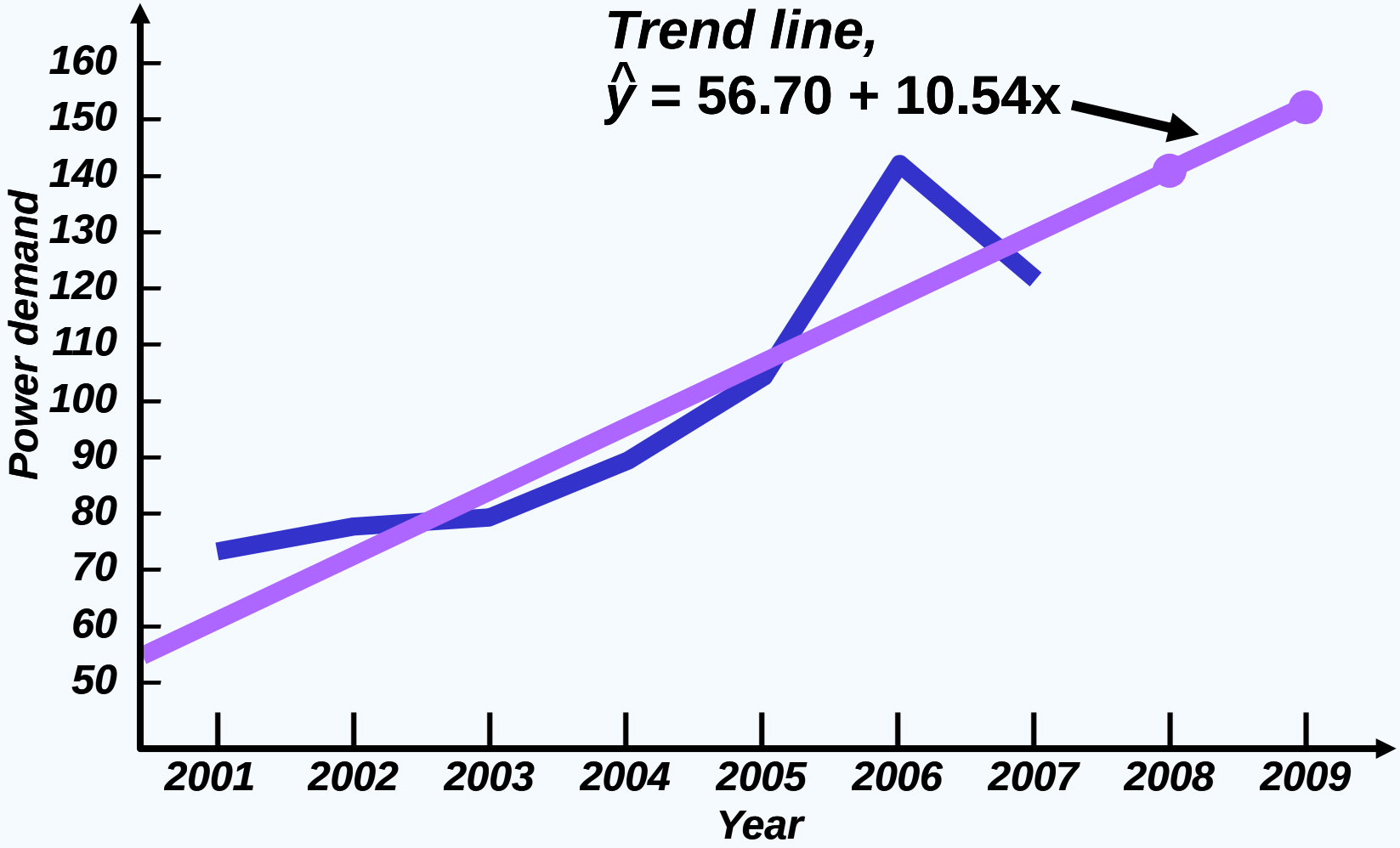
The trend line is

$$\hat{y} = 56.70 + 10.54x$$

$$b = \frac{\Sigma xy - n\bar{x}\bar{y}}{\Sigma x^2 - n\bar{x}^2} = \frac{3{,}063 - (7)(4)(98.86)}{140 - (7)(4^2)} = 10.54$$

$$a = \bar{y} - b\bar{x} = 98.86 - 10.54(4) = 56.70$$

Least Squares Example



Least Squares Requirements

1. *Selalu petakan data karena asumsi yang digunakan membutuhkan hubungan yang linear*
2. *We do not predict time periods far beyond the database*
3. *Deviations around the least squares line are assumed to be random*

Operations Management

Capacity Planning

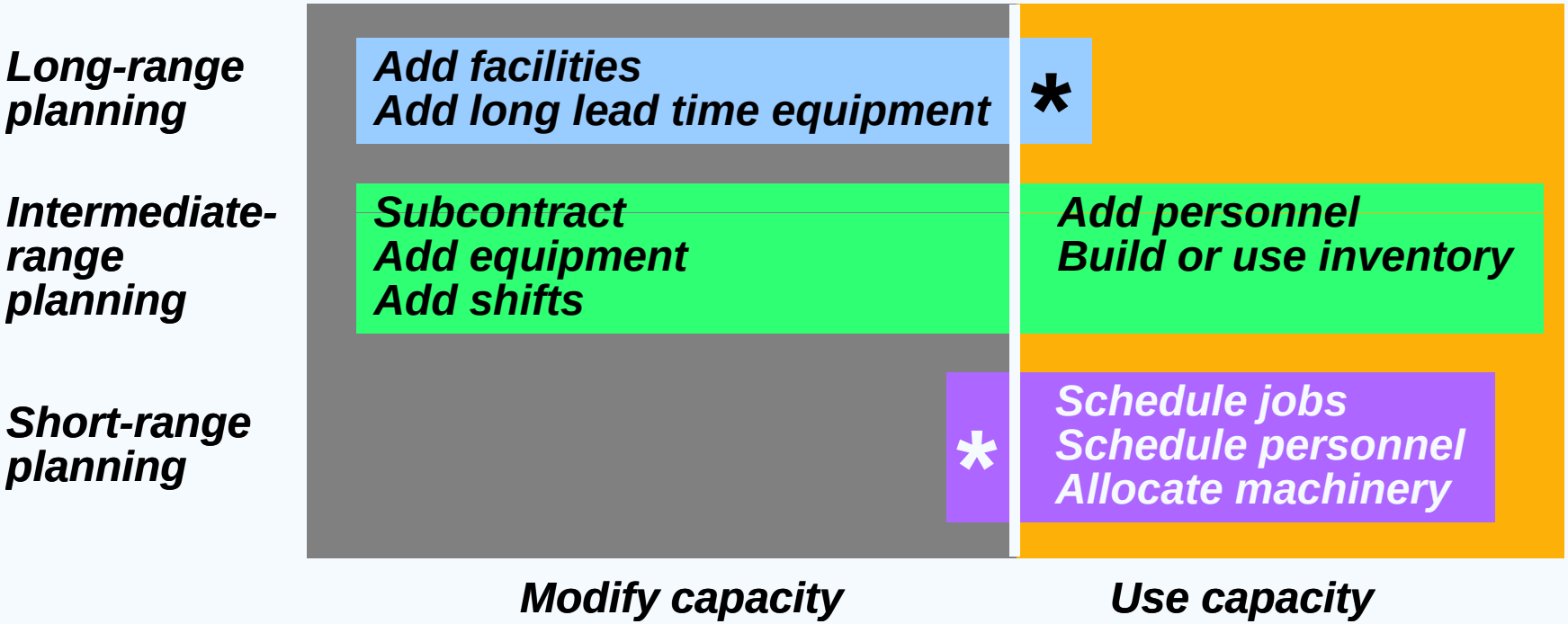
PowerPoint presentation to accompany
Heizer/Render
Principles of Operations Management, 7e
Operations Management, 9e

PEARSON Prentice Hall

Capacity

- ☑ *Output/hasil produksi, or the number of units a facility can hold, receive, store, or produce in a period of time*
- ☑ *Determines fixed costs*
- ☑ *Determines if demand will be satisfied*
- ☑ *Three time horizons*

Planning Over a Time Horizon



* Limited options exist

Figure S7.1

Design and Effective Capacity

- ☑ *Design capacity output maksimum sistem secara teoritis dlm periode tertentu*
  - ☑ *Normally expressed as a rate*
- ☑ *Effective capacity kapasitas yg diharapkan dicapai oleh perusahaan dg batasan operasi yg ada*
  - ☑ *Often lower than design capacity*

Utilization and Efficiency

Utilization is the percent of design capacity achieved

$$\text{Utilization} = \text{Actual output}/\text{Design capacity}$$

Efficiency is the percent of effective capacity achieved

$$\text{Efficiency} = \text{Actual output}/\text{Effective capacity}$$

Bakery Example

Actual production last week* = 148,000 *rolls
Effective capacity* = 175,000 *rolls
Design capacity* = 1,200 *rolls per hour
Bakery operates* 7 *days/week,* 3 - 8 *hour shifts

Design capacity* = (7 x 3 x 8) x (1,200) = 201,600 *rolls

Bakery Example

Actual production last week* = 148,000 *rolls
Effective capacity* = 175,000 *rolls
Design capacity* = 1,200 *rolls per hour
Bakery operates 7 days/week, 3 - 8 hour shifts

Design capacity* = (7 x 3 x 8) x (1,200) = 201,600 *rolls

Bakery Example

Actual production last week* = 148,000 *rolls
Effective capacity* = 175,000 *rolls
Design capacity* = 1,200 *rolls per hour
Bakery operates* 7 *days/week*, 3 - 8 *hour shifts

Design capacity* = (7 x 3 x 8) x (1,200) = 201,600 *rolls

***Utilization* = 148,000/201,600 = 73.4%**

Bakery Example

Actual production last week* = 148,000 *rolls
Effective capacity* = 175,000 *rolls
Design capacity* = 1,200 *rolls per hour
Bakery operates* 7 *days/week,* 3 - 8 *hour shifts

Design capacity* = (7 x 3 x 8) x (1,200) = 201,600 *rolls

***Utilization* = 148,000/201,600 = 73.4%**

Bakery Example

Actual production last week = 148,000 *rolls*
Effective capacity = 175,000 *rolls*
Design capacity = 1,200 *rolls per hour*
Bakery operates 7 *days/week,* 3 - 8 *hour shifts*

Design capacity = (7 x 3 x 8) x (1,200) = 201,600 *rolls*

Utilization = 148,000/201,600 = 73.4%

Efficiency = 148,000/175,000 = 84.6%

Bakery Example

Actual production last week* = 148,000 *rolls
Effective capacity* = 175,000 *rolls
Design capacity* = 1,200 *rolls per hour
Bakery operates* 7 *days/week,* 3 - 8 *hour shifts

Design capacity* = (7 x 3 x 8) x (1,200) = 201,600 *rolls

***Utilization* = 148,000/201,600 = 73.4%**

***Efficiency* = 148,000/175,000 = 84.6%**

Bakery Example

Actual production last week* = 148,000 *rolls
Effective capacity* = 175,000 *rolls
Design capacity* = 1,200 *rolls per hour
Bakery operates 7 days/week, 3 - 8 hour shifts
***Efficiency* = 84.6%**
***Efficiency of new line* = 75%**

***Expected Output* = (*Effective Capacity*)(*Efficiency*)**

= (175,000)(.75) = 131,250 *rolls*

Bakery Example

Actual production last week = 148,000 *rolls*
Effective capacity = 175,000 *rolls*
Design capacity = 1,200 *rolls per hour*
Bakery operates 7 *days/week,* 3 - 8 *hour shifts*
Efficiency = 84.6%
Efficiency of new line = 75%

Expected Output = (*Effective Capacity*)(*Efficiency*)

= (175,000)(.75) = 131,250 *rolls*

Capacity and Strategy

- ☑ ***Capacity decisions impact all 10 decisions of operations management as well as other functional areas of the organization***
- ☑ ***Capacity decisions must be integrated into the organization's mission and strategy***

Capacity Considerations

- ☑ ***Ramalkan permintaan secara akurat***
- ☑ ***Memahami teknologi dan peningkatan kapasitas***
- ☑ ***Find the optimum operating level (volume)***
- ☑ ***Build for change***

Managing Demand

- ☑ *Demand exceeds capacity*
  - ☑ *Membatasi permintaan dg menaikan harga, mengurangi bisnis dg keuntunan marjinal*
  - ☑ *Long term solution is to increase capacity*
- ☑ *Capacity exceeds demand*
  - ☑ *Stimulate market*
  - ☑ *Product changes*
- ☑ *Adjusting to seasonal demands*
  - ☑ *Produce products with complementary demand patterns*

Complementary Demand Patterns

Figure S7.3

Complementary Demand Patterns

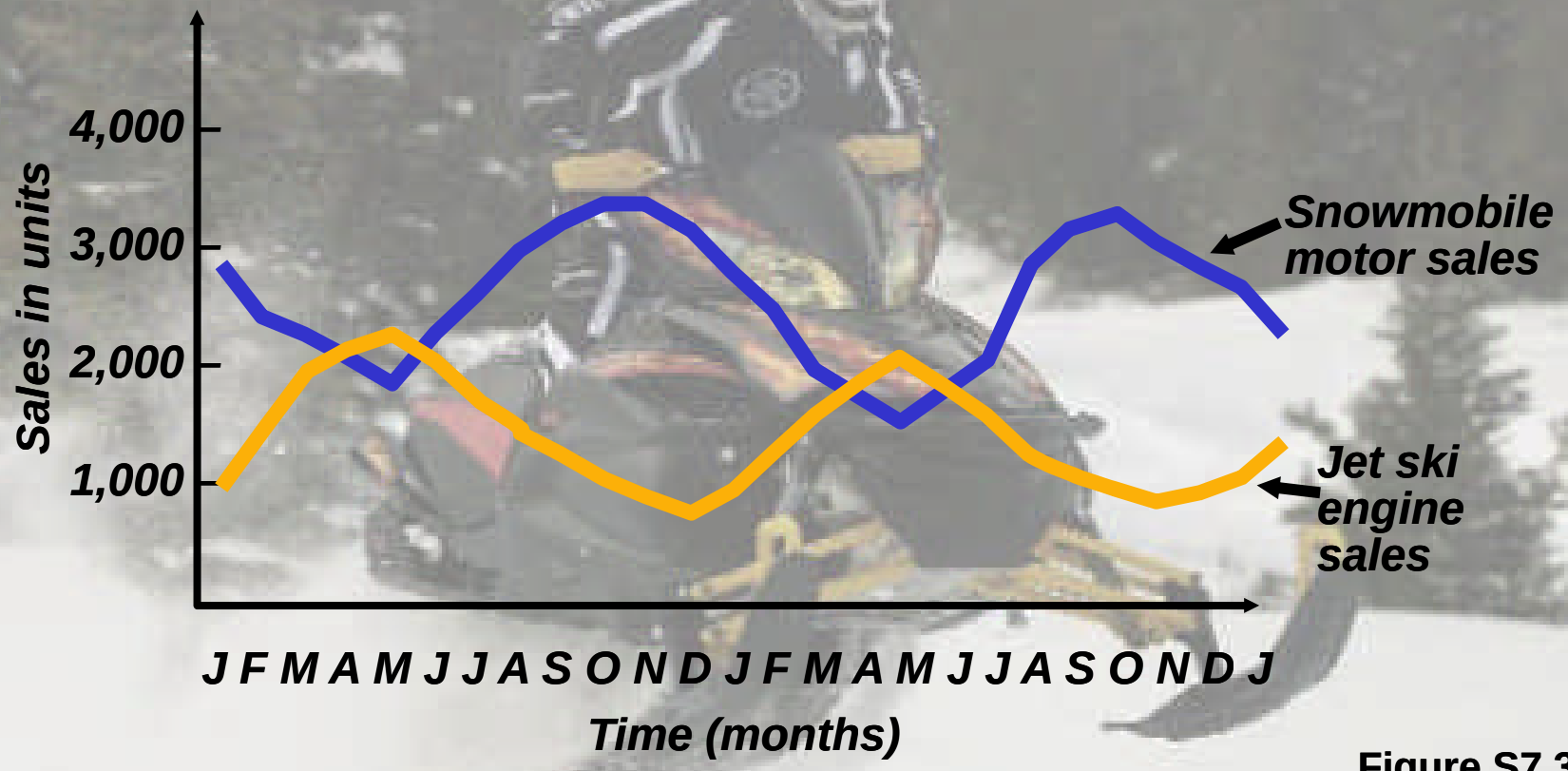


Figure S7.3

Complementary Demand Patterns

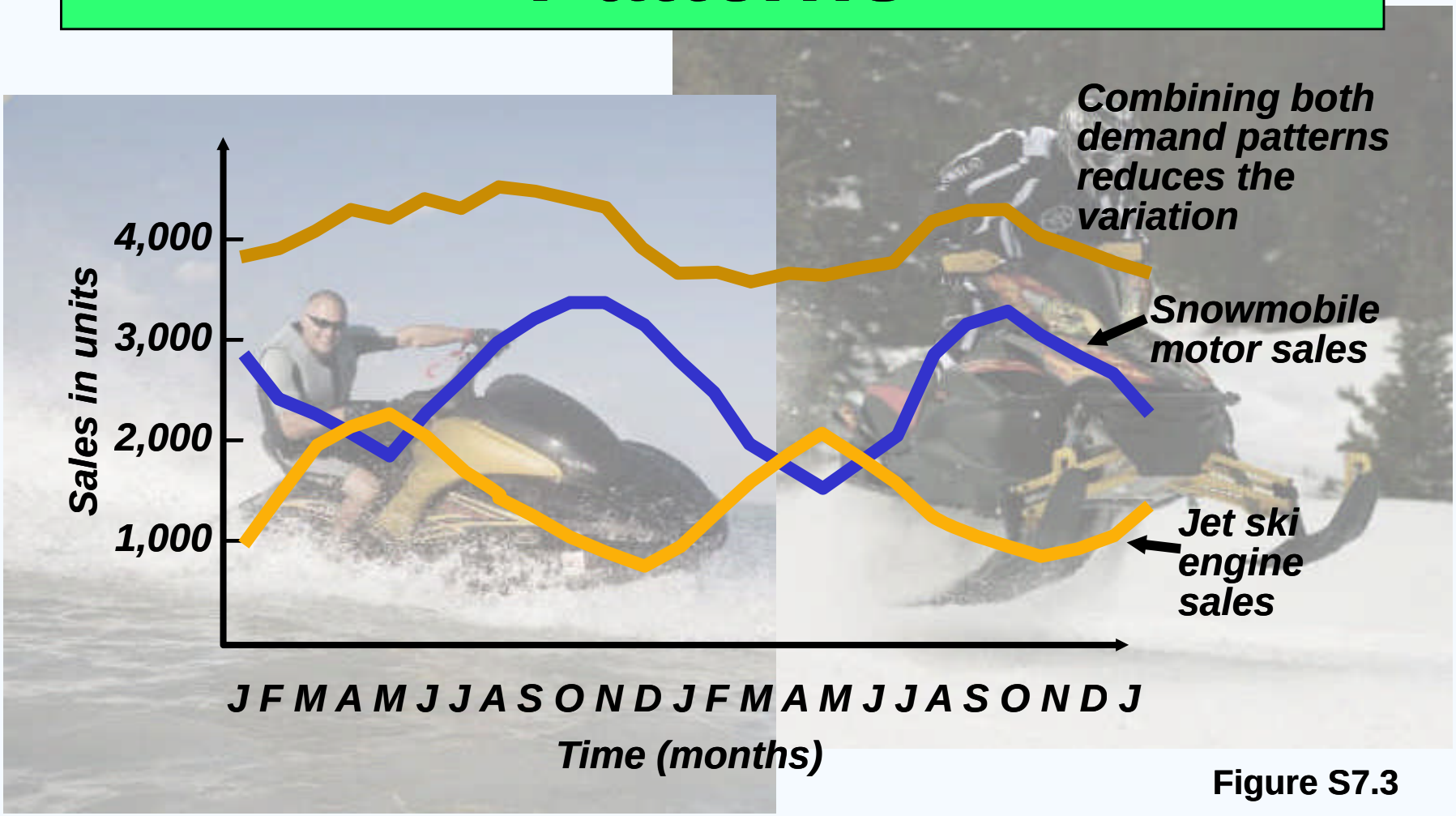


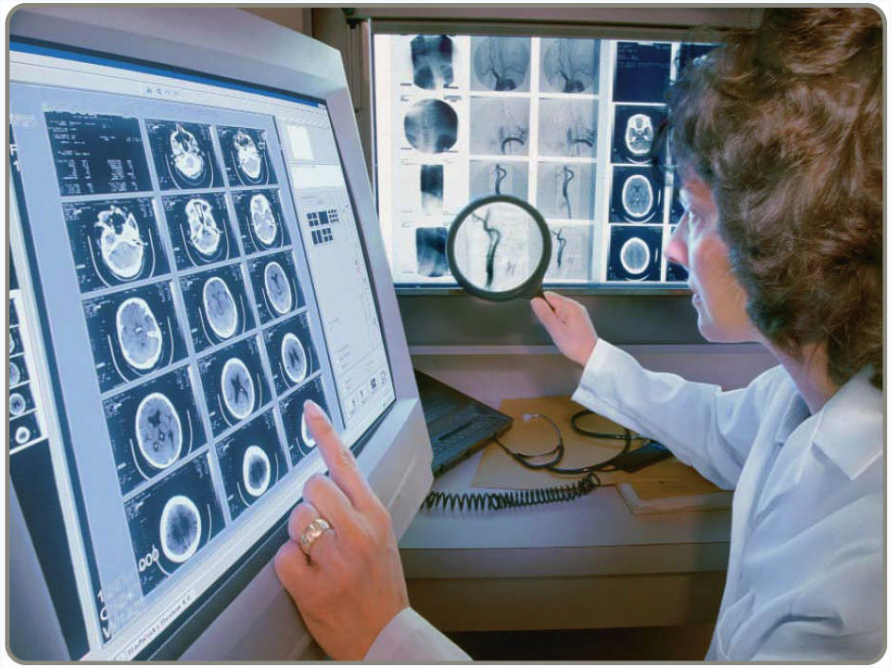
Figure S7.3

Tactics for Matching Capacity to Demand

1. *Making staffing changes*
2. *Adjusting equipment*
   - ☑ *Purchasing additional machinery*
   - ☑ *Selling or leasing out existing equipment*
3. *Improving processes to increase throughput*
4. *Redesigning products to facilitate more throughput*
5. *Adding process flexibility to meet changing product preferences*
6. *Closing facilities*

