



Yayasan Pakuan Siliwangi
Universitas Pakuan
Sekolah Pascasarjana

Kejujuran, Integritas, Kreativitas, Kualitas, Harmoni

Jln. Pakuan PO BOX 452 Bogor Telp./Fax (0251) 8320123 E-mail: pasca@unpak.ac.id
Web: www.pasca.unpak.ac.id



Bogor, 04 Oktober 2023

Hal : Pengajuan Dana dan SK Visiting Profesor
Lampiran : 1 Set

Yth. Dekan Sekolah Pascasarjana
U.P. Wakil Dekan Bid. SDM dan Keuangan Sekolah Pascasarjana
Universitas Pakuan
Bogor

Dengan hormat,

Dalam rangka perkuliahan semester ganjil 2023/2024 pada Program Studi Manajemen dimana salah satu program kerja yaitu Visiting Profesor, Adapun professor yang kami undang yaitu Prof. Dr. Abdul Thalib Bon yang berasal dari UTHM. maka dengan ini kami mengajukan permohonan dana dan Surat Keputusan untuk Visiting Profesor tersebut. Pertemuan pertama perkuliahan yang diisi oleh Visiting Profesor tersebut akan diadakan secara luring pada:

Hari/Tanggal : Jum'at, 06 Oktober 2023 dan Sabtu, 07 Oktober 2023
Waktu : Jam 17.00 - 20.00 WIB dan Jam 13.00 – 18.00 WIB
Tempat : Ruang Auditorium Lt. 3 Sekolah Pascasarjana

Besar harapan kami pengajuan ini dapat direalisasikan.

Demikian permohonan ini kami sampaikan. Atas perhatian Bapak diucapkan terima kasih.

Hormat saya,
Ketua Program Studi
Manajemen (S-2),

Dr. Herdiyana, SE., MM. Tembusan :

1. Kepala Tata Usaha;
2. Arsip.

TJ/H

KULIAH UMUM MAJEMEN RANTAI PASOKAN
SEMESTER GANJIL 2023/2024
Prof. Dr. ABDUL TALIB BON
TERMS OF REFERENCES

LATAR BELAKANG

Prodi MM telah menambahkan mata kuliah baru Manajemn Rantai Pasokan kepada para mahasiswa di semester pertama 2023/2024. Manfaat mahasiswa setelah mengikuti perkuliahan manajemen rantai pasokan danap memperkaya pemahaman dan kompetensi dalam perusahaan secara umum dapat memberikan kepuasan pelanggan, meningkatkan pendapatan, menurunkan biaya, pemanfaatan aset yang semakin tinggi, peningkatan keuntungan dan perusahaan semakin besar.

TUJUAN KULIAH UMUM

- a. Sebagai kuliah perdana dari mata kuliah baru Manajemen Rantai Pasokan kepada para mahasiswa semester ganjil 2023/2024.
- b. Memberikan pemahaman konsep manajemen rantai pasokan dengan contoh kasus dari dosen praktisi professor.

Waktu

Jum'at, 06 Oktober 2023 1 Sesi : Pk. 17.00 – 20.00 WIB.

Sabtu, 07 Oktober 2023 2 Sesi : Pk. 13.00 – 18.00 WIB.

Anggaran

Uraian	Biaya	Catatan
Santika Hotel Bogor 2 Malam Cek in Jum'at, 06 Oktober Cek Out Minggu, 08 Oktober	Rp. 1.800.000	-
Honor Kuliah 3 Sesi (7 Jam x Rp. 500.000)	Rp. 3.500.000	Disesuaikan dengan Honor Pengajar Visiting Profesor yang Berlaku
Snack dan Makan Siang 2 Hari	Rp. 250.000	-
Total	Rp. 5.550.000	
Lima Juta lima ratus lima puluh Rupiah		

REKAP PENGELUARAN ANGGARAN PER MATA PROGRAM TAHUN 2023
SEKOLAH PASCASARJANA UNIVERSITAS PAKSIAN
1 Januari - 16 September 2023