Demand and Capacity Management in the Service Sector

- ☑ *Demand management*
  - ☑ *Appointment, reservations, FCFS rule*
- ☑ *Capacity management*
  - ☑ *Full time, temporary, part-time staff*



Break-Even Analysis

- ☑ *Technique for evaluating process and equipment alternatives*
- ☑ *Objective is to find the point in dollars and units at which cost equals revenue*
- ☑ *Requires estimation of fixed costs, variable costs, and revenue*

Break-Even Analysis

- ☑ *Fixed costs are costs that continue even if no units are produced*
  - ☑ *Depreciation, taxes, debt, mortgage payments*
- ☑ *Variable costs are costs that vary with the volume of units produced*
  - ☑ *Labor, materials, portion of utilities*
  - ☑ *Contribution is the difference between selling price and variable cost*

Break-Even Analysis

Assumptions

- ☑ Costs and revenue are linear functions
  - ☑ Generally not the case in the real world
- ☑ We actually know these costs
  - ☑ Very difficult to accomplish
- ☑ There is no time value of money

Break-Even Analysis

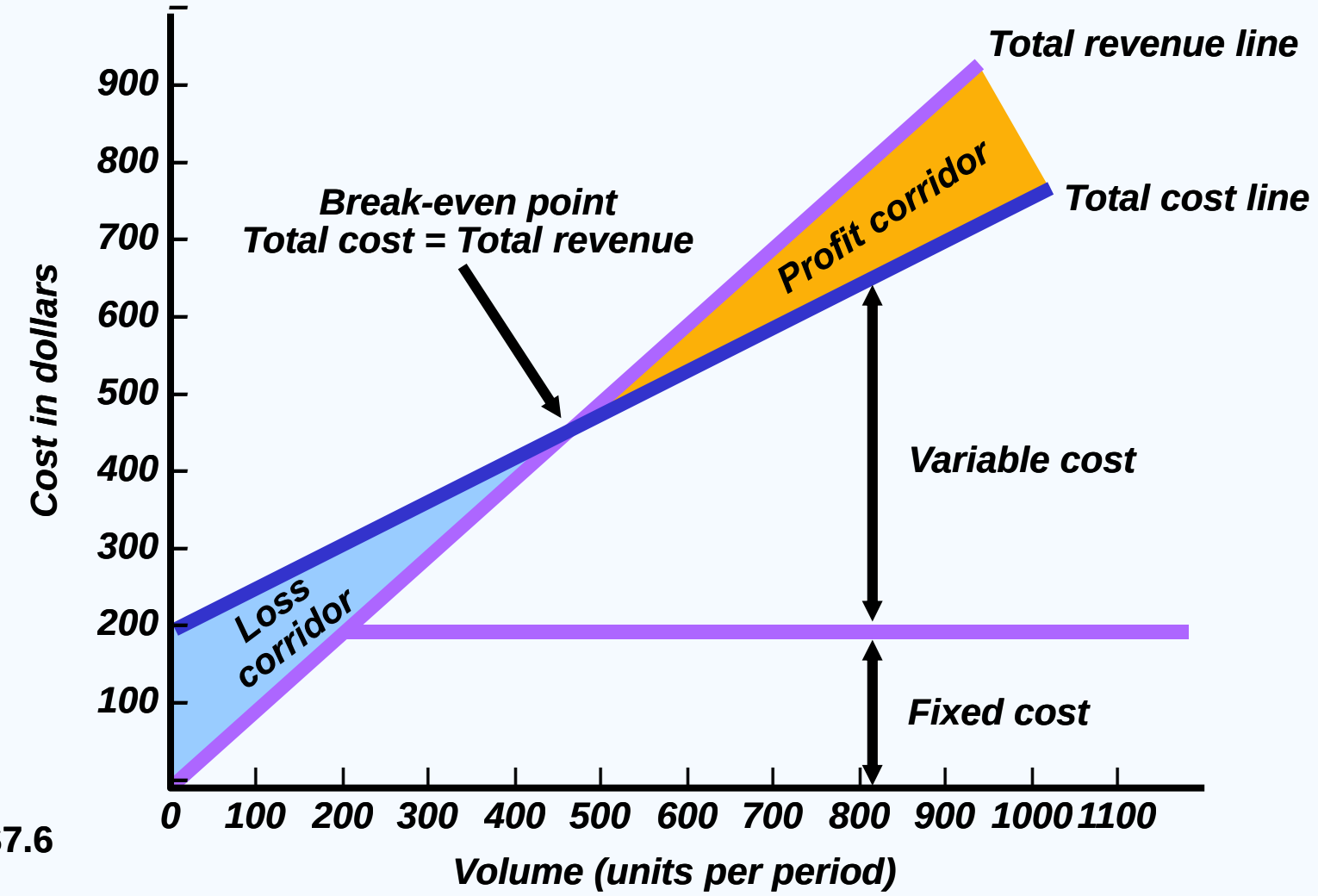


Figure S7.6

Break-Even Analysis

BEP_x = break-even point in units

$BEP_\$$ = break-even point in dollars

P = price per unit (after all discounts)

x = number of units produced

TR = total revenue = Px

F = fixed costs

V = variable cost per unit

TC = total costs = $F + Vx$

Break-even point occurs when

$$TR = TC$$

or

$$Px = F + Vx$$

$$BEP_x = \frac{F}{P - V}$$

Break-Even Analysis

BEP_x = break-even point in units

$BEP_\$$ = break-even point in dollars

P = price per unit (after all discounts)

x = number of units produced

TR = total revenue = Px

F = fixed costs

V = variable cost per unit

TC = total costs = $F + Vx$

$$BEP_\$ = BEP_x P$$

$$= \frac{F}{P - V} P$$

$$= \frac{F}{(P - V)/P}$$

$$= \frac{F}{1 - V/P}$$

$$Profit = TR - TC$$

$$= Px - (F + Vx)$$

$$= Px - F - Vx$$

$$= (P - V)x - F$$

Break-Even Example

Fixed costs = $10,000
Direct labor = $1.50/*unit*
Material = $.75/*unit*
Selling price = $4.00 *per unit*

$$BEP_{\$} = \frac{F}{1 - (V/P)} = \frac{\$10{,}000}{1 - [(1.50 + .75)/(4.00)]}$$

Break-Even Example

Fixed costs* = $10,000** **_Material_ = $.75/*unit

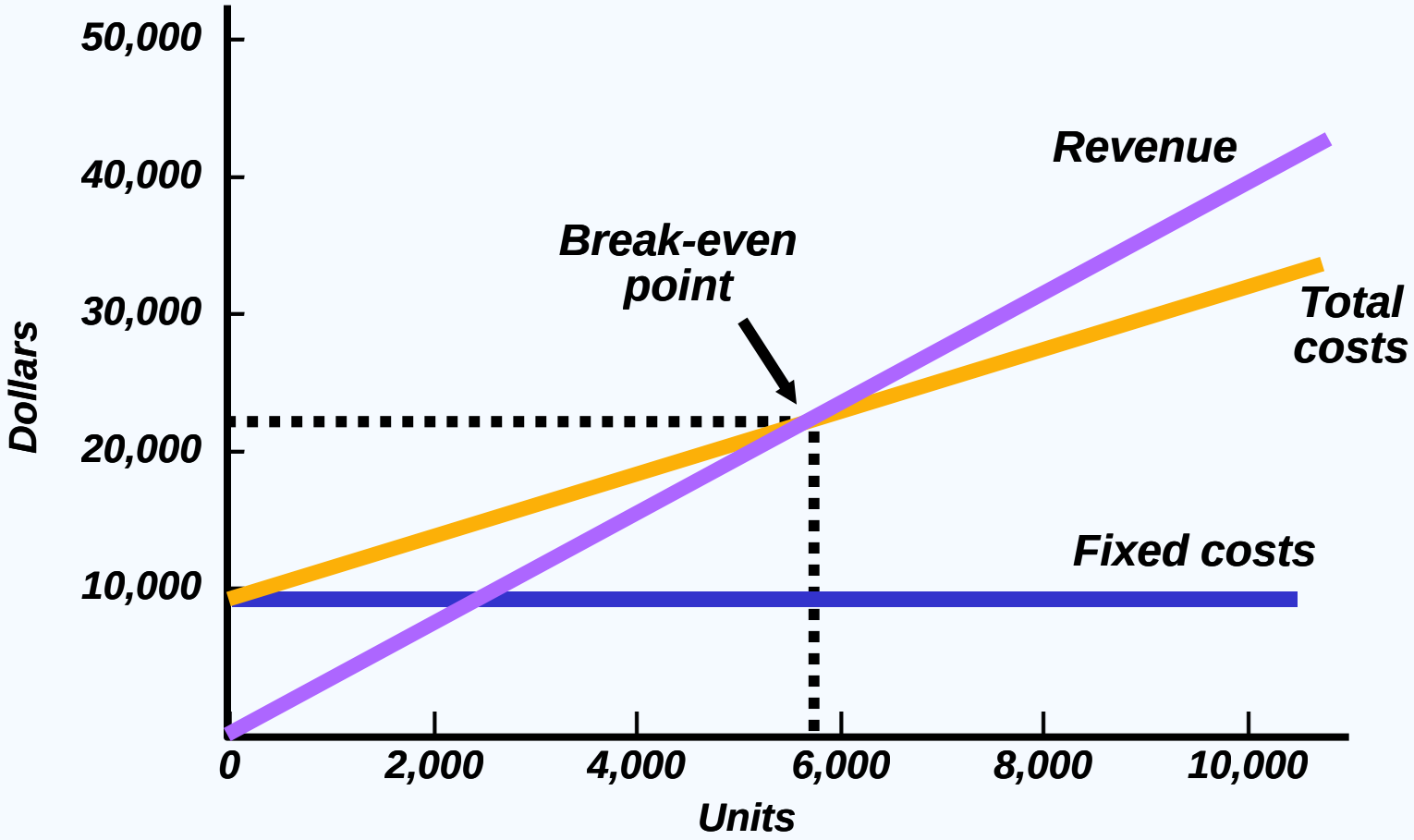
Direct labor* = $1.50/*unit **_Selling price_ = $4.00 *per unit***

$$BEP_{\$} = \frac{F}{1 - (V/P)} = \frac{\$10{,}000}{1 - [(1.50 + .75)/(4.00)]}$$

$$= \frac{\$10{,}000}{.4375} = \$22{,}857.14$$

$$BEP_{x} = \frac{F}{P - V} = \frac{\$10{,}000}{4.00 - (1.50 + .75)} = 5{,}714$$

Break-Even Example



Break-Even Example

Multiproduct Case

$$BEP_{\$} = \frac{F}{\sum\left[\left(1 - \frac{V_i}{P_i}\right) \times (W_i)\right]}$$

where V = variable cost per unit
P = price per unit
F = fixed costs
W = percent each product is of total dollar sales
i = each product

Multiproduct Example

Fixed costs = $3,500 per month

Item	*Price*	*Cost*	*Annual Forecasted Sales Units*
Sandwich	$2.95	$1.25	7,000
Soft drink	.80	.30	7,000
Baked potato	1.55	.47	5,000
Tea	.75	.25	5,000
Salad bar	2.85	1.00	3,000

Multiproduct Example

Fixed costs = $3,500 per month

Item	Price	Cost	Annual Forecasted Sales Units
Sandwich	$2.95	$1.25	7,000

Item (*i*)	Selling Price (*P*)	Variable Cost (*V*)	(*V*/*P*)	1 - (*V*/*P*)	Annual Forecasted Sales $	% of Sales	Weighted Contribution (col 5 x col 7)
Sandwich	$2.95	$1.25	.42	.58	$20,650	.446	.259
Soft drink	.80	.30	.38	.62	5,600	.121	.075
Baked potato	1.55	.47	.30	.70	7,750	.167	.117
Tea	.75	.25	.33	.67	3,750	.081	.054
Salad bar	2.85	1.00	.35	.65	8,550	.185	.120
					$46,300	1.000	.625

Multiprod

$$BEP_{\$} = \frac{F}{\sum\left[\left(1 - \frac{V_i}{P_i}\right) \times (W_i)\right]}$$

$$= \frac{\$3,500 \times 12}{.625} = \$67,200$$

$$\text{Daily sales} = \frac{\$67,200}{312 \text{ days}} = \$215.38$$

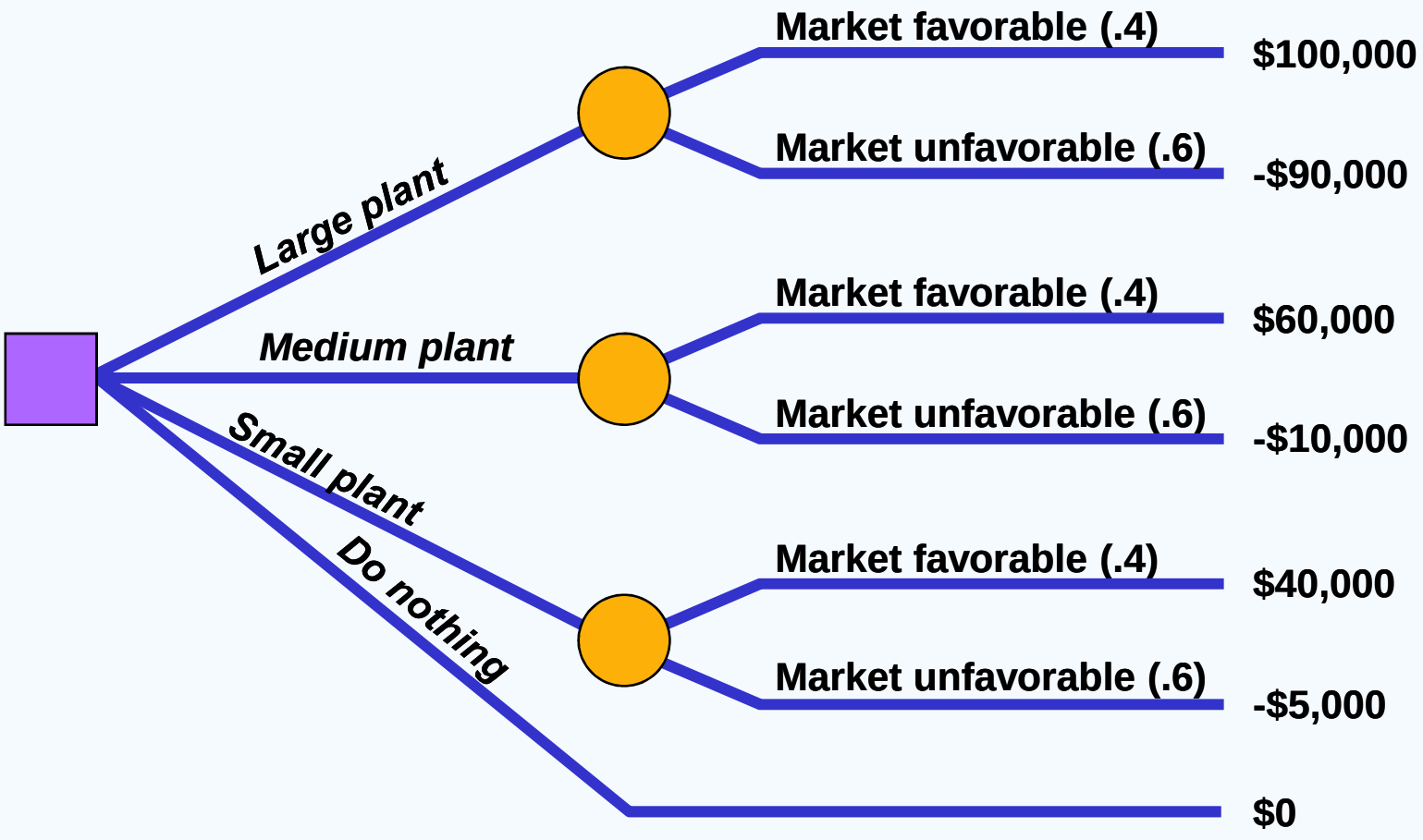
$$\frac{.446 \times \$215.38}{\$2.95} = 32.6 \approx 33 \text{ sandwiches per day}$$

Fixed costs = $3,500 per m

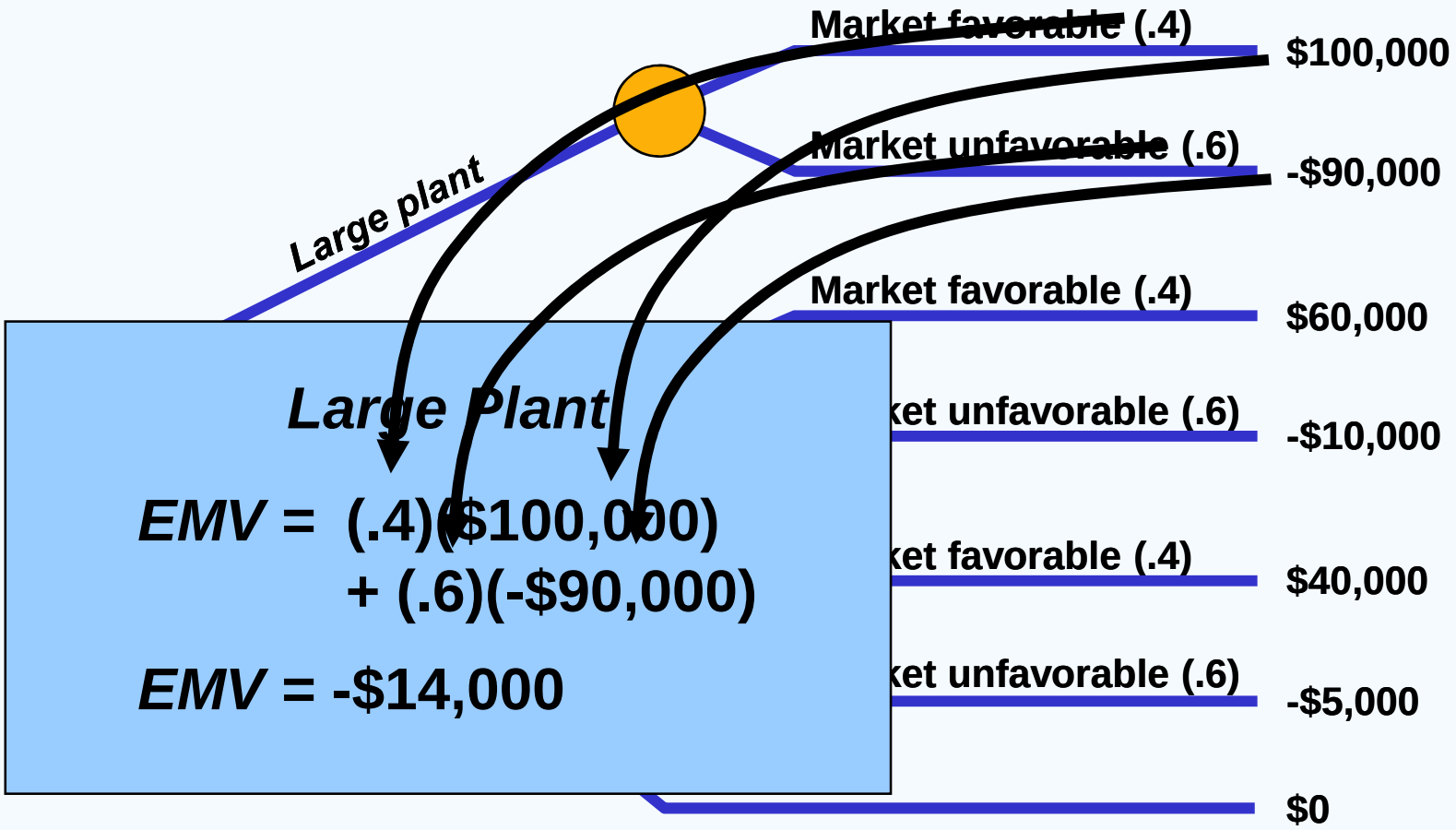
Item	Price
Sandwich	$2.95

Item (*i*)	Selling Price (*P*)	Variable Cost (*V*)	(*V*/*P*)				
Sandwich	$2.95	$1.25	.42				
Soft drink	.80	.30	.38				
Baked potato	1.55	.47	.30				
Tea	.75	.25	.33	.67	3,750	.081	.054
Salad bar	2.85	1.00	.35	.65	8,550	.185	.120
					$46,300	1.000	.625

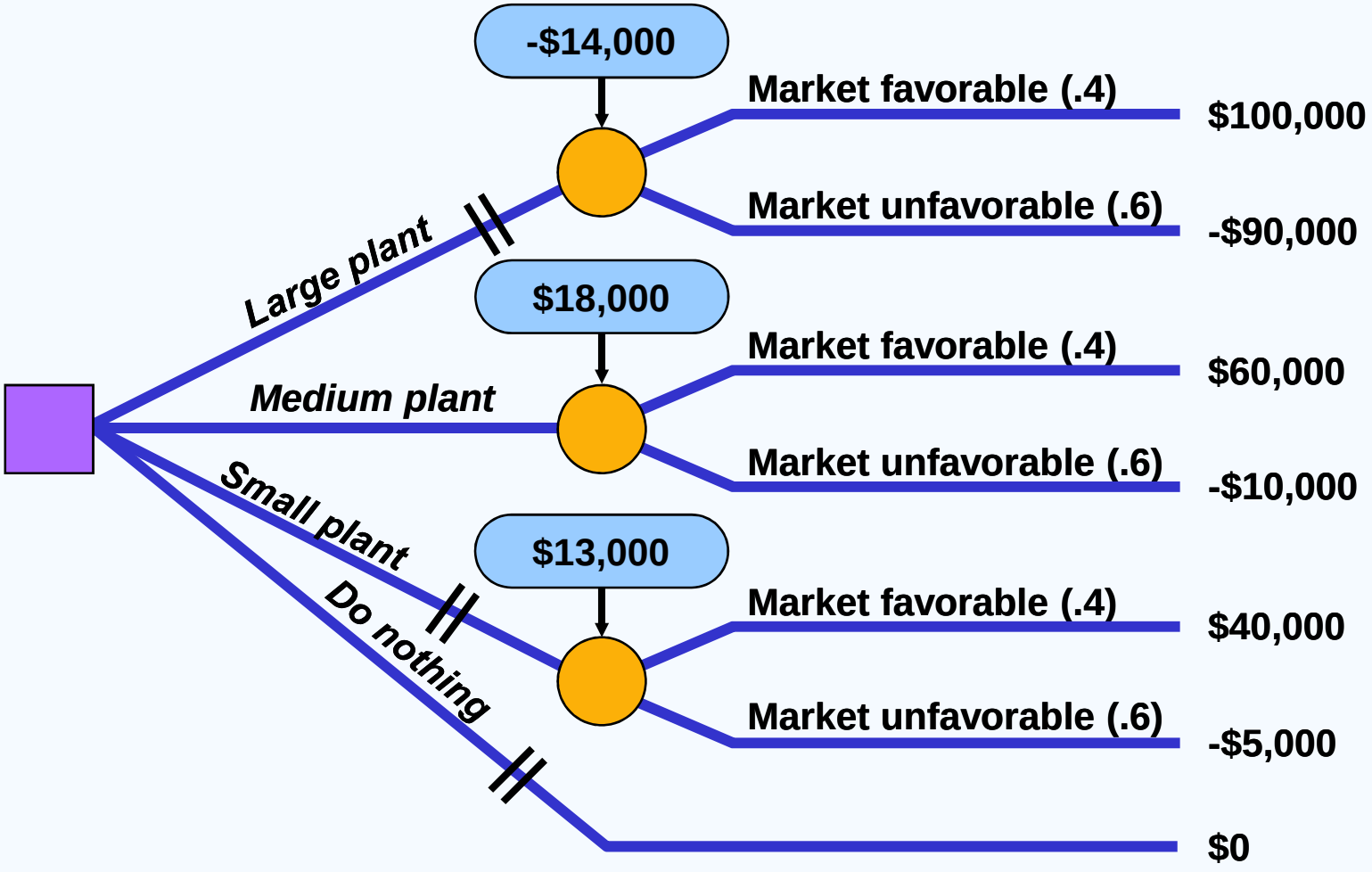
Decision Trees and Capacity Decision



Decision Trees and Capacity Decision



Decision Trees and Capacity Decision



Strategy-Driven Investment

- ☑ ***Operations may be responsible for return-on-investment (ROI)***
- ☑ ***Analyzing capacity alternatives should include capital investment, variable cost, cash flows, and net present value***

Net Present Value (NPV)

$$P = \frac{F}{(1 + i)^N}$$

where F = future value

P = present value

i = interest rate

N = number of years

Net Present Value (NPV)

$$P = \frac{F}{(1 + i)^N}$$

While this works fine, it is cumbersome for larger values of N

e value
ent value
est rate
ber of years

NPV Using Factors

$$P = \frac{F}{(1 + i)^N} = FX$$

where X = a factor from Table S7.1 defined as $= 1/(1 + i)^N$ and F = future value

Portion of Table S7.1

Year	5%	6%	7%	…	10%
1	.952	.943	.935		.909
2	.907	.890	.873		.826
3	.864	.840	.816		.751
4	.823	.792	.763		.683
5	.784	.747	.713		.621

Present Value of an Annuity

An annuity is an investment which generates uniform equal payments

$$S = RX$$

where X = *factor from Table S7.2*

S = *present value of a series of uniform annual receipts*

R = *receipts that are received every year of the life of the investment*

Present Value of an Annuity

Portion of Table S7.2

Year	*5%*	*6%*	*7%*	*…*	*10%*
1	.952	.943	.935		.909
2	1.859	1.833	1.808		1.736
3	2.723	2.676	2.624		2.487
4	4.329	3.465	3.387		3.170
5	5.076	4.212	4.100		3.791

Present Value of an Annuity

$7,000 *in receipts per for* 5 *years*
***Interest rate* = 6%**

From Table S7.2
***X* = 4.212**

S* = *RX
***S* = $7,000(4.212) = $29,484**

Present Value With Different Future Receipts

Investment A's Cash Flow	Investment B's Cash Flow	Year	Present Value Factor at 8%
$10,000	$9,000	1	.926
9,000	9,000	2	.857
8,000	9,000	3	.794
7,000	9,000	4	.735

Present Value With Different Future Receipts

Year	Investment A's Present Values	Investment B's Present Values
1	$9,260 = (.926)($10,000)	$8,334 = (.926)($9,000)
2	7,713 = (.857)($9,000)	7,713 = (.857)($9,000)
3	6,352 = (.794)($8,000)	7,146 = (.794)($9,000)
4	5,145 = (.735)($7,000)	6,615 = (.735)($9,000)
Totals	$28,470	$29,808
Minus initial investment	-25,000	-26,000
Net present value	$3,470	$3,808

Operations Management

Chapter 13 – Aggregate Planning

PowerPoint presentation to accompany
Heizer/Render
Principles of Operations Management, 7e
Operations Management, 9e

PEARSON Prentice Hall

Aggregate Planning

Determine the quantity and timing of production for the immediate future

- ☑ ***Objective is to minimize cost over the planning period by adjusting***
  - ☑ ***Production rates***
  - ☑ ***Labor levels***
  - ☑ ***Inventory levels***
  - ☑ ***Overtime work***
  - ☑ ***Subcontracting rates***
  - ☑ ***Other controllable variables***

Aggregate Planning

Required for aggregate planning

- ☑ ***A logical overall unit for measuring sales and output***
- ☑ ***A forecast of demand for an intermediate planning period in these aggregate terms***
- ☑ ***A method for determining costs***
- ☑ ***A model that combines forecasts and costs so that scheduling decisions can be made for the planning period***

The Planning Process

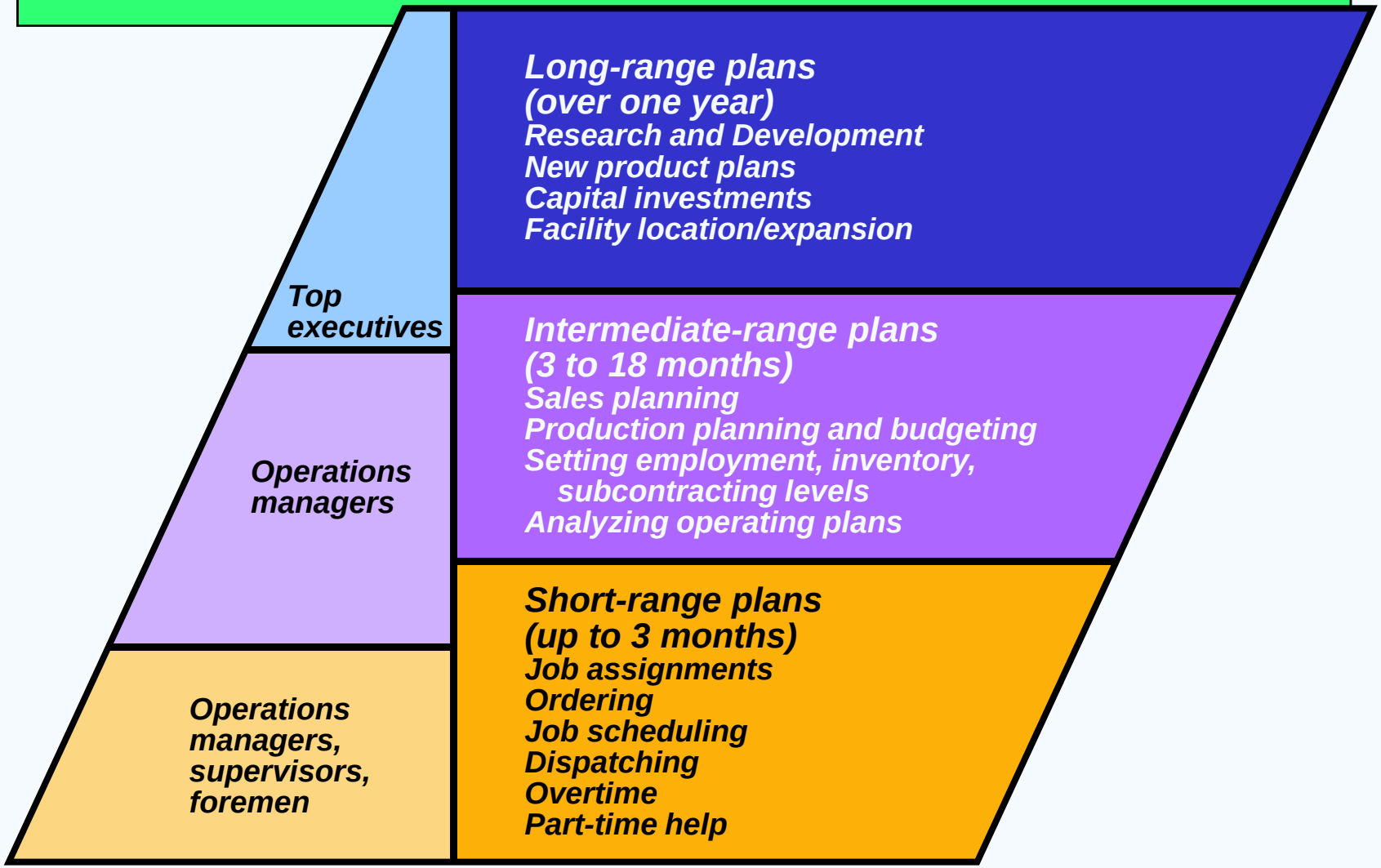


Figure 13.1

Aggregate Planning

Quarter 1		
Jan	Feb	Mar
150,000	120,000	110,000

Quarter 2		
Apr	May	Jun
100,000	130,000	150,000

Quarter 3		
Jul	Aug	Sep
180,000	150,000	140,000





Aggregate Planning

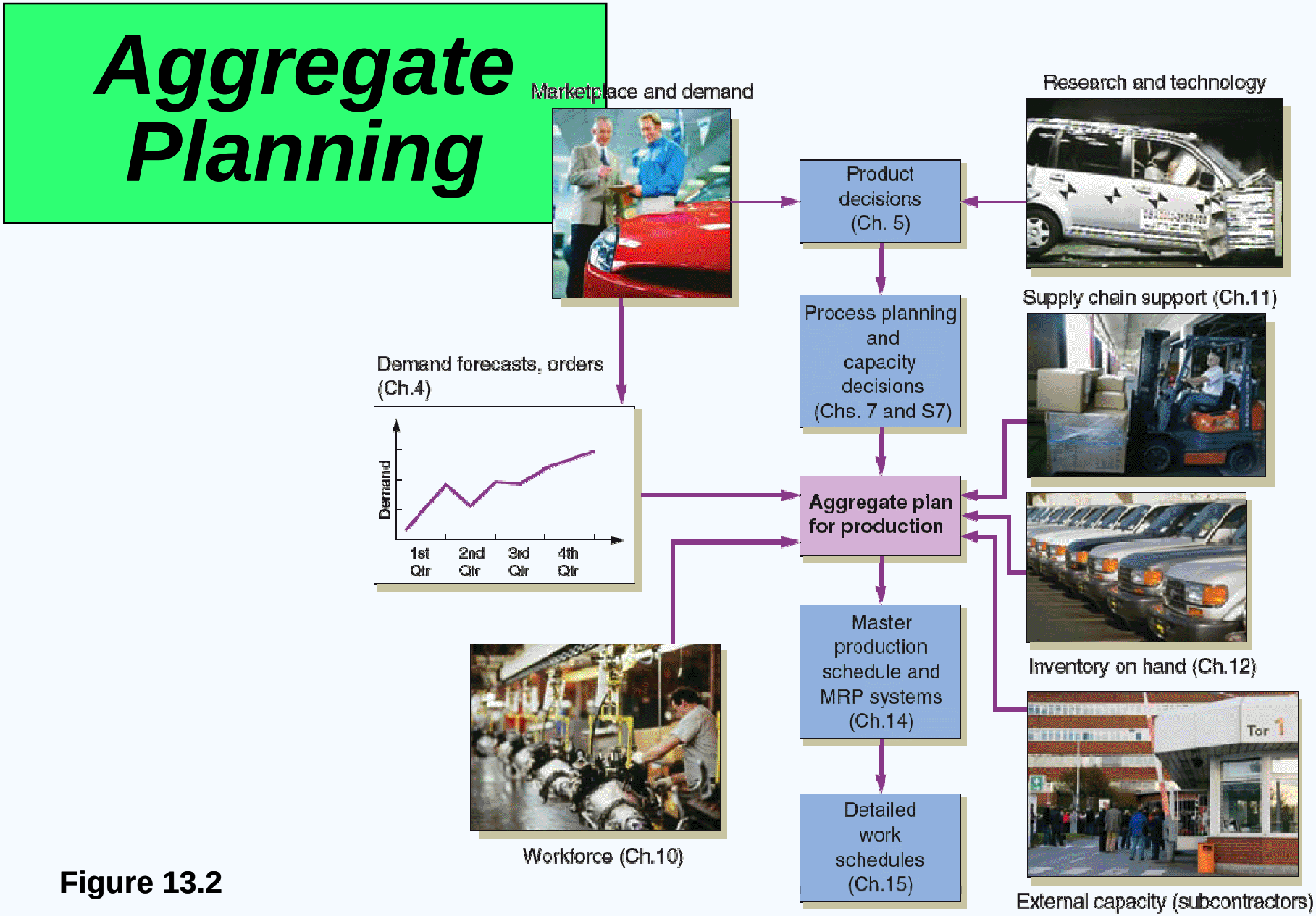


Figure 13.2

Aggregate Planning

- ☑ *Combines appropriate resources into general terms*
- ☑ *Part of a larger production planning system*
- ☑ *Disaggregation breaks the plan down into greater detail*
- ☑ *Disaggregation results in a master production schedule*

Aggregate Planning Strategies

1. *Use inventories to absorb changes in demand*
2. *Accommodate changes by varying workforce size*
3. *Use part-timers, overtime, or idle time to absorb changes*
4. *Use subcontractors and maintain a stable workforce*
5. *Change prices or other factors to influence demand*

Capacity Options

- ☑ *Changing inventory levels*
  - ☑ *Increase inventory in low demand periods to meet high demand in the future*
  - ☑ *Increases costs associated with storage, insurance, handling, obsolescence, and capital investment 15% to 40%*
  - ☑ *Shortages can mean lost sales due to long lead times and poor customer service*

Capacity Options

- ☑ *Varying workforce size by hiring or layoffs*
  - ☑ *Match production rate to demand*
  - ☑ *Training and separation costs for hiring and laying off workers*
  - ☑ *New workers may have lower productivity*
  - ☑ *Laying off workers may lower morale and productivity*

Capacity Options

- ☑ *Varying production rate through overtime or idle time*
  - ☑ *Allows constant workforce*
  - ☑ *May be difficult to meet large increases in demand*
  - ☑ *Overtime can be costly and may drive down productivity*
  - ☑ *Absorbing idle time may be difficult*

Capacity Options

- ☑ ***Subcontracting***
  - ☑ ***Temporary measure during periods of peak demand***
  - ☑ ***May be costly***
  - ☑ ***Assuring quality and timely delivery may be difficult***
  - ☑ ***Exposes your customers to a possible competitor***

Capacity Options

- ☑ *Using part-time workers*
  - ☑ *Useful for filling unskilled or low skilled positions, especially in services*

Demand Options

- ☑ *Influencing demand*
  - ☑ *Use advertising or promotion to increase demand in low periods*
  - ☑ *Attempt to shift demand to slow periods*
  - ☑ *May not be sufficient to balance demand and capacity*

Demand Options

- ☑ *Back ordering during high-demand periods*
  - ☑ *Requires customers to wait for an order without loss of goodwill or the order*
  - ☑ *Most effective when there are few if any substitutes for the product or service*
  - ☑ *Often results in lost sales*

Demand Options

- ☑ *Counterseasonal product and service mixing*
  - ☑ *Develop a product mix of counterseasonal items*
  - ☑ *May lead to products or services outside the company's areas of expertise*

Aggregate Planning Options

Option	Advantages	Disadvantages	Some Comments
Changing inventory levels	Changes in human resources are gradual or none; no abrupt production changes.	Inventory holding cost may increase. Shortages may result in lost sales.	Applies mainly to production, not service, operations.
Varying workforce size by hiring or layoffs	Avoids the costs of other alternatives.	Hiring, layoff, and training costs may be significant.	Used where size of labor pool is large.