Prodi/Unit	No	Mata Program	Anggaran	Realisasi	Setor	Persentase Penggunaan	
Manajemen	1	Sosialisasi dan survey pemahaman MTS Program Studi	Rp 6.450.000	Rp 950.000	Rp 1.500.000	15%	
	2	Kerjasama dengan instansi dan atau Perguruan Tinggi DN (Tersebut Minen)	Rp 12.650.000	Rp 8.350.000	Rp 4.200.000	66%	
	3	Kerjasama dengan instansi dan atau Perguruan Tinggi LH (UTHM)	Rp 16.930.000	Rp -	Rp 16.930.000	0%	
	4	Survey Kepuasan Civitas Akademika	Rp 900.000	Rp -	Rp 900.000	0%	
	5	Tracer Study	Rp 1.000.000	Rp -	Rp 1.000.000	0%	
	6	Promosi	Rp 21.190.000	Rp 7.820.000	Rp 11.170.000	37%	
	7	Perkuliahan Semester Genap 2022/2023 & Semester Ganjil 2023/2024		Tayaman			
	8	UTS DAN UAS	Rp 126.900.000	Rp 67.850.000	Rp 59.050.000	53%	
	9	Ulang Proposal dan Tesis	Rp 273.200.000	Rp 221.650.000	Rp 49.550.000	82%	
	10	Bimbingan Akademik	Rp 27.000.000	Rp -	Rp 27.000.000	0%	
	11	Pelatihan Metodologi Penelitian dan Pengolahan Data	Rp 5.780.000	Rp -	Rp 5.780.000	0%	
	12	Clinical Coach, Cox Trinitin, Pelatihan dan Teknik Sitasi		Unit Pengelola			
	13	Prestasi Akademik & Non Akademik Mahasiswa	Rp 3.000.000	Rp 3.000.000	Rp -	100%	
	14	Seminar di LN	Rp 1.000.000	Rp -	Rp 1.000.000	0%	
	15	Publikasi Karya Ilmiah Mahasiswa dalam Jurnal Internasional Bereputasi		LPPM			
	16	HaKI Tesis Mahasiswa	Rp 5.000.000	Rp -	Rp 5.000.000	0%	
	17	Double Degree Dengan UTHM		Unit Pengelola			
	18	Workshop Penyusunan Bahan Ajar dan RPS Smt. Genap	Rp 9.500.000	Rp -	Rp 9.500.000	0%	
	19	Visiting Professor	Rp 14.500.000	Rp -	Rp 14.500.000	0%	
	20	Keanggotaan Dosen Dalam Asosiasi Profesi	Rp 5.000.000	Rp 3.150.000	Rp 1.850.000	63%	
	21	Publikasi Internasional Jurnal Bereputasi		LPPM			
	22	Publikasi Nasional Dalam Jurnal Sinta 3		LPPM			
	23	Publikasi Dalam Seminar Nasional/ Seminar Internasional		LPPM			
	24	Publikasi Populer Dalam Media Massa Per Tahun		LPPM			
	25	Exchange Dosen ke LN		Unit Pengelola			
	26	Penerbitan Buku		Unpak Press			
	27	HaKI Hasil Penelitian Dosen	Rp 1.000.000	Rp -	Rp 1.000.000	0%	
	28	Publikasi Internasional Kolaborasi Dengan Peneliti Luar DN Dan LH		LPPM			
	29	Seminar Internasional	Rp 8.950.000	Rp 1.800.000	Rp 7.150.000	20%	
	30	Workshop/FGD Akademik	Rp 7.050.000	Rp -	Rp 7.050.000	0%	
	31	Guest Lecture	Rp 15.750.000	Rp -	Rp 15.750.000	0%	
	32	Kolaborasi Perkuliahan Dengan Prodi Mitra Di PT Lain	Rp 21.000.000	Rp 5.020.000	Rp 15.980.000	24%	
	33	Penelitian kolaborasi LH (SPs)		LPPM			
	34	PAK Dosen Dengan Dana Hibah Eksternal		LPPM			
	35	Kegiatan Penelitian Dan Pim Dosen Melibatkan Mahasiswa		LPPM			
	36	Kolaborasi Penelitian dengan LH		LPPM			
	37	Fengabdian Kepada Masyarakat kolaborasi LH (Dana SPs)		LPPM			
		JUMLAH	Rp 583.750.000	Rp 321.590.000	Rp 262.160.000	55%	