Table 13.1

Aggregate Planning Options

Option	Advantages	Disadvantages	Some Comments
Varying production rates through overtime or idle time	Matches seasonal fluctuations without hiring/ training costs.	Overtime premiums; tired workers; may not meet demand.	Allows flexibility within the aggregate plan.
Sub-contracting	Permits flexibility and smoothing of the firm's output.	Loss of quality control; reduced profits; loss of future business.	Applies mainly in production settings.

Table 13.1

Aggregate Planning Options

Option	Advantages	Disadvantages	Some Comments
Using part-time workers	Is less costly and more flexible than full-time workers.	High turnover/ training costs; quality suffers; scheduling difficult.	Good for unskilled jobs in areas with large temporary labor pools.
Influencing demand	Tries to use excess capacity. Discounts draw new customers.	Uncertainty in demand. Hard to match demand to supply exactly.	Creates marketing ideas. Overbooking used in some businesses.

Table 13.1

Aggregate Planning Options

Option	Advantages	Disadvantages	Some Comments
Back ordering during high-demand periods	May avoid overtime. Keeps capacity constant.	Customer must be willing to wait, but goodwill is lost.	Many companies back order.
Counter-seasonal product and service mixing	Fully utilizes resources; allows stable workforce.	May require skills or equipment outside the firm's areas of expertise.	Risky finding products or services with opposite demand patterns.

Table 13.1

Methods for Aggregate Planning

- ☑ ***A mixed strategy may be the best way to achieve minimum costs***
- ☑ ***There are many possible mixed strategies***
- ☑ ***Finding the optimal plan is not always possible***

Mixing Options to Develop a Plan

- ☑ *Chase strategy*
  - ☑ *Match output rates to demand forecast for each period*
  - ☑ *Vary workforce levels or vary production rate*
  - ☑ *Favored by many service organizations*

Mixing Options to Develop a Plan

- ☑ *Level strategy*
  - ☑ *Daily production is uniform*
  - ☑ *Use inventory or idle time as buffer*
  - ☑ *Stable production leads to better quality and productivity*
- ☑ *Some combination of capacity options, a mixed strategy, might be the best solution*

Graphical Methods

- ☑ *Popular techniques*
- ☑ *Easy to understand and use*
- ☑ *Trial-and-error approaches that do not guarantee an optimal solution*
- ☑ *Require only limited computations*

Graphical Methods

1. Determine the demand for each period
2. Determine the capacity for regular time, overtime, and subcontracting each period
3. Find labor costs, hiring and layoff costs, and inventory holding costs
4. Consider company policy on workers and stock levels
5. Develop alternative plans and examine their total costs

Roofing Supplier Example 1

Month	Expected Demand	Production Days	Demand Per Day (computed)
Jan	900	22	41
Feb	700	18	39
Mar	800	21	38
Apr	1,200	21	57
May	1,500	22	68
June	1,100	20	55
	6,200	124	

Table 13.2

$$\text{Average requirement} = \frac{\text{Total expected demand}}{\text{Number of production days}}$$

$$= \frac{6{,}200}{124} = 50 \text{ units per day}$$

Roofing Supplier Example 1

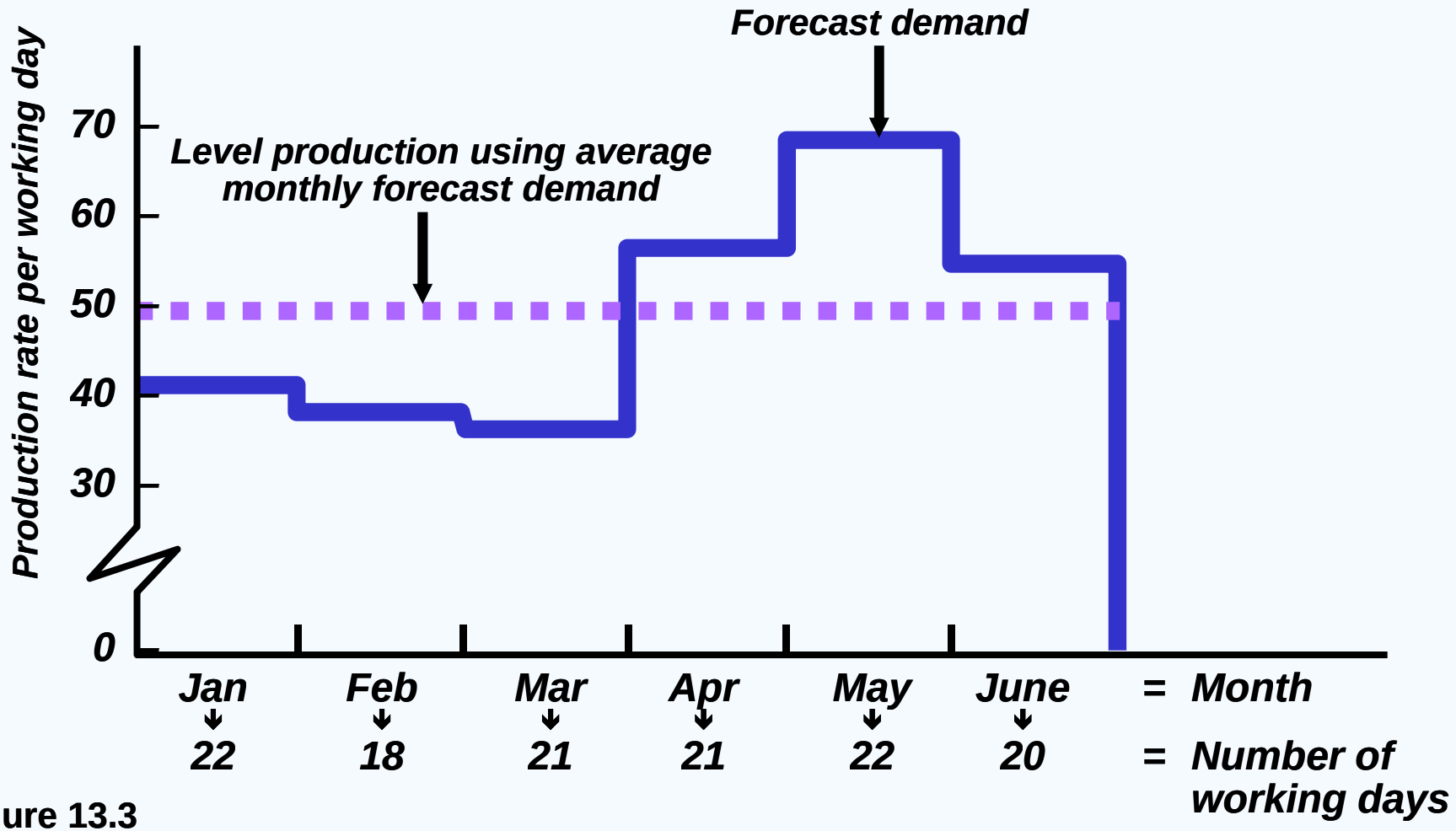


Figure 13.3

Roofing Supplier Example 2

Cost Information	
Inventory carrying cost	$ 5 *per unit per month*
Subcontracting cost per unit	$10 *per unit*
Average pay rate	$ 5 *per hour* ($40 *per day*)
Overtime pay rate	$ 7 *per hour* (*above 8 hours per day*)
Labor-hours to produce a unit	1.6 *hours per unit*
Cost of increasing daily production rate (hiring and training)	$300 *per unit*
Cost of decreasing daily production rate (layoffs)	$600 *per unit*

Table 13.3

Plan 1 – constant workforce

Roofing Supplier Example 2

Month	Production at 50 Units per Day	Demand Forecast	Monthly Inventory Change	Ending Inventory
Jan	1,100	900	+200	200
Feb	900	700	+200	400
Mar	1,050	800	+250	650
Apr	1,050	1,200	-150	500
May	1,100	1,500	-400	100
June	1,000	1,100	-100	0
				1,850

Total units of inventory carried over from one month to the next = 1,850 *units*

Workforce required to produce 50 *units per day* = 10 *workers*

Roofing Supplier Example 2

Costs		Calculations
Inventory carrying	$9,250	(= 1,850 units carried x $5 per unit)
Regular-time labor	49,600	(= 10 workers x $40 per day x 124 days)
Other costs (overtime, hiring, layoffs, subcontracting)	0	
Total cost	$58,850	

Total units of inventory carried over from one month to the next = 1,850 units

Workforce required to produce 50 units per day = 10 workers

Roofing Supplier Example 2

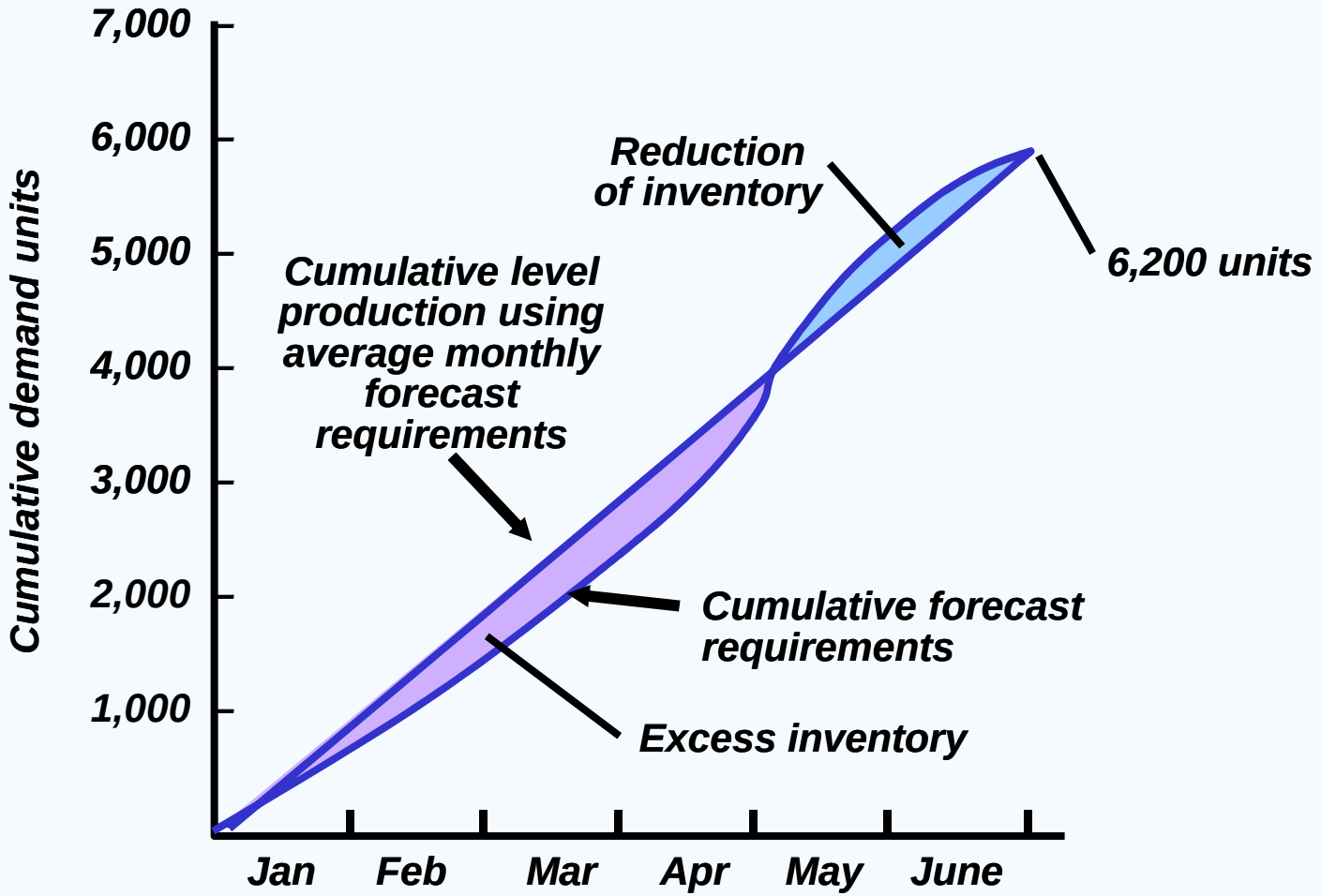


Figure 13.4

Roofing Supplier Example 3

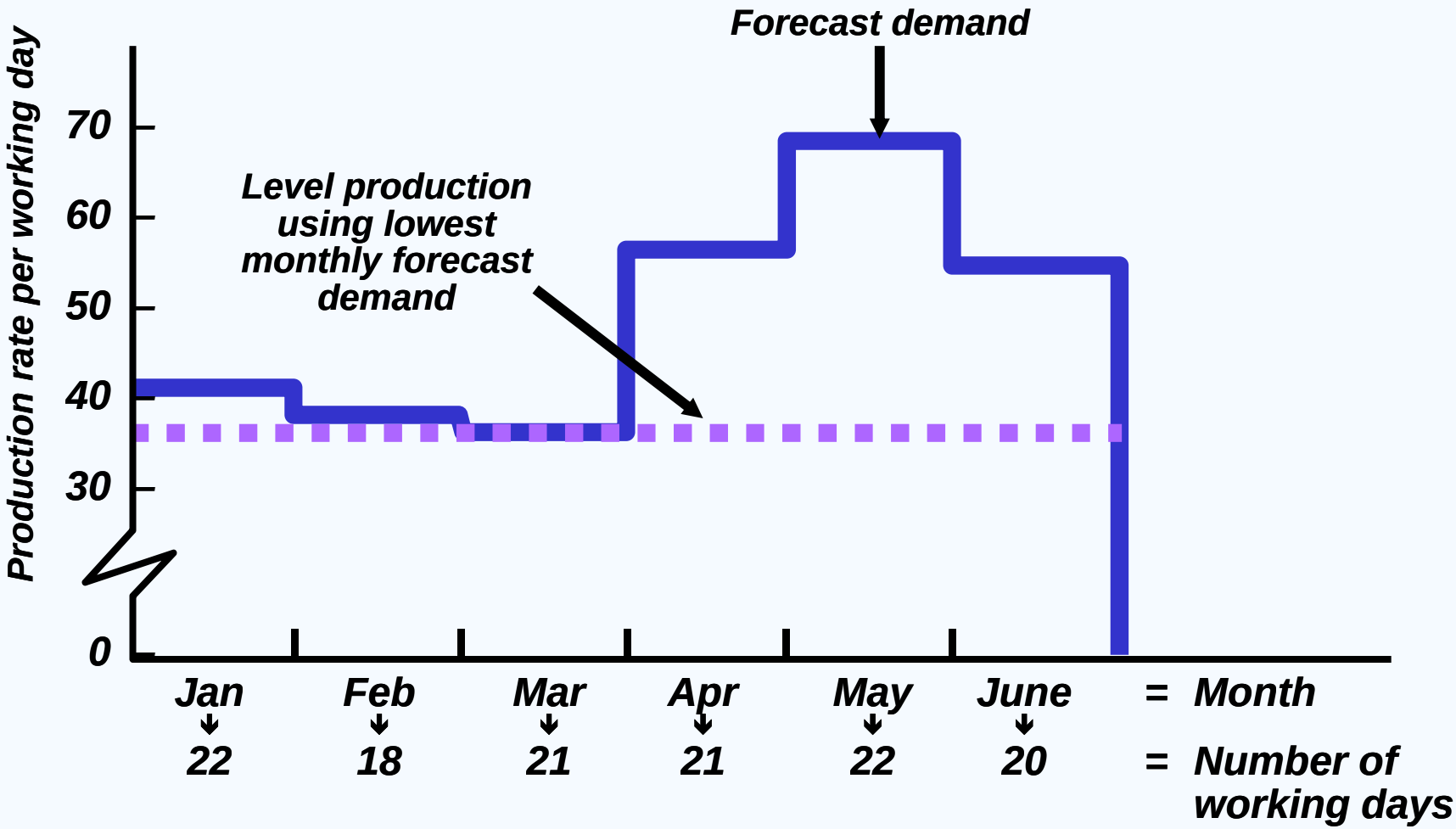
Month	Expected Demand	Production Days	Demand Per Day (computed)
Jan	900	22	41
Feb	700	18	39
Mar	800	21	38
Apr	1,200	21	57
May	1,500	22	68
June	1,100	20	55
	6,200	124	

Table 13.2

Plan 2 – subcontracting

Minimum requirement = 38 units per day

Roofing Supplier Example 3



Roofing Supplier Example 3

Cost Information	
Inventory carrying cost	$ 5 per unit per month
Subcontracting cost per unit	$10 per unit
Average pay rate	$ 5 per hour ($40 per day)
Overtime pay rate	$ 7 per hour (above 8 hours per day)
Labor-hours to produce a unit	1.6 hours per unit
Cost of increasing daily production rate (hiring and training)	$300 per unit
Cost of decreasing daily production rate (layoffs)	$600 per unit

Table 13.3

Roofing Supplier Example 3

In-house production = 38 *units per day*
x 124 *days*
= 4,712 *units*

Subcontract units = 6,200 - 4,712
= 1,488 *units*

(layoffs)

Table 13.3

Roofing Supplier Example 3

In-house production = 38 *units per day*
x 124 *days*
= 4,712 *units*

Costs		*Calculations*
Regular-time labor	$37,696	(= 7.6 *workers* x $40 *per day* x 124 *days*)
Subcontracting	14,880	(= 1,488 *units* x $10 *per unit*)
Total cost	$52,576	

Roofing Supplier Example 4

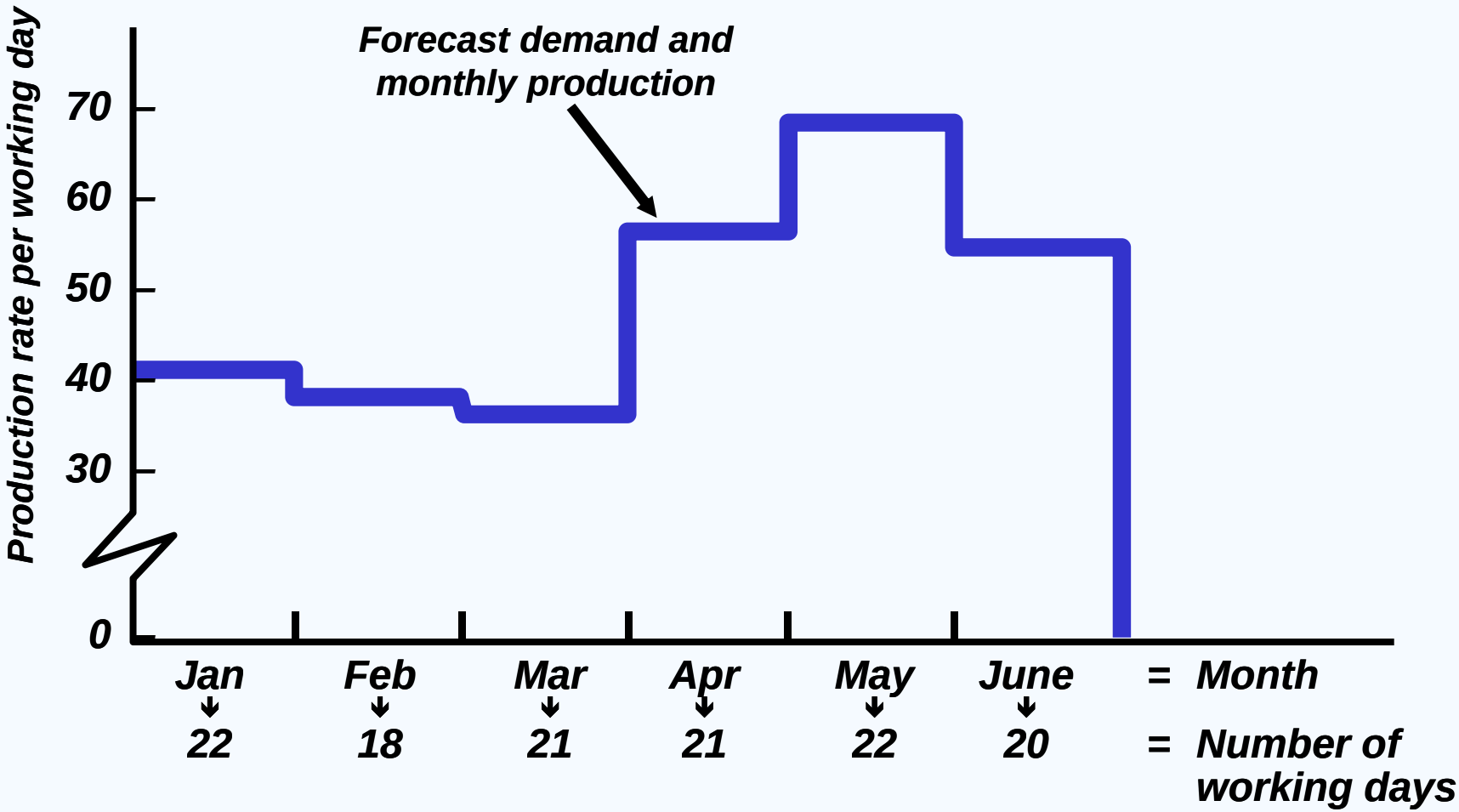
Month	Expected Demand	Production Days	Demand Per Day (computed)
Jan	900	22	41
Feb	700	18	39
Mar	800	21	38
Apr	1,200	21	57
May	1,500	22	68
June	1,100	20	55
	6,200	124	

Table 13.2

Plan 3 – hiring and firing

Production = Expected Demand

Roofing Supplier Example 4



Roofing Supplier Example 4

Cost Information	
Inventory carrying cost	$ 5 per unit per month
Subcontracting cost per unit	$10 per unit
Average pay rate	$ 5 per hour ($40 per day)
Overtime pay rate	$ 7 per hour (above 8 hours per day)
Labor-hours to produce a unit	1.6 hours per unit
Cost of increasing daily production rate (hiring and training)	$300 per unit
Cost of decreasing daily production rate (layoffs)	$600 per unit

Table 13.3

Roofing Supplier Example 4

Month	Forecast (units)	Daily Prod Rate	Basic Production Cost (demand x 1.6 hrs/unit x $5/hr)	Extra Cost of Increasing Production (hiring cost)	Extra Cost of Decreasing Production (layoff cost)	Total Cost
Jan	900	41	$ 7,200	—	—	$ 7,200
Feb	700	39	5,600	—	$1,200 (= 2 x $600)	6,800
Mar	800	38	6,400	—	$600 (= 1 x $600)	7,000
Apr	1,200	57	9,600	$5,700 (= 19 x $300)	—	15,300
May	1,500	68	12,000	$3,300 (= 11 x $300)	—	15,300
June	1,100	55	8,800	—	$7,800 (= 13 x $600)	16,600
			$49,600	$9,000	$9,600	$68,200

Table 13.4

Comparison of Three Plans

Cost	Plan 1	Plan 2	Plan 3
Inventory carrying	$ 9,250	$ 0	$ 0
Regular labor	49,600	37,696	49,600
Overtime labor	0	0	0
Hiring	0	0	9,000
Layoffs	0	0	9,600
Subcontracting	0	14,880	0
Total cost	$58,850	$52,576	$68,200

Plan 2 is the lowest cost option

Table 13.5

Mathematical Approaches

- ☑ *Useful for generating strategies*
  - ☑ *Transportation Method of Linear Programming*
    - ☑ *Produces an optimal plan*
  - ☑ *Management Coefficients Model*
    - ☑ *Model built around manager's experience and performance*
  - ☑ *Other Models*
    - ☑ *Linear Decision Rule*
    - ☑ *Simulation*

Transportation Method

	Sales Period		
	Mar	Apr	May
Demand	800	1,000	750
Capacity:			
Regular	700	700	700
Overtime	50	50	50
Subcontracting	150	150	130
Beginning inventory	100 tires		

Costs	
Regular time	$40 per tire
Overtime	$50 per tire
Subcontracting	$70 per tire
Carrying	$ 2 per tire per month

Table 13.6

Transportation Example

Important points

1. Carrying costs are $2/tire/month. If goods are made in one period and held over to the next, holding costs are incurred
2. Supply must equal demand, so a dummy column called “unused capacity” is added
3. Because back ordering is not viable in this example, cells that might be used to satisfy earlier demand are not available

Transportation Example

Important points

4. ***Quantities in each column designate the levels of inventory needed to meet demand requirements***
5. ***In general, production should be allocated to the lowest cost cell available without exceeding unused capacity in the row or demand in the column***

Transp
Examp

SUPPLY FROM		DEMAND FOR: Period 1 (Mar.)	Period 2 (Apr.)	Period 3 (May)	Unused Capacity (dummy)	TOTAL CAPACITY AVAILABLE (supply)
Beginning inventory		0 100	2	4	0	100
Period 1	*Regular time*	40 700	42	44	0	700
	Overtime	50	52 50	54	0	50
	Subcontract	70	72 150	74	0	150
Period 2	*Regular time*	×	40 700	42	0	700
	Overtime	×	50 50	52	0	50
	Subcontract	×	70 50	72	0 100	150
Period 3	*Regular time*	×	×	40 700	0	700
	Overtime	×	×	50 50	0	50
	Subcontract	×	×	70	0 130	130
TOTAL DEMAND		800	1,000	750	230	2,780

Table 13.7

Management Coefficients Model

- ☑ ***Builds a model based on manager's experience and performance***
- ☑ ***A regression model is constructed to define the relationships between decision variables***
- ☑ ***Objective is to remove inconsistencies in decision making***

Other Models

Linear Decision Rule

- ☑ *Minimizes costs using quadratic cost curves*
- ☑ *Operates over a particular time period*

Simulation

- ☑ *Uses a search procedure to try different combinations of variables*
- ☑ *Develops feasible but not necessarily optimal solutions*

Summary of Aggregate Planning Methods

Techniques	Solution Approaches	Important Aspects
Graphical methods	Trial and error	Simple to understand and easy to use. Many solutions; one chosen may not be optimal.
Transportation method of linear programming	Optimization	LP software available; permits sensitivity analysis and new constraints; linear functions may not be realistic.

Table 13.8

Summary of Aggregate Planning Methods

Techniques	Solution Approaches	Important Aspects
Management coefficients model	Heuristic	Simple, easy to implement; tries to mimic manager's decision process; uses regression.
Simulation	Change parameters	Complex; may be difficult to build and for managers to understand.

Table 13.8

Contoh Kasus

Diketahui demand bulanan untuk tahun 2011 sbb :

Periode	Bulan	Demand
1	Jan	500
2	Feb	400
3	Mar	300
4	Apr	500
5	Mei	700
6	Jun	900
7	Jul	1200
8	Agu	1100
9	Sep	900
10	Okt	800
11	Nop	700
12	Des	600

Opsi Produksi	Biaya per unit	Kapasitas per bulan
Reguler	5	650
Overtime	8	150
Inventory	1	Tdk terbatas
Subcontract	12	100

Diketahui persediaan pada bulan januari kosong dan untuk bulan desember 2011 sebanyak 50 unit

Operations Management

Outsourcing

PowerPoint presentation to accompany
Heizer/Render
Principles of Operations Management, 7e
Operations Management, 9e

PEARSON Prentice Hall

Outsourcing

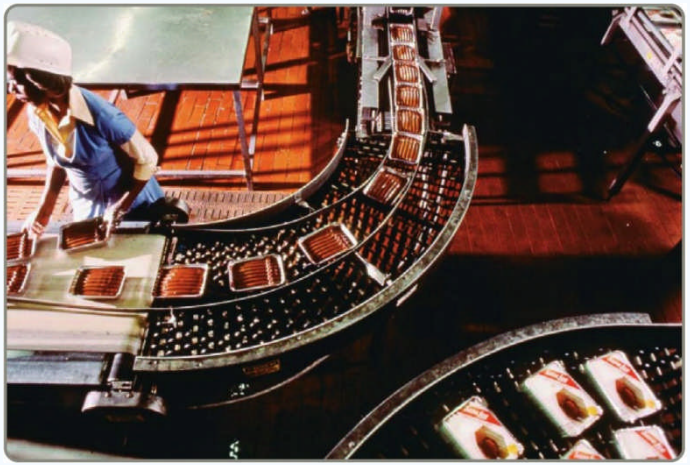
- ☑ *Outsourcing can replace entire purchasing, information systems, marketing, finance, and operations department*
- ☑ *Applicable to firms throughout the world*
- ☑ *Making the right decision may be the difference between success and failure*

What is Outsourcing?

- ☑ *Procuring from external suppliers service or products the firms used to provide for itself*
- ☑ *Offshoring is moving processes to a foreign country but retaining control*
- ☑ *Firms that outsource are called clients, the actual work is done by the outsourcing provider*
- ☑ *Extension of the long-standing practice of subcontracting*

What is Outsourcing?

- ☑ *Outsourcing has become a major strategy as firms move toward specialization*
  - ☑ *Increasing expertise*
  - ☑ *Reduced cost of reliable transportation*
  - ☑ *Rapid deployment of telecommunications and computers – the Internet*



Examples of Outsourcing

- ☑ *Call centers in French Angola*
- ☑ *Legal and finance service in the Philippines*
- ☑ *EDS handling information technology for Nextel*
- ☑ *IBM providing travel and payroll for P&G*
- ☑ *Solectron producing IBM computers*

Types of Outsourcing

- ☑ *Common processes outsourced are*
  - ☑ *Purchasing*
  - ☑ *Logistics*
  - ☑ *R&D*
  - ☑ *Operations*
  - ☑ *Service management*
  - ☑ *Human resources*
  - ☑ *Finance/accounting*
  - ☑ *Customer relations*
  - ☑ *Sales/marketing*
  - ☑ *Training*
  - ☑ *Legal processes*
- ☑ *Outsourcing implies a legally binding contract*

Strategic Planning and Core Competencies

- ☑ *Strategic planning defines the mission and goals for the organization*
- ☑ *From this the organization determines the role of each business activity*
- ☑ *Core competencies are things the organization does better than its competition*
- ☑ *Non-core activities are good candidates for outsourcing*

Strategic Planning and Core Competencies

Sony, An Outsourcing Company

Outsourcers could provide

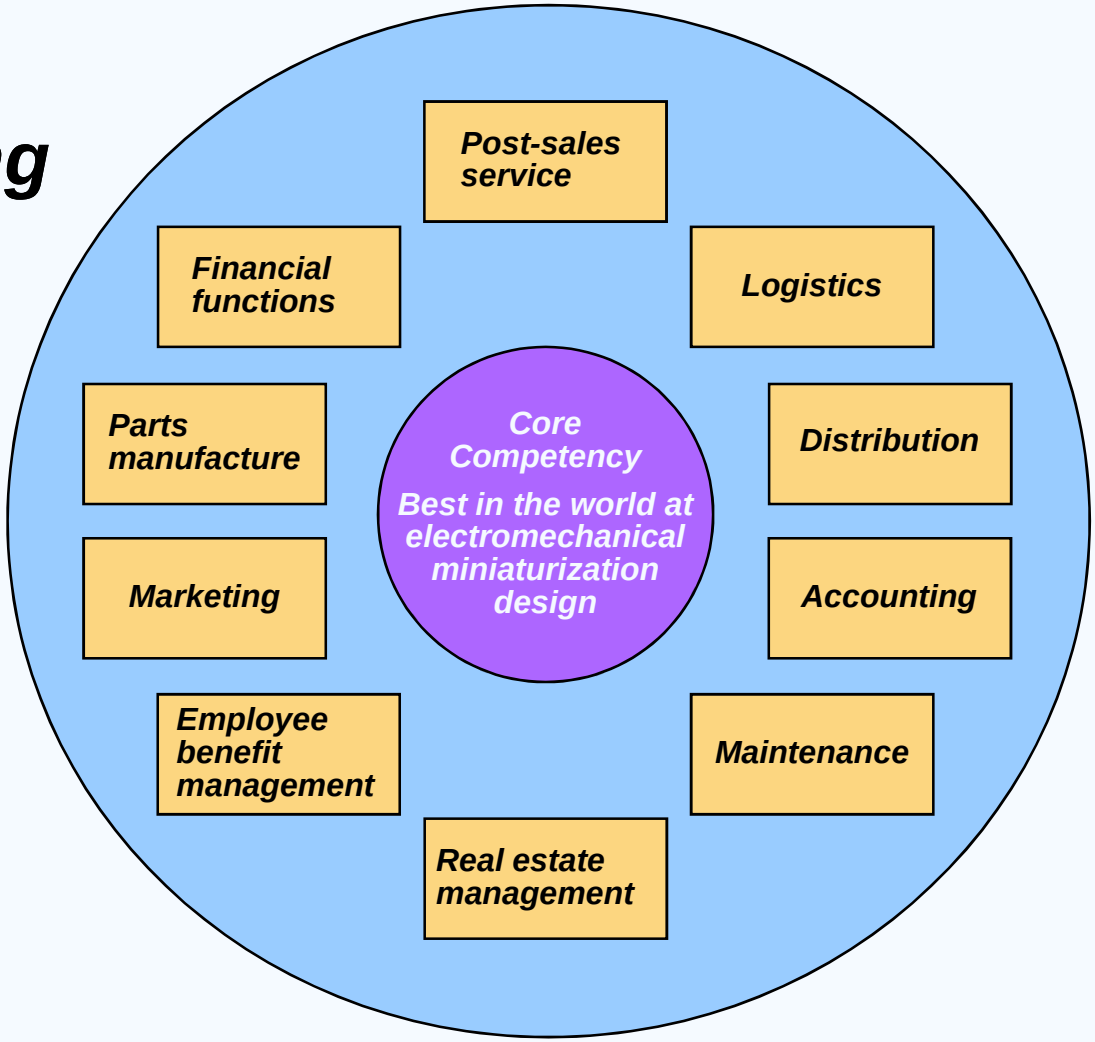


Figure S11.1

Theory of Comparative Advantage

If an external outsourcing provider can perform activities more productively than the client firm, the outsourcing provider should do the work

This applies regardless of the geographical location

Outsourcing Trends and Political Repercussions

According to a survey of 53 major corporations, the most important reasons for outsourcing are:

Cost savings	*77%*
Gaining outside expertise	*70%*
Improving services	*61%*
Focusing on core competencies	*59%*
Gaining access to technology	*56%*

Outsourcing Trends and Political Repercussions

- ☑ ***Outsourcing includes specific business functions (computer help desks) and entire departments (accounting, marketing, finance, etc.)***
- ☑ ***35% of businesses said they would continue or expand outsourcing***
- ☑ ***40% said they would continue outsourcing but revise their arrangements***
- ☑ ***Some said they would reduce outsourcing***

Outsourcing Trends and Political Repercussions

- ☑ Outsourcing includes specific business
- ☑ Not all outsourcing experiences are satisfactory
- ☑ There is still a lot to learn about outsourcing as a method to improve productivity
- ☑ Some said they would reduce outsourcing

Outsourcing Trends and Political Repercussions

- ☑ *Political backlash can occur when jobs are outsourced to foreign countries*
  - ☑ *In the U.S. state and federal laws have been enacted to limit or prevent outsourcing activities*
- ☑ *Recent data suggests more foreigners outsource jobs to the U.S. than American companies outsource offshore*
- ☑ *Backsourcing describes the process of returning work to the original firm when outsourcing fails*

Risks in Outsourcing

- ☑ *Outsourcing can be risky*
- ☑ *As many as half of all outsourcing agreements fail because of inappropriate planning and analysis*
- ☑ *Erratic power grids, government difficulties, inexperienced managers, and unmotivated labor can create problems*
- ☑ *Failure to achieve unrealistic goals sometimes create the impression of failure*

Risks in Outsourcing

Outsourcing Process	Examples of Possible Risks
Identify non-core competencies	Can be incorrectly identified as a non-core competency
Identify non-core activities that should be outsourced	Just because the activity is not a core competence for your firm does not mean an outsource provider is more competent and efficient
Identify impact on existing facilities, capacity, and logistics	May fail to understand the change in resources and talents needed internally

Table S11.1

Risks in Outsourcing

Outsourcing Process	Examples of Possible Risks
Establish goals and draft outsourcing agreement specifications	Goals can be set so high that failure is certain
Identify and select outsource provider	Can select the wrong outsource provider
Negotiate goals and measures of outsourcing performance	Can misinterpret measures and goals, how they are measured, and what they mean

Table S11.1

Risks in Outsourcing

Outsourcing Process	Examples of Possible Risks
Monitor and control current outsourcing program	May be unable to control product development, schedules, and quality
Evaluate and give feedback to outsource provider	May have non-responsive provider (i.e., one that ignores feedback)
Evaluate international political and currency risks	County's currency may be unstable, a country may be politically unstable, or cultural and language differences may inhibit successful operations

Table S11.1

Risks in Outsourcing

Outsourcing Process	Examples of Possible Risks
Evaluate coordination needed for shipping and distribution	May not understand the timing necessary to manage flows to different facilities and markets

Table S11.1

Risks in Outsourcing

Outsourcing brings other issues:

- ☑ ***Employment***
- ☑ ***Changes in facilities and processes needed to receive components in a different state of assembly***
- ☑ ***Vastly expanded logistics issues***

Methodologies for Outsourcing

- ☑ ***Evaluating Multiple Criteria with Factor Rating***
- ☑ ***Break-even Analysis***