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SURAT KEPUTUSAN
DEKAN SEKOLAH PASCASARJANA
UNIVERSITAS PAKUAN
NOMOR :214/Kep/SPs/Unpak/IX/2023

Tentang

PENGANGKATAN *VISITING PROFESSOR*
PADA PROGRAM STUDI MANAJEMEN
SEKOLAH PASCASARJANA UNIVERSITAS PAKUAN
A.N. PROF. DR. ABDUL THALIB BIN BON

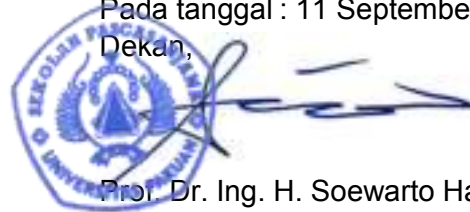
DEKAN SEKOLAH PASCASARJANA

- Menimbang : a. Bahwa sebagai implementasi/realisasi kerjasama antara Sekolah Pascasarjana Universitas Pakuan dengan Universiti Tun Hussein Onn Malaysia (UTHM);
b. Bahwa berdasarkan pertimbangan sebagaimana dimaksud pada huruf a, perlu menetapkan Keputusan Dekan Sekolah Pascasarjana Universitas Pakuan tentang Pengangkatan *Visiting Professor* pada Program Studi Manajemen Sekolah Pascasarjana Universitas Pakuan;
- Mengingat : 1. Undang-undang Nomor 12 Tahun 2012, tentang Pendidikan Tinggi;
2. Peraturan Menteri Negara Pendayagunaan Aparatur Negara dan Reformasi Birokrasi, Nomor 9 Tahun 2011 untuk Roadmap Penelitian;
3. Peraturan Presiden Nomor 8 Tahun 2012 tentang Kerangka Kualifikasi Nasional Indonesia;
4. Permendikbud Nomor 73 Tahun 2013 tentang Penerapan Kerangka Kualifikasi Nasional Indonesia Bidang Pendidikan Tinggi;
5. Peraturan Pemerintah Nomor 4 Tahun 2014 tentang Penyelenggaraan Pendidikan Tinggi dan Pengelolaan Perguruan Tinggi;
6. Permenristekdikti Nomor 44 Tahun 2015 tentang Standar Nasional Pendidikan Tinggi;
7. Permenristekdikti Nomor 62 Tahun 2016 tentang Sistem Penjaminan Mutu Pendidikan Tinggi;
8. Surat Keputusan Mendiknas RI Nomor 184/U/2001 tentang Pedoman Pengawasan Pengendalian dan Pembinaan Program Diploma, Sarjana dan Pascasarjana di Perguruan Tinggi;
9. Surat Keputusan Rektor Universitas Pakuan Nomor 41.1/KEP/REK/V/2017 tentang Sistem Pendidikan di Universitas Pakuan;
10. Surat Keputusan Rektor Universitas Pakuan Nomor 12.1/KEP/REK/III/2018 tentang Pusat Unggulan dan Inovasi di Universitas Pakuan;
11. Statuta Universitas Pakuan Tahun 2022;
12. Surat Keputusan Rektor Universitas Pakuan Nomor 35/KEP/REK/VIII/2020 tentang Pengangkatan Dekan dan Wakil Dekan di Lingkungan Universitas Pakuan Masa Bakti Tahun 2020-2025.