Rating International Risk Factors

Nine factors rated 0-3, 0 is no risk, 3 is high risk

Risk Factor	England	Mexico	Spain	Canada
Economic: Labor cost/ laws	1	0	2	1
Economic: Capital availability	0	2	1	0
Economic: Infrastructure	0	2	2	0
Culture: Language	0	0	0	0
Culture: Social norms	2	0	1	2
Migration: Uncontrolled	0	2	0	0
Politics: Ideology	2	0	1	2
Politics: Instability	0	1	2	2
Politics: Legalities	3	0	2	3
Total risk rating scores	8	7	11	10

Table S11.2

Rating Outsourcing Providers

Seven factors rated 1-5 and an importance weight

Factor (criterion)	Importance Weight	Outsourcing Providers		
		BIM (U.S.)	S.P.C. (India)	Telco (Israel)
1. Can reduce operating costs	.2	3	3	5
2. Can reduce capital investment	.2	4	3	3
3. Skilled personnel	.2	5	4	3
4. Can improve quality	.1	4	5	2
5. Can gain access to technology not in company	.1	5	3	5
6. Can create additional capacity	.1	4	2	4
7. Aligns with policy/ philosophy/culture	.1	2	3	5
Total and Averages	1.0	3.9	3.3	3.8

Table S11.3

Break-Even Analysis

First define total cost in-house

$$TC_{in} = F_{in} + (V_{in} \times X_{in})$$

where

TC_{in} *is the total cost of an item produced in-house*
F_{in} *is the total in-house fixed cost*
V_{in} *is the variable cost/unit produced in-house*
X_{in} *is the total number of units produced in-house*

Break-Even Analysis

The total cost under outsourcing is

$$TC_{out} = F_{out} + (V_{out} \times X_{out})$$

At break-even $X_{in} = X_{out}$ ***and*** $TC_{in} = TC_{out}$

$$F_{in} + (V_{in} \times X) = F_{out} + (V_{out} \times X)$$

Solving for X

$$X = \frac{F_{in} - F_{out}}{V_{out} - V_{in}}$$

Outsourcing Break-Even Example

Fixed cost at Toledo plant = $2 *million*
Variable cost/toy = $3
Fixed cost at Astro plant = $1 *million*
Variable cost/toy = $4
Annual demand = 1.1 *million toys*

$$X = \frac{F_{in} - F_{out}}{V_{out} - V_{in}} = \frac{2{,}000{,}000 - 1{,}000{,}000}{4 - 3}$$

= 1,000,000 *units*

Since demand > break-even point, produce in Toledo

Advantages of Outsourcing

- ☑ *Cost savings*
- ☑ *Gaining outside experience*
- ☑ *Improving operations and service*
- ☑ *Focusing on core competencies*
- ☑ *Gaining outside technologies*
- ☑ *Other advantages*

Disadvantages of Outsourcing

- ☑ *Increased transportation costs*
- ☑ *Loss of control*
- ☑ *Creating future competition*
- ☑ *Negative impact on employees*
- ☑ *Longer-term impact*

Audits and Metrics

- ☑ *Outsourcing agreements must specify results and outcomes*
- ☑ *Evaluation necessary to ensure satisfactory performance*
- ☑ *If the outsourced product or service is strategically important, the relationship needs continuing communication, understanding, trust and performance*
- ☑ *Services may require imaginative metrics*

Ethical Issues in Outsourcing

Ethics Principle	Outsourcing Linkage
Seek to do no harm to indigenous cultures	Don't use outsourcing in a way that violates religious holidays
Seek to do no harm to the ecological systems of the world	Don't use outsourcing to move pollution from one country to another
Seek to uphold universal labor standards	Don't use outsourcing to take advantage of cheap child labor that leads to child abuse

Table S11.4

Ethical Issues in Outsourcing

Ethics Principle	Outsourcing Linkage
Seek to uphold basic human rights	Don't accept outsourcing that violates basic human rights
Seek to pursue long-term involvement in foreign countries	Don't use outsourcing as a short-term arrangement to reduce costs; view it as a long-term partnership
Seek to share knowledge and technology with foreign countries	Don't think an outsourcing agreement will prevent loss of technology, but use the inevitable sharing to build a good relationship

Table S11.4

BALANCED SCORECARD

GAMBARAN UMUM

- MERUPAKAN SISTEM MANAJEMEN STRATEGI
- DAPAT MENDONGKRAK KEMAMPUAN ORGANISASI DLM MELIPATGANDAKAN KINERJANYA
- MENJABARKAN VISI, MISI, STRATEGI KEDALAM:

  - TUJUAN OPERASIONAL YANG KOMPREHENSIF
  - SEKELOMPOK TOLOK UKUR KINERJA UNTUK 4 PERSPEKTIF (KEUANGAN, PELANGGAN, PROSES BISNIS INTERNAL, PEMBELAJARAN & TUMBUH)

GAMBARAN UMUM

- Pada mulanya, sistem manajemen strategis bercirikan: mengandalkan anggaran tahunan, berjangka panjang dan berfokus pada kinerja keuangan.
- Penerapan sistem manajemen strategis GAGAL disebabkan antara lain: hanya 25% manajer yang memiliki insentif yang terhubung ke strategi, 60% perusahaan tidak menghubungkan anggarannya ke strategi, 85% dari tim eksekutif menghabiskan waktu kurang dari satu jam untuk membahas strategi tiap bulan, dan hanya 5% pegawai yang memahami strategi.

SIAPA YANG MENGGUNAKAN BALANCED SCORECARD ?

- Banyak organisasi swasta, pemerintah dan nirlaba yang telah menggunakan *balanced scorecard*
- 60% dari 1000 organisasi dalam Fortune menggunakan *balanced scorecard*.
- Perusahaan yang menunjukkan keberhasilan luar biasa setelah menerapkan *balanced scorecard* adalah antara lain: MOBIL Oil yang pada tahun 1993 menempati posisi ke 6 dalam *provitability*, kemudian menjadi nomor satu pada periode 1995–1998; CIGNA pd tahun 1993 rugi $275 M, tahun 1994: menjadi untung sebesar $15 M dan tahun 1997 sebesar $98 M; BROWN & ROOT ENG. tahun 1993 rugi namun tahun 1996 menjadi nomor satu dalam pertumbuhan *profit*.

KELEBIHAN SISTEM MANAJEMEN BERBASIS BSC

- BSC menunjukkan indikator *outcome* dan *output* yang jelas, indikator internal dan eksternal, indikator keuangan dan non-keuangan, dan indikator sebab dan akibat.
- *BSC* paling tepat disusun pada saat-saat tertentu, misalnya ketika ada merjer atau akuisisi, ketika ada tekanan dari pemegang saham, ketika akan melaksanakan strategi besar dan ketika organisasi berubah haluan atau akan mendorong proses perubahan.
- *BSC* juga diterapkan dalam situasi-situasi yang rutin, antara lain: pada saat menyusun rencana alokasi anggaran, menyusun manajemen kinerja, melakukan sosialisasi terhadap kebijakan baru, memperoleh umpan balik, meningkatkan kapasitas staf.

PENGERTIAN BSC

- " a measurement and management system that views a business unit's performance from four perspectives : financial, customer, internal business process, and learning and growth" (Anthony, Banker, Kaplan dan Young, 1997)
- " suatu sistem manajemen, pengukuran, dan pengendalian yang secara cepat, tepat, dan komprehensif dapat memberikan pemahaman kepada pimpinan tentang performance organisasi " (Kaplan & Norton, 1996)

MANFAAT MENERAPKAN BSC

- DAPAT MENGUKUR KINERJA ORGANISASIYG EFEKTIF DAN SEIMBANG *(BALANCED)*
- DAPAT DIGUNAKAN UNT MENDONGKRAK KEMAMPUAN ORGAN DLM MELIPAT GANDAKAN KINERJA
- MANAJEMEN DPT MEMILIKI PETA PERJALANANYANG MENCERMINKAN TERIRORIAL LINGKUNGAN ORGANISASIYANG AKAN DITEMPUH UNTUK MEWUJUDKAN MASA DEPAN ORGANISASI

MANFAAT BSC

- menjelaskan visi organisasi
- menyelaraskan organisasi untuk mencapai visi itu
- mengintegrasikan perencanaan strategis dan alokasi sumber daya
- meningkatkan efektivitas manajemen dengan menyediakan informasi yang tepat untuk mengarahkan perubahan

5 PRINSIP UTAMA DALAM MENERAPKAN BSC

- menerjemahkan sistem manajemen strategi berbasis *balanced scorecard* ke dalam terminologi operasional sehingga semua orang dapat memahami
- menghubungkan dan menyelaraskan organisasi dengan strategi, untuk memberikan arah dari eksekutif kepada staf garis depan
- membuat strategi merupakan pekerjaan bagi semua orang melalui kontribusi setiap orang dalam implementasi strategis
- membuat strategi suatu proses terus menerus melalui pembelajaran dan adaptasi organisasi dan
- melaksanakan agenda perubahan oleh eksekutif guna memobilisasi perubahan.

BALANCED (berimbang)

- BERIMBANG DIMAKSUDKAN UNTUK MENUNJUK KAN BHW KINERJA DIUKUR SCR BERIMBANG ANTARA :
  - keuangan dan non keuangan (pelanggan, proses bisnis internal, pembelajaran dan pertumbuhan)
  - fokus eksternal dan fokus internal
  - process centric dan people centric
  - tujuan jangka pendek dan jangka panjang
  - hasil/outcome (*lagging indicators*) dan pemicu kinerja/ *performance drivers* (*leading indicators*)

SCORECARD (kartu skor)

- KARTUYANG DIGUNAKAN UNTUK MENCATAT SKOR DARI HASIL KINERJA
- KARTUYANG DAPAT DIGUNAKAN UNTUK MERENCANAKAN SKORYANG HENDAK DIWUJUDKAN DIMASA DEPAN

Melalui kartu skor, skor yang hendak diwujudkan dimasa depan diperbandingkan dg hasil kinerja sesungguhnya

Hasil perbandingan ini digunakan untuk evaluasi atas kinerja yang bersangkutan

Untuk itu harus memperhitungkan keseimbangan (balanced)

SEJARAH BCS

- AWALNYA DICIPTAKAN UNTUK MENGATASI PROBLEM KELEMAHAN ***SISTEM PENGUKURAN KINERJA*** EKSEKUTIFYANG BERFOKUS PADA ***KEUANGAN***

- SELANJUTNYA TIDAK HANYA SEBAGAI ALAT PENGUKUR KINERJA EKSEKUTIF, NAMUN MELUAS SEBAGAI PENDEKATAN DALAM ***PENYUSUNAN RENCANA STRATEGIK (RENSTRA)***

EMPAT PERTANYAAN POKOK :

1. BAGAIMANA PANDANGAN PARA PELANGGAN THD ORGANISASI *(customer perspective) ?*
2. PROSES BISNIS INTERNAL APA YANG HARUS DITINGKATKAN / DIPERBAIKI *(process business internal perspective)?*
3. APAKAH ORGANISASI DAPAT MELAKUKAN PERBAIKAN DAN PENCIPTAAN NILAI SECARA BERKESINAMBUNGAN *(learning and growth perspective) ?*
4. BAGAIMANA PENAMPILAN KERJA ORGANISASI *(financial perspective) ?*

4 Perspectives in Balanced Scorecard

ASPEK-ASPEK YANG DIUKUR BSC

1. **PERSPEKTIF KEUANGAN**

   - tahap *growth* : tingkat pertumbuhan pendapatan atau penjualan dlm segmen pasar yg ditargetkan
   - tahap *sustain* : ROI, ROCE dan EVA
   - tahap *harvest* : arus kas masuk dan pengurangan modal kerja

Secara tradisional, laporan keuangan merupakan indikator historis-agregatif yang merefleksikan akibat dari implementasi dan eksekusi strategi dlm satu periode

Perspektif Keuangan

- Bagi perusahaan privat (persero), perspektif keuangan merupakan **tujuan utama** (ultimate goals) -- tanpa harus mengorbankan kepentingan stakeholders lain yang relevan (masyarakat, lingkungan, pemerintah, dll)
- Indikator-indikator Keuangan merupakan salah satu elemen kunci untuk menentukan **tingkat kesehatan** suatu perusahaan -- dan memastikan apakah perusahaan tersebut akan sustainable (langgeng) atau mengalami kebangkrutan

Perspektif Keuangan

Perspektif keuangan secara umum berfokus pada dua elemen utama :

- Peningkatan Pendapatan
- Peningkatan Produktivitas atau Efisiensi Biaya

Profit

Contoh Sasaran Strategis dalam Perspektif Keuangan

- Meningkatkan laba bersih
- Meningkatkan jumlah pendapatan
- Meningkatkan pertumbuhan pendapatan
- Meningkatkan produktivitas biaya (efisisien biaya)
- Menurunkan piutang ragu-ragu (non performing loan)

ASPEK-ASPEK YANG DIUKUR BSC

2. PERSPEKTIF PELANGGAN

2.1. Customer Core Measurement, yang meliputi :

- market share
- customer retention
- customer acquisition
- customer satisfaction
- customer profitability

2.2. Customer Value Proposition, yang meliputi :

- product / service attributes
- customer relationship
- image and reputation

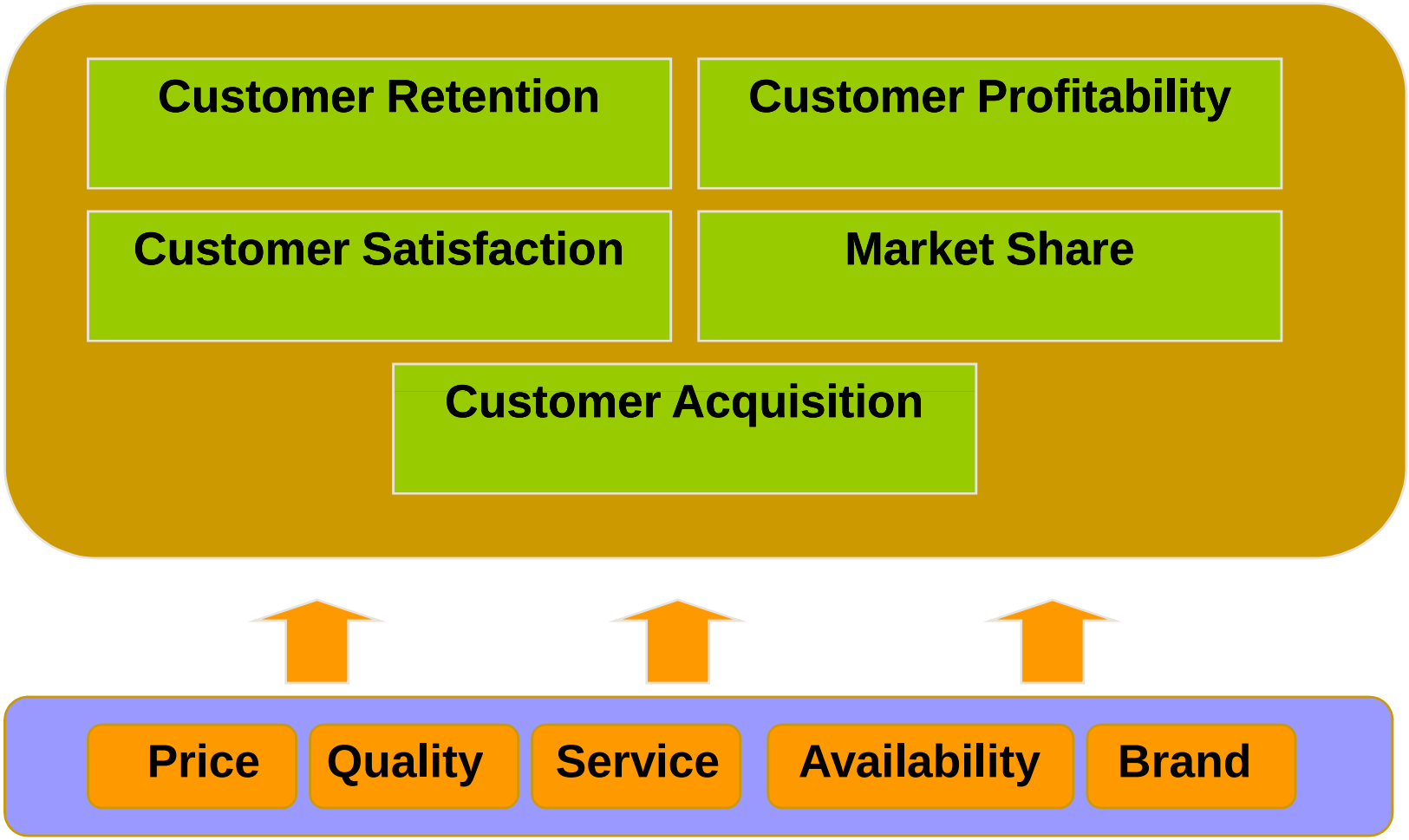
Perspektif Pelanggan

- Perspektif ini bersifat amat sentral, sebab tanpa adanya pelanggan, bagaimana mungkin suatu perusahaan bisa berdiri?
- Perspektif pelanggan mencakup elemen-elemen berikut:
  - **Perolehan pelanggan** baru (atau perubahan status tarif pelanggan lama menjadi lebih menguntungkan)
  - **Profitabilitas pelanggan** (segmen pelanggan apa saja yang menguntungkan? Berapa persentase jumlahnya dibanding total pelanggan? Segmen pelanggan apa yang menyumbang pendapatan terbesar?)