MEMUTUSKAN

- Menetapkan : **PENGANGKATAN *VISITING PROFESSOR* PADA PROGRAM STUDI MANAJEMEN SEKOLAH PASCASARJANA UNIVERSITAS PAKUAN A.N. PROF. DR. ABDUL THALIB BIN BON**
- Pertama : Mengangkat Saudara:
Nama : Prof. Dr. Abdul Thalib Bin Bon
Institusi : Universiti Tun Hussein Onn Malaysia (UTHM)
Jangka Waktu : Semester Ganjil Tahun Akademik 2023/2024
Mata Kuliah : Supply Chain Management and Logistics
- Kedua : Keputusan ini mulai berlaku pada tanggal tetapkan, dengan ketentuan apabila terdapat kekeliruan dalam Keputusan ini akan dilakukan perbaikan dan penyesuaian sebagaimana mestinya.

Ditetapkan di : Bogor
Pada tanggal : 11 September 2023
Dekan,



Prof. Dr. Ing. H. Soewarto Hardhienata
NIP 19581213 198211 1001

Tembusan :

1. Yth. Para Wakil Dekan SPs Unpak :
2. Yth. Ketua Program Studi di lingkungan SPs Unpak;
3. Yth. Yang bersangkutan.

Understanding the Supply Chain and Logistic Management

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Traditional View: Logistics in the US Economy (2006, 2007)

Freight Transportation	\$809, \$856 Billion
Inventory Expense	\$446, \$487 Billion
Administrative Expense	\$50, \$54 Billion
Total Logistics Costs	\$1.31, \$1.4 Trillion
Logistics Related Activity	10%, 10.1% of GNP

Source: 18th and 19th Annual State of Logistics Report – Logistics Magazine

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Traditional View: Logistics in the Manufacturing Firm

Profit	4%	<table border="1"> <tr><td>Profit</td></tr> <tr><td>Logistics Cost</td></tr> <tr><td>Marketing Cost</td></tr> <tr><td>Manufacturing Cost</td></tr> </table>	Profit	Logistics Cost	Marketing Cost	Manufacturing Cost
Profit						
Logistics Cost						
Marketing Cost						
Manufacturing Cost						
Logistics Cost	21%					
Marketing Cost	27%					
Manufacturing Cost	48%					

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Supply Chain Management: The Magnitude in the Traditional View

- Estimated that the grocery industry could save \$30 billion (10% of operating cost) by using effective logistics and supply chain strategies
 - A typical box of cereal spends 104 days from factory to sale
 - A typical car spends 15 days from factory to dealership
- Laura Ashley turns its inventory 10 times a year, five times faster than 3 years ago

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Supply Chain Management: The True Magnitude

- Compaq estimates it lost \$.5 billion to \$1 billion in sales in 1995 because laptops were not available when and where needed
- When the 1 gig processor was introduced by AMD, the price of the 800 mb processor dropped by 30%
- P&G estimates it saved retail customers \$65 million by collaboration resulting in a better match of supply and demand

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Outline

- What is a Supply Chain?
- Decision Phases in a Supply Chain
- Process View of a Supply Chain
- The Importance of Supply Chain Flows
- Examples of Supply Chains

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What is a Supply Chain?

- Introduction
- The objective of a supply chain

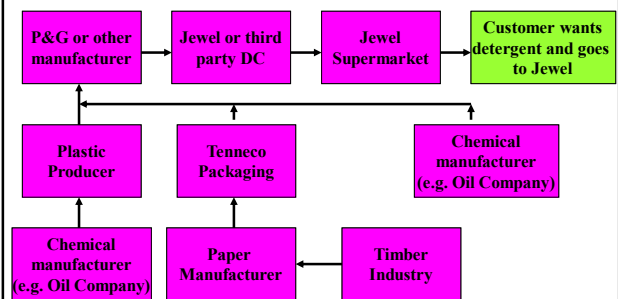
What is a Supply Chain?

- All stages involved, directly or indirectly, in fulfilling a customer request
- Includes manufacturers, suppliers, transporters, warehouses, retailers, and customers
- Within each company, the supply chain includes all functions involved in fulfilling a customer request (product development, marketing, operations, distribution, finance, customer service)
- Examples: Fig. 1.1 Detergent supply chain (Wal-Mart), Dell

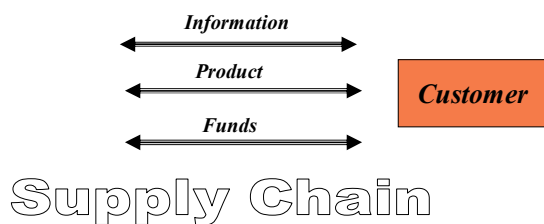
What is a Supply Chain?

- Customer is an integral part of the supply chain
- Includes movement of products from suppliers to manufacturers to distributors, but also includes movement of information, funds, and products in both directions
- Probably more accurate to use the term “supply network” or “supply web”
- Typical supply chain stages: customers, retailers, distributors, manufacturers, suppliers (Fig. 1.2)
- All stages may not be present in all supply chains (e.g., no retailer or distributor for Dell)

What is a Supply Chain?



Flows in a Supply Chain



The Objective of a Supply Chain

- Maximize overall value created
- Supply chain value: difference between what the final product is worth to the customer and the effort the supply chain expends in filling the customer’s request
- Value is correlated to supply chain profitability (difference between revenue generated from the customer and the overall cost across the supply chain)

The Objective of a Supply Chain

- Example: Dell receives \$2000 from a customer for a computer (revenue)
- Supply chain incurs costs (information, storage, transportation, components, assembly, etc.)
- Difference between \$2000 and the sum of all of these costs is the supply chain profit
- Supply chain profitability is total profit to be shared across all stages of the supply chain
- Supply chain success should be measured by total supply chain profitability, not profits at an individual stage

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The Objective of a Supply Chain

- Sources of supply chain revenue: the customer
- Sources of supply chain cost: flows of information, products, or funds between stages of the supply chain
- ***Supply chain management is the management of flows between and among supply chain stages to maximize total supply chain profitability***

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Decision Phases of a Supply Chain

- Supply chain strategy or design
- Supply chain planning
- Supply chain operation

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Supply Chain Strategy or Design

- Decisions about the structure of the supply chain and what processes each stage will perform
- Strategic supply chain decisions
 - Locations and capacities of facilities
 - Products to be made or stored at various locations
 - Modes of transportation
 - Information systems
- Supply chain design must support strategic objectives
- Supply chain design decisions are long-term and expensive to reverse – must take into account market uncertainty

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Supply Chain Planning

- Definition of a set of policies that govern short-term operations
- Fixed by the supply configuration from previous phase
- Starts with a forecast of demand in the coming year

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Supply Chain Planning

- Planning decisions:
 - Which markets will be supplied from which locations
 - Planned buildup of inventories
 - Subcontracting, backup locations
 - Inventory policies
 - Timing and size of market promotions
- Must consider in planning decisions demand uncertainty, exchange rates, competition over the time horizon

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Supply Chain Operation

- Time horizon is weekly or daily
- Decisions regarding individual customer orders
- Supply chain configuration is fixed and operating policies are determined
- Goal is to implement the operating policies as effectively as possible
- Allocate orders to inventory or production, set order due dates, generate pick lists at a warehouse, allocate an order to a particular shipment, set delivery schedules, place replenishment orders
- Much less uncertainty (short time horizon)

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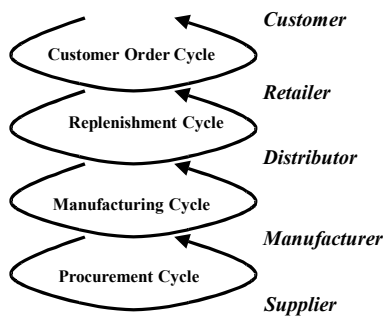
Process View of a Supply Chain