Perspektif Pelanggan

- **Kepuasan pelanggan**, mencakup opini pelanggan tentang :
  - Keandalan dan mutu produk yang ditawarkan
  - Harga produk (dibanding nilai produk yang ditawarkan)
  - Layanan purna jual (service) meliputi kecekatan dan kecepatan dalam merespon permintaan pelanggan
- Kepuasan pelanggan diukur melalui survei kepuasan pelanggan. Diwujudkan dalam skor kepuasan pelanggan dengan skala 1 (amat buruk) s/d 10 (amat memuaskan)

Model dalam Perspektif Pelanggan



Contoh Sasaran Strategis

Perspektif Pelanggan

- Meningkatkan profitabilitas per pelanggan
- Meingkatkan market share
- Mengembangkan brand image
- Meningkatkan kepuasan pelanggan
- Meningkatkan jumlah pelanggan loyal

ASPEK-ASPEK YANG DIUKUR BSC

3. **PERSPEKTIF PROSES BISNIS INTERNAL**

3.1. Proses Inovasi

3.2. Proses Operasi *waktu, kualitas dan biaya*

- proses penyediaan layanan

- proses pemberian layanan kepada pelanggan

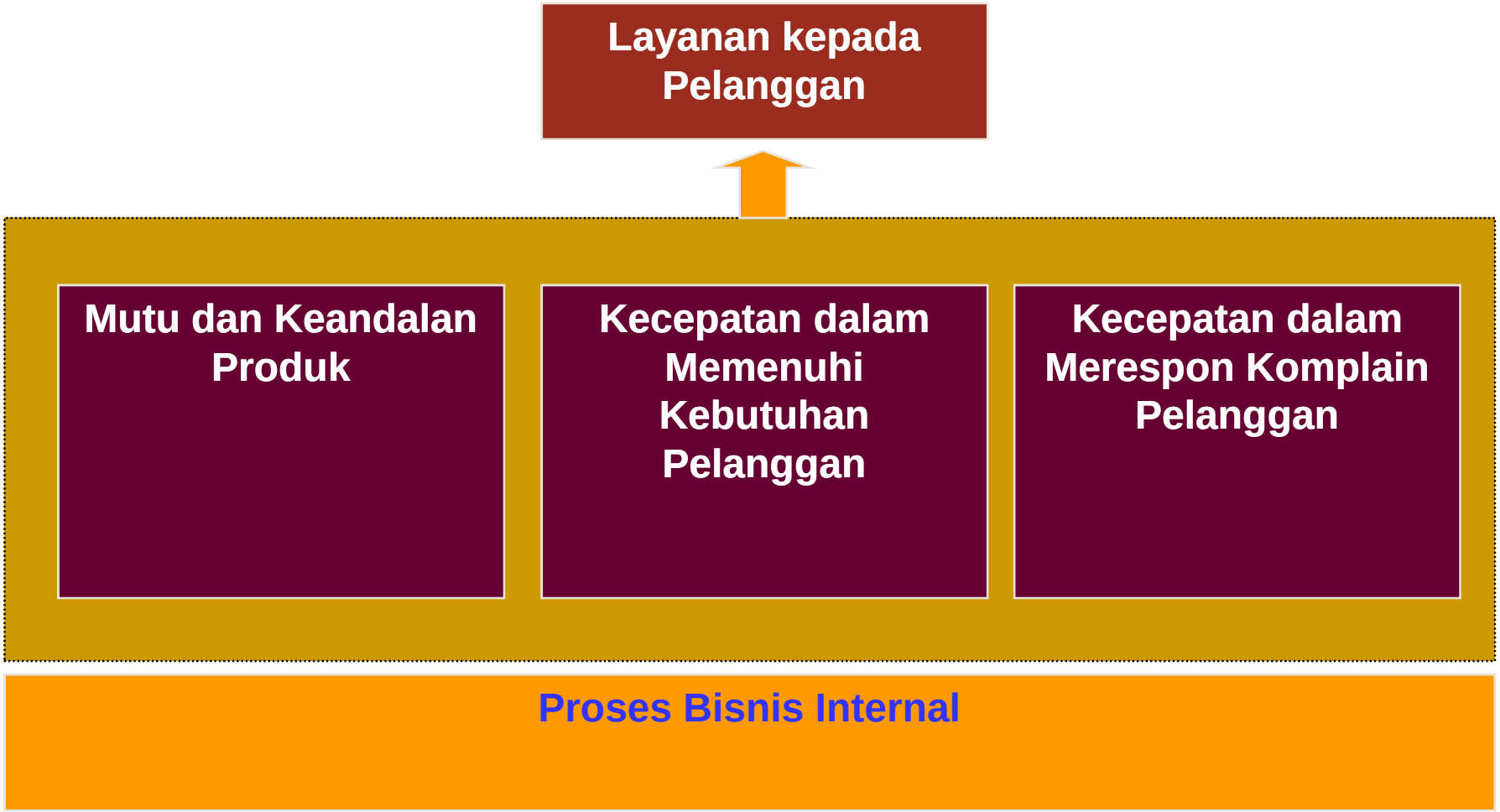
3.3. Proses Pelayanan purna jual

- *tolok ukur : waktu, kualitas dan biaya*

Perspektif Proses Bisnis Internal

- Perspektif ini mencerminkan proses bisnis kunci yang harus dilakukan secara optimal untuk memenuhi kebutuhan pelanggan
- Fokus perspektif ini adalah pada proses-proses bisnis yang memiliki dampak besar dalam peningkatan kinerja perusahaan
- Umumnya, sasaran strategis dalam perspektif ini berjumlah lebih banyak dibanding pada perspektif lainnya

Elemen-elemen dalam Proses Bisnis



Contoh Sasaran Strategis dalam Proses Bisnis

- Meningkatkan mutu dan keandalan produk
- Menurunkan jumlah produk yang gagal
- Meningkatkan kecepatan pelayanan
- Mengembangkan inovasi proses
- Mengembangkan kapasitas produksi

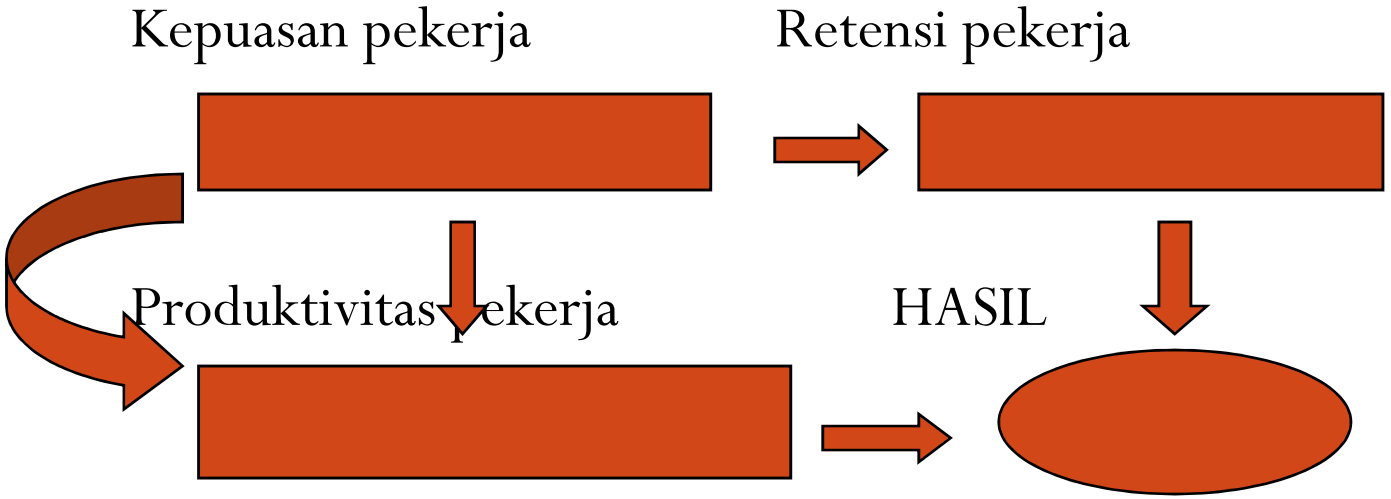
ASPEK-ASPEK YANG DIUKUR BSC

4. PERSPEKTIF PEMBELAJARAN& PERTUMBUHAN

4.1. Employee Capabilities

4.2. Information systems capabilities

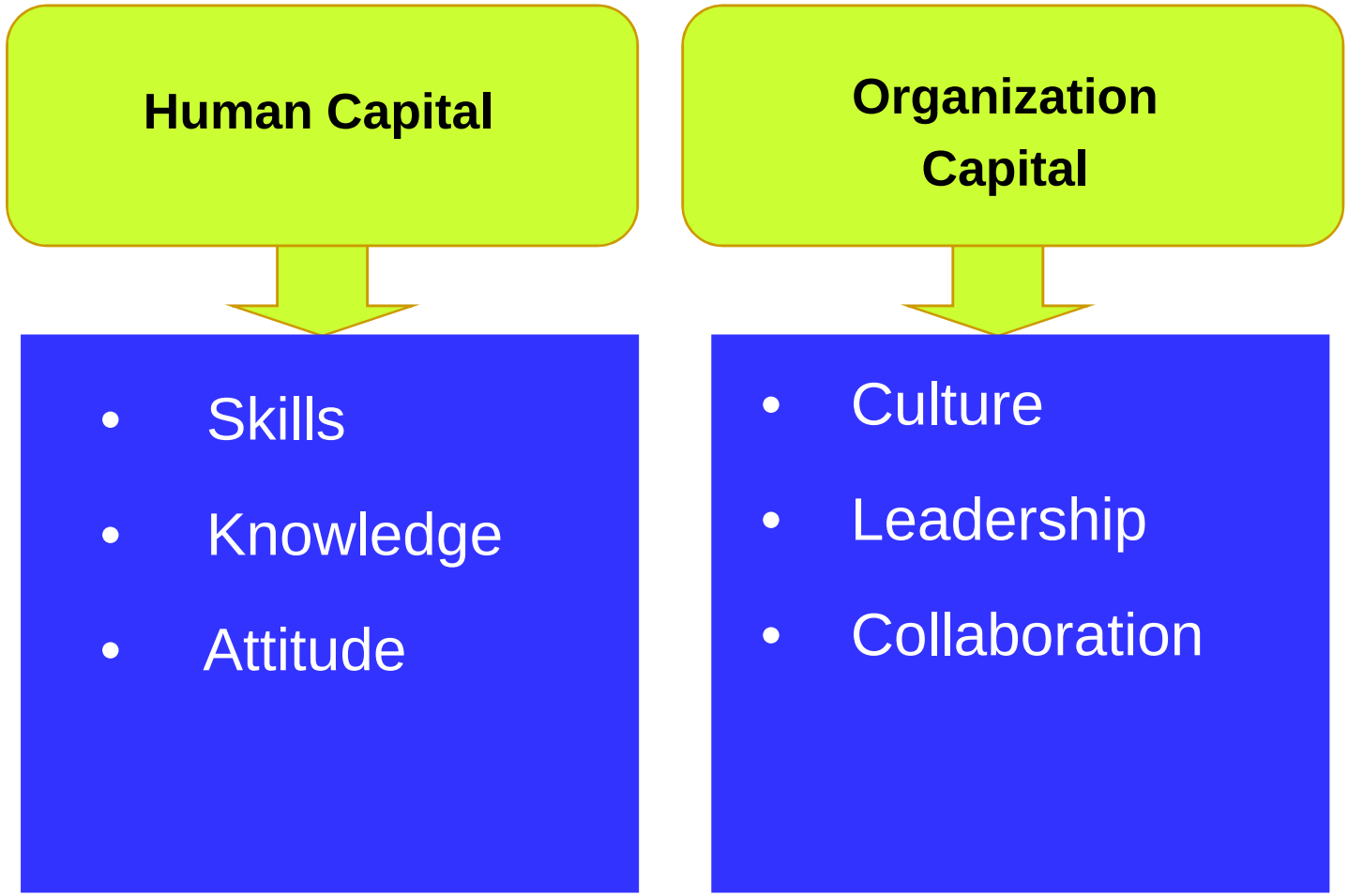
4.3. Motivation, empowerment and alignment



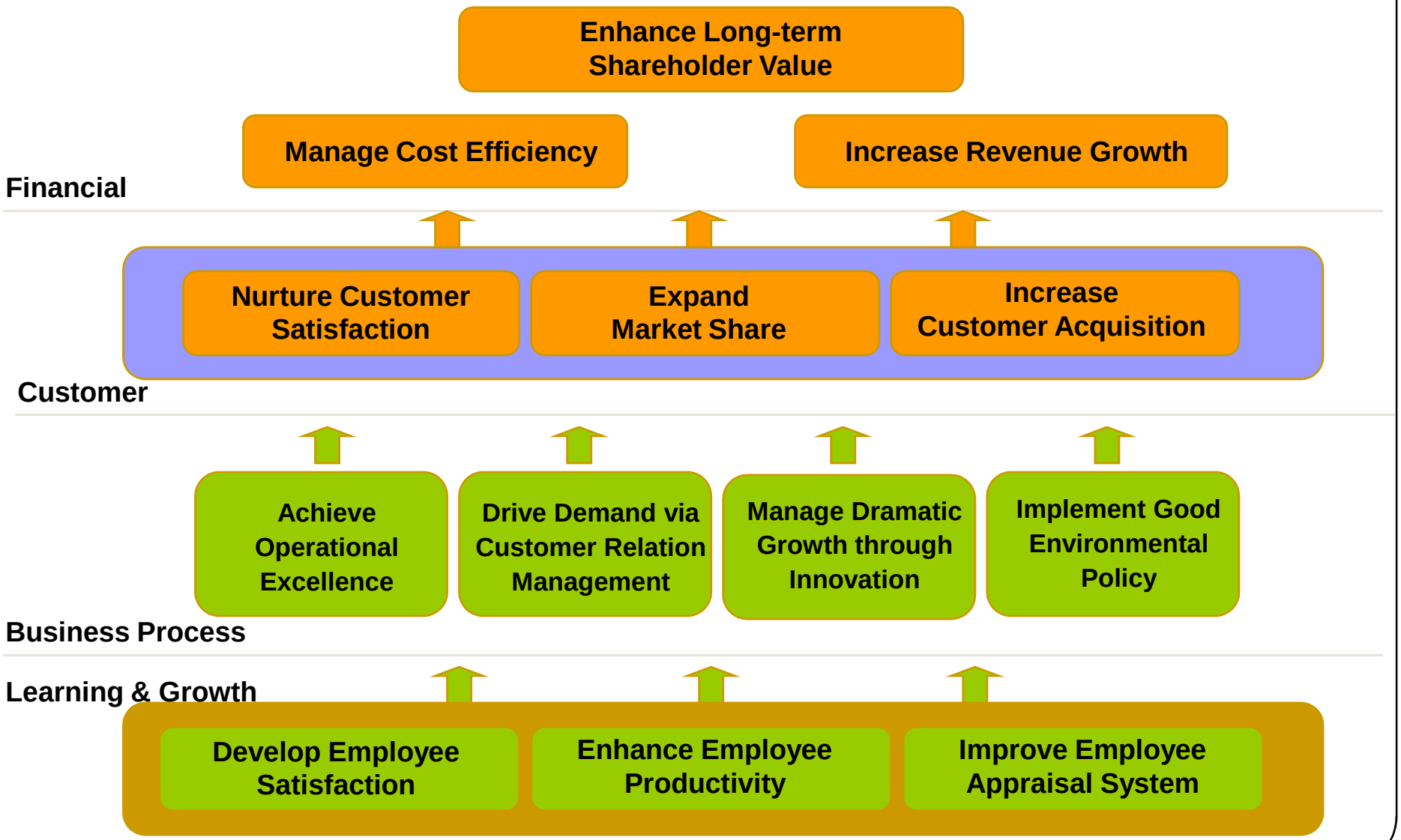
Perspektif Pembelajaran

- Perspektif ini mencerminkan kapabilitas yang harus dimiliki oleh perusahaan, dalam dua aspek utama, yakni:
  - Pengembangan **sumber daya manusia**
  - Pengembangan **sistem organisasional, kepemimpinan dan kultur perusahaan**
- Perspektif ini menunjukkan bahwa kapabilitas sumber daya manusia dan sistem organisasi yang solid merupakan 'pondasi' bagi kemajuan kinerja perusahaan

Perspektif Learning and Growth



Corporate Balanced Scorecard Map - An Example



Contoh Sasaran Strategis dalam Perspektif Pembelajaran

- Mengembangkan kompetensi karyawan
- Membangun kultur perusahaan yang unggul
- Menciptakan pola kepemimpinan yang efektif
- Meningkatkan produktivitas karyawan

FAKTOR YG MEMACU ORGANISASI UNTUK MENGIMPLEMENTASIKAN BSC

1. LINGKUNGAN ORGANISASIYANG SANGAT KOMPETITIF
   - membangun keunggulan kompetitif melalui destinctive capability
   - pemutakhiran peta perjalanan untuk mewujudkan masa depan
   - menempuh langkah-langkah strategik dlm membangun masa depan
   - memusatkan kapabilitas dan komitmen seluruh personil
2. SISTEM MANAJEMEN TIDAK SESUAI DG TUNTUTAN ORGANISASI
   - hanya mengandalkan anggaran tahunan sebagai alat perencanaan
   - tidak terdapat kekoherenan antara Ren. Jajang dan Ren Japen
   - sistem manajemen tidak mengikutsertakan secara optimal seluruh personel dalam membangun masa depan

HUBUNGAN KE EMPAT PERSPEKTIF KINERJA DALAM BSC

KEUANGAN

ROCE / ROE

PELANGGAN

loyalitas pelanggan

pengiriman tepat waktu

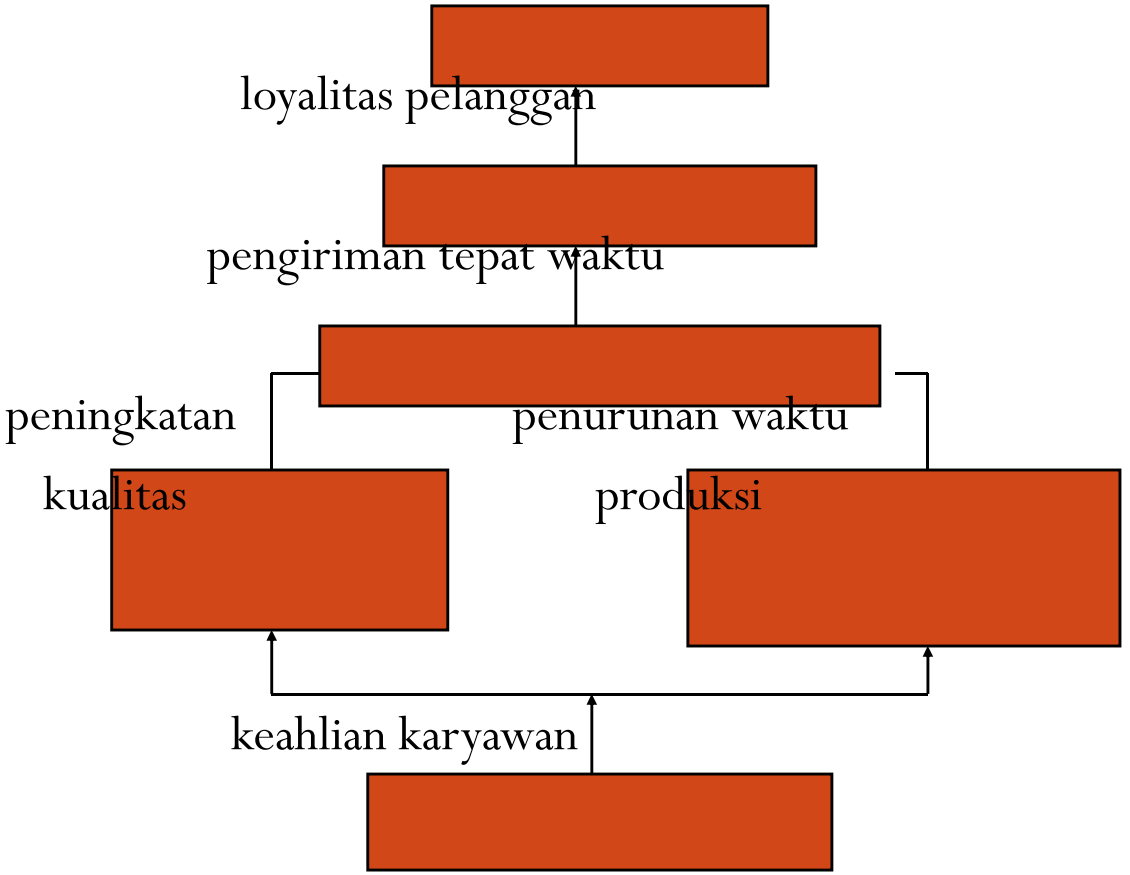
PROSES BISNIS INTERNAL

peningkatan kualitas

penurunan waktu produksi

BELAJAR DAN BERTUMBUH

keahlian karyawan



LANGKAH-LANGKAH PEMBANGUNAN BALANCED SCORECARD

1. MEMBANGUN KONSENSUS ATAS PENTINGNYA PERUBAHAN MANAJEMEN
2. PEMBENTUKAN TIM PROYEK BSC
3. MENDEFINISIKAN INDUSTRI, MENJELASKAN PERKEMBANGANNYA DAN PERAN PERUSHN
4. MENENTUKAN UNIT ATAU SBU
5. MENGEVALUASI SISTEM PENGUKURAN YG ADA
6. MERUMUSKAN / MENGKONFIRMASIKAN VISI
7. MERUMUSKAN PERSPEKTIF

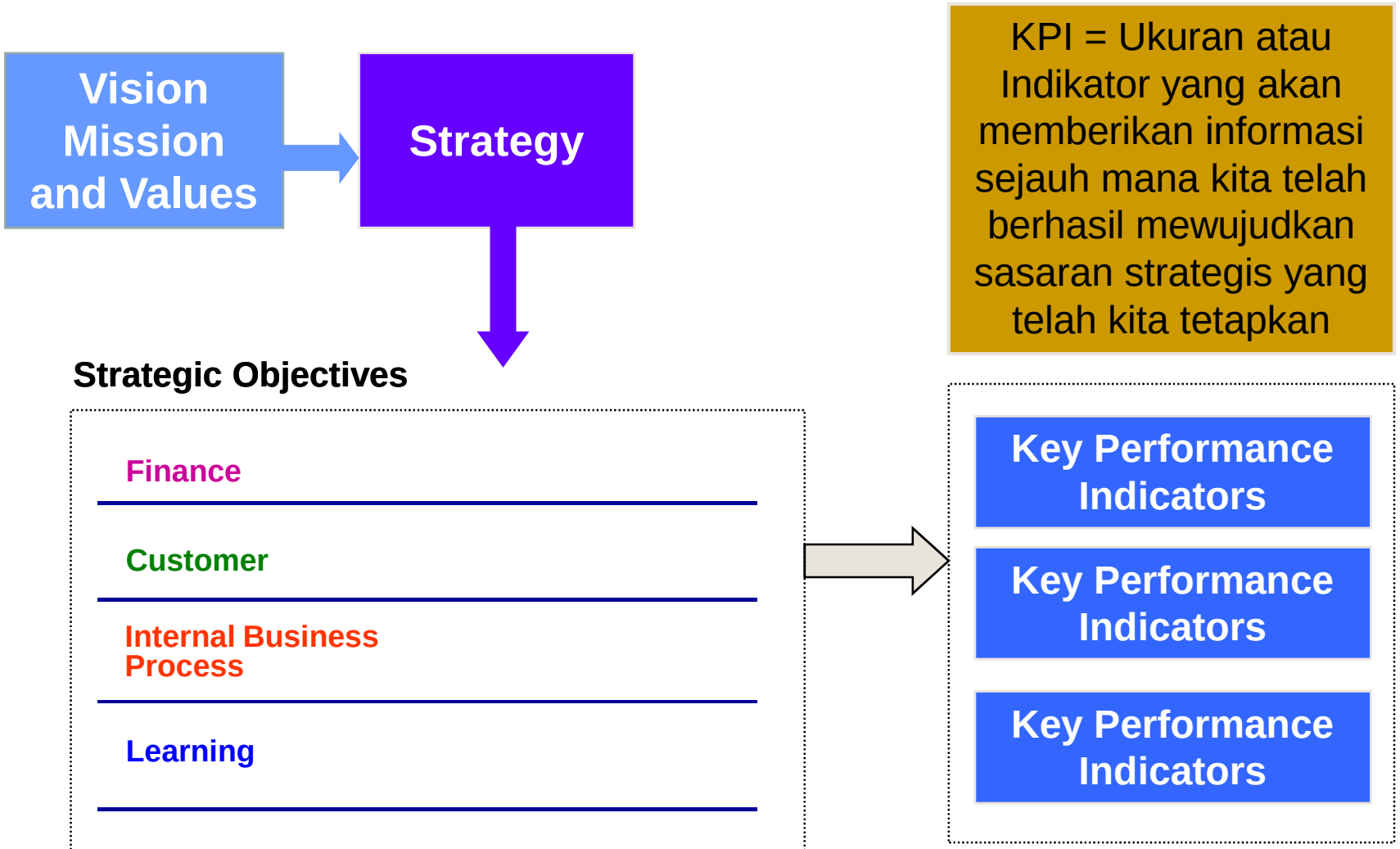
LANGKAH-LANGKAH PEMBANGUNAN BALANCED SCORECARD

8. RINCI VISI BERDASARKAN MASING-2 PERSPEKTIF DAN RUMUSKAN SELURUH TUJUAN STRATEGIK
9. IDENTIFIKASI FAKTOR-FAKTOR PENTING BAGI KEBERHASILAN *(KEY SUCCESS FACTOR)*
10. MENGEMBANGKAN TOLOK UKUR, IDENTIFIKASI SEBAB AKIBAT, DAN SUSUN KESEIMBANGAN
11. MENGEMBANGKAN *TOP-LEVEL SCORECARD*
12. RINCIAN *SCORECARD* & TOLOK UKUR
13. MERUMUSKAN TUJUAN-TUJUAN
14. MENGEMBANGKAN RENCANA TINDAKAN
15. IMPLEMENTASI *SCORECARD*

PERANCANGAN SISTEM PENGUKURAN KINERJA DGN BSC

1. PENENTUAN ARSITEKTUR PENGUKURAN
   - 1.1. Tetapkan Visi dan Misi Organisasi
   - 1.2. Tetapkan Strategi Organisasi
2. TUJUAN-TUJUAN STRATEGIK
3. PENENTUAN UKURAN PERFORMANSI *(Key Performance Indicator = KPI)*
4. PENETAPAN TARGET
   - 4.1. Perspektif Finansial
   - 4.2. Perspektif Pelanggan
   - 4.3. Perspektif Proses Bisnis Internal
   - 4.4. Perspektif Belajar dan Pertumbuhan
5. PEMBUATAN FORMAT PENGUKURAN KINERJA

Key Performance Indicators (KPI)



KEY PERFORMANCE INDICATORS - KPI

1. PERSPEKTIF FINANSIAL

1.1. *Key Performance Outcome (Lag Indicators)* :

- Tingkat pertumbuhan penjualan
- Return on Capital Employed (ROCE)
- Tingkat penggunaan investasi

1.2. *Key Performance Driver (Lead Indicators)* :

- Tingkat penjualan
- Market share
- Pendapatan
- Total Aset
- Investasi/ pendanaan

KEY PERFORMANCE INDICATORS - KPI

2. PERSPEKTIF PELANGGAN

2.1. Key Performance Outcome (Lag Indicators) :

- Laba bersih dari pelanggan
- Pangsa pasar domestik dan global
- Persentase pertumbuhan pelanggan
- Tingkat kepuasan pelanggan
- Tingkat pemenuhan keluhan pelanggan
- Waktu pemenuhan keluhan pelanggan
- Tingkat loyalitas pelanggan

2.2. Key Performance Driver (Lead Indicators) :

- Profit pelanggan
- Penjualan produk
- Biaya keluar
- Dukungan administrasi
- Dukungan sistem informasi
- Respons time
- Juml pelanggan
- Data base pasar

KEY PERFORMANCE INDICATORS - KPI

3. PERSPEKTIF PROSES BISNIS INTERNAL

3.1. Key Performance Outcome (Lag Indicators) :

- Persentase produk cacat
- Efektivitas siklus manufaktur (MCE)
- Jumlah produk baru
- Rasio biaya yang dikeluarkan untuk R&D
- % jenis produk yang memperoleh pengakuan internasional

3.2. Key Performance Driver (Lead Indicators) :

- Standarisasi mutu
- Perancangan produk
- MCE
- Kualitas produk
- Penguasaan teknologi
- Waktu proses
- Produk cacat
- Investasi R&D

KEY PERFORMANCE INDICATORS - KPI

4. PERSPEKTIF BELAJAR & PERTUMBUHAN

4.1. Key Performance Outcome (Lag Indicators) :

- Rasio ketersediaan informasi
- Tingkat kepuasan kerja
- Tingkat pengembangan karier
- Tingkat produktivitas karyawan
- Jumlah saran yang diimplementasikan

3.2. Key Performance Driver (Lead Indicators) :

- Juml karyawan yang dilatih
- Kualitas karyawan
- Juml karyawan yang puas
- Pengembangan sistem kompensasi
- Juml program aplikasi diinstall
- Pengembangan SDM

Six Sigma

PENGERTIAN

- Six Sigma
  - adalah suatu alat manajemen baru yang digunakan untuk mengganti Total Quality Management (TQM) sangat terfokus terhadap pengendalian kualitas dengan mendalami sistem produksi perusahaan secara keseluruhan.
- Six sigma juga disebut sistem komprehensive (strategi-disiplin ilmu-alat) untuk mencapai dan mendukung kesuksesan bisnis.

Six Sigma

- Six Sigma
  - disebut strategi karena terfokus pada peningkatan kepuasan pelanggan
  - disebut disiplin ilmu karena mengikuti model formal, yaitu DMAIC
    - (Define, Measure, Analyze, Improve, Control)
  - disebut alat karena digunakan bersamaan dengan yang lainnya
    - seperti Diagram Pareto (Pareto Chart) dan Histogram.

TUJUAN

- Menghilangkan cacat produksi
- Memangkas waktu pembuatan produk
- Mehilangkan biaya

SEJARAH

- Carl Frederick Gauss (1777-1885) adalah orang yang pertama kali memperkenalkan konsep kurva normal dalam bidang statistik.
- Konsep ini kemudian dikembangkan oleh Walter Shewhart di tahun 1920 yang menjelaskan bahwa 3 sigma dari nilai rata-rata (*mean*) mengindikasikan perlunya perbaikan dalam sebuah proses.
- Pada akhir tahun 1970, Dr. Mikel Harry, seorang insinyur senior pada *Motorola's Government Electronics Group* (GEG) memulai percobaan untuk melakukan *problem solving* dengan menggunakan analisa statistik.

SEJARAH

- Dengan menggunakan cara tsb, GEG mulai menunjukkan peningkatan yang dramatis: produk didesain dan diproduksi lebih cepat dengan biaya yg lebih murah.Metode tersebut kemudian ia tuliskan dalam sebuah makalah berjudul

  "The Strategic Vision for Accelerating Six Sigma Within Motorola“

- Dr. Mikel Harry kemudian dibantu oleh Richard Schroeder, mantan exekutive Motorola, menyusun suatu konsep perubahan manajemen (*change management*) yang didasarkan pada data.
- Hasil dari kerja sama tersebut adalah sebuah alat pengukuran kualitas yg sederhana yg kemudian menjadi filosofi kemajuan bisnis, yg dikenal dengan nama Six Sigma.

Aplikasi Program Six Sigma Motorola

- Beberapa keberhasilan Motorola yang patut dicatat dari aplikasi program Six Sigma (Vincent Gasperz, 2002) adalah sebagai berikut:
  - Peningkatan produktivitas rata-rata : 12,3% per tahun.
  - Penurunan COPQ (cost of poor quality) lebih dari 84%
  - Eliminasi kegagalan dalam proses sekitar 99.7%
  - Penghematan biaya manufakturing lebih dari $11 Milyar
  - Peningkatan tingkat pertumbuhan tahunan rata-rata sebesar 17% dalam penerimaan, keuntungan, dan harga saham Motorola

PERSPEKTIF SIX SIGMA

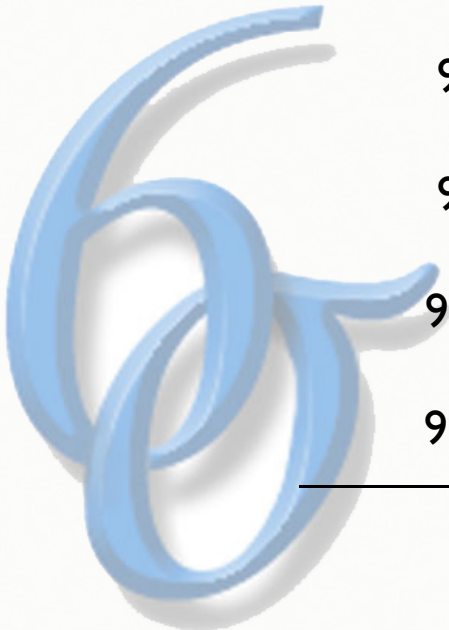
- Six sigma dapat dijelaskan dalam dua perspektif, yaitu
  - Perspektif statistik
  - Perspektif metodologi

Perspektif statistik

- Sigma dalam statistik dikenal sebagai standar deviasi yang menyatakan nilai simpangan terhadap nilai tengah.
- Suatu proses dikatakan baik apabila berjalan pada suatu rentang yang disepakati.
- Rentang tersebut memiliki batas,
  - batas atas atau USL *(Upper Specification Limit)*
  - batas bawah atau LSL *(Lower Specification Limit)*
- Proses yang terjadi di luar rentang disebut cacat.
- Proses Six Sigma adalah proses yang hanya menghasilkan DPMO *(defect permillion opportunity)*

DPMO *(defect permillion opportunity)*

Yield (probabilitas tanpa cacat)	DPMO (defect Permillion opportunity)	Sigma
30.9 %	690.000	1
69.2 %	308.000	2
93.3 %	66.800	3
99.4 %	6.210	4
99.98 %	320	5
99.9997	3.4	6



Perspektif metodologi

- Six Sigma merupakan pendekatan menyeluruh untuk menyelesaikan masalah dan peningkatan proses melalui fase DMAIC
  - (*Define, Measure, Analyze, Improve, Control*)
- DMAIC merupakan jantung analisis six sigma yang menjamin *voice of costumer* berjalan dalam keseluruhan proses sehingga produk yang dihasilkan memuaskan pelanggan.

DMAIC

- *Define*
  - adalah fase menentukan masalah, menetapkan persyaratan-persyaratan pelanggan, mengetahui CTQ (*Critical to Quality*).
- *Measure*
  - adalah fase mengukur tingkat kecacatan pelanggan (Y).
- *Analyze*
  - adalah fase menganalisis faktor-faktor penyebab masalah/cacat (X).
- *Improve*
  - adalah fase meningkatkan proses (X) dan menghilangkan faktor-faktor penyebab cacat.
- *Control*
  - adalah fase mengontrol kinerja proses (X) dan menjamin cacat tidak muncul.

Fase menentukan masalah (Define)

- Define adalah fase menentukan masalah
  - Menetapkan persyaratan-persyaratan pelanggan, dan membangun tim.
  - Alat-alat (*tools*) statistik yang sering dipakai pada fase ini adalah diagram sebab-akibat (*Cause and Effect Chart*) dan diagram pareto (Pareto Chart). Kedua alat (*tool*) statistik tersebut digunakan untuk melakukan identifikasi masalah dan menentukan prioritas permasalahan.
- Aspek-aspek yang perlu diperhatikan dalam menentukan masalah adalah
  - Spesifik, menjelaskan secara tepat apa yang salah, bagian proses mana yang salah dan apa salahnya.
  - Dapat diamati, menjelaskan bukti-bukti nyata suatu masalah. bukti-bukti tersebut dapat diperoleh baik melalui laporan internal maupun umpan balik pelanggan.
  - Dapat diukur, menunjukkan lingkup masalah dalam suatu ukuran.
  - Dapat dikendalikan, masalah harus dapat diselesaikan dalam rentang waktu tertentu. Apabila masalah terlalu besar maka dapat dipecah-pecah sehingga dapat lebih dikendalikan.
- CTQ (Critical to Quality)
  - Setelah semua varibel yang dipandang penting oleh pelanggan didapatkan dan diberi nilai terukur (varibel terukur tersebut disebut CTQ). CTQ adalah sebuah karakteristik dari sebuah produk atau jasa yang memenuhi kebutuhan pelanggan (internal ataupun eksternal).

Pengukuran (Measure)

- Measure adalah fase mengukur tingkat kinerja saat ini, sebelum mengukur tingkat kinerja biasanya terlebih dahulu melakukan analisis terhadap sistem pengukuran yang digunakan.
- ***Analisis Sistem Pengukuran***
  - Masalah yang muncul dalam pengukuran adalah variabilitas pengukuran yang dinyatakan dalam varian(*variance*).Varian total suatu pengukuran berasal dari varian yang ditimbulkan oleh produk (*part to part*) dan varian akibat kesalahan pengukuran.
- ***Analisis Kapabilitas Proses***
  - Kapabilitas suatu proses menggambarkan seberapa pas (*uniform*) proses tersebut.Analisis kapablitas proses dilakukan dengan memperbandingkan kinerja suatu proses dengan spesifikasinya, suatu proses memiliki kapabilitas bila semua nilai variabel yang mungkin, berada dalam batas spesifikasi.

Analisis (Analyze)

- Fase analisis (*analyze*) merupakan fase mencari dan menentukan akar atau penyebab dari suatu masalah. Masalah-masalah yang timbul kadang-kadang sangat kompleks sehingga membingungkan antara mana yang akan dan tidak kita selesaikan.
- ***Diagram Pareto* (Pareto Chart)**
  - Diagram pareto digunakan untuk melakukan prioritas terhadapa masalah-masalah yang harus ditangani dengan aturan pengelompokan 80-20, 20% dari kecacatan akan menyebabkan 80% masalah.
- ***Diagram sebab-akibat* (Cause & Effect Chart)**
  - Diagram sebab-akibat (Cause & Effect Chart) digunakan untuk mengorganisasi hasil informasi brainstorming dari sebab-sebab suatu masalah. Diagram ini sering disebut juga dengan diagram fishbone karena bentuknya yang mirip dengan tulang ikan, atau diagram ishikawa untuk menghormati sang penemu.
- ***Uji hipotesis rata-rata***
  - Umumnya uji hipotesis rata-rata digunakan untuk menetapkan faktor kausatif (x) dengan cara menginformasikan sumber-sumber variasi. Disamping itu, digunakan juga untuk menunjukan perbedaan yang signifikan antara data awal (baseline) dengan data yang diambil setelah perubahan (improvement).

Pengembangan (Improve)

- Pengembangan (*Improve*) adalah fase meningkatkan proses(x) dan menghilangkan sebab-sebab cacat. Pada fase pengukuran (*measure*) telah dinetapkan variabel faktor (x) dan untuk masing-masing variabel respons(y).
- Sedangkan pada fase pengembangan i(*improve*) banyak melibatkan uji perancangan percobaan (*Design of Experiment*) atau disingkat DoE.
- DoE merupakan suatu pengujian dengan mengubah variabel faktor sehingga penyebab perubahan pada variabel respon diketahui.
- ***Taguchi***
  - Desain Taguchi (Taguchi Design) merupakan perancangan parameter (*robust*), yaitu metode atau teknik perancangan produk atau proses terfokus pada minimalisasi variasi dan sensitivitas tingkat bising (*noise*).

Pengendalian (Control)

- Pengendalian (*Control*) adalah fase mengendalikan kinerja proses (x) dan menjamin cacat tidak muncul kembali.
- Alat (*tool*) yang umum digunakan adalah **diagram kontrol**.
- Fungsi umum diagram kontrol adalah, sebagai berikut :
  - Membantu mengurangi variabilitas.
  - Memonitor kinerja setiap saat.
  - Memungkinkan proses koreksi untuk mencegah penolakan.

Faktor penting dalam implementasi Six Sigma

- **Dukungan dari Top level.**
  - Six sigma menawarkan pencapaian yang terukur yang tidak akan mampu ditolak oleh pemimpin perusahaan, yang dikerjakan oleh seorang super star yg sangat tahu apa yg harus dilakukan di bidangnya (Black Belt, Project Champion, Executive Champion).
- **Tim yang hebat.**
  - Para Executive Champion, Deployment Champions, Project Champions, Master Black Belts, Black Belts, dan Green Belts adalah orang-orang yg terlatih dengan baik untuk mengerjakan proyek Six Sigma.
- **Training yg berbeda dgn yg pernah ada.**
  - Anggota proyek Six Sigma adalah mereka yg pernah ditraining secara khusus dengan biaya antara $15,000-$25,000 per Black Belt, yg akan dibayar melalui saving yg didapat dari setiap proyek Six Sigma.
- **Alat ukur yg baru.**
  - Dengan menggunakan DPMO (*Defects Per Million Opportunities*) yang berhubungan erat dgn Critical to Quality (CTC) yg diukur berdasarkan persepsi customer, yg bisa dibandingkan antar departemen atau divisi dalam satu perusahaan.
- **Tradisi perusahaan yg baru.**
  - Yaitu mempromosikan usaha untuk melakukan peningkatan kualitas secara terus menerus.