- Cycle view: processes in a supply chain are divided into a series of cycles, each performed at the interfaces between two successive supply chain stages
- Push/pull view: processes in a supply chain are divided into two categories depending on whether they are executed in response to a customer order (pull) or in anticipation of a customer order (push)

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Cycle View of Supply Chains



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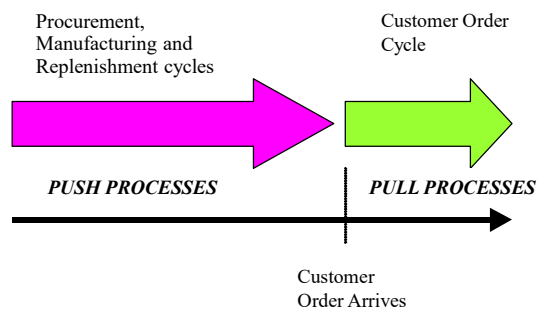
Cycle View of a Supply Chain

- Each cycle occurs at the interface between two successive stages
- Customer order cycle (customer-retailer)
- Replenishment cycle (retailer-distributor)
- Manufacturing cycle (distributor-manufacturer)
- Procurement cycle (manufacturer-supplier)
- Cycle view clearly defines processes involved and the owners of each process. Specifies the roles and responsibilities of each member and the desired outcome of each process.

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Push/Pull View of Supply Chains



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Push/Pull View of Supply Chain Processes

- Supply chain processes fall into one of two categories depending on the timing of their execution relative to customer demand
- Pull: execution is initiated in response to a customer order (reactive)
- Push: execution is initiated in anticipation of customer orders (speculative)
- Push/pull boundary separates push processes from pull processes

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Push/Pull View of Supply Chain Processes

- Useful in considering strategic decisions relating to supply chain design – more global view of how supply chain processes relate to customer orders
- Can combine the push/pull and cycle views
 - L.L. Bean (Figure 1.6)
 - Dell (Figure 1.7)
- The relative proportion of push and pull processes can have an impact on supply chain performance

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1-25

Supply Chain Macro Processes in a Firm

- Supply chain processes discussed in the two views can be classified into (Figure 1.8):
 - Customer Relationship Management (CRM)
 - Internal Supply Chain Management (ISCM)
 - Supplier Relationship Management (SRM)
- Integration among the above three macro processes is critical for effective and successful supply chain management

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Examples of Supply Chains

- Gateway
- Zara
- McMaster Carr / W.W. Grainger
- Toyota
- Amazon / Borders / Barnes and Noble
- Webvan / Peapod / Jewel

What are some key issues in these supply chains?

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Gateway: A Direct Sales Manufacturer

- Why did Gateway have multiple production facilities in the US? What advantages or disadvantages does this strategy offer relative to Dell, which has one facility?
- What factors did Gateway consider when deciding which plants to close?
- Why does Gateway not carry any finished goods inventory at its retail stores?
- Should a firm with an investment in retail stores carry any finished goods inventory?
- Is the Dell model of selling directly without any retail stores always less expensive than a supply chain with retail stores?
- What are the supply chain implications of Gateway's decision to offer fewer configurations?

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1-28

7-Eleven

- What factors influence decisions of opening and closing stores? Location of stores?
- Why has 7-Eleven chosen off-site preparation of fresh food?
- Why does 7-Eleven discourage direct store delivery from vendors?
- Where are distribution centers located and how many stores does each center serve? How are stores assigned to distribution centers?
- Why does 7-Eleven combine fresh food shipments by temperature?
- What point of sale data does 7-Eleven gather and what information is made available to store managers? How should information systems be structured?

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1-29

W.W. Grainger and McMaster Carr

- How many DCs should there be and where should they be located?
- How should product stocking be managed at the DCs? Should all DCs carry all products?
- What products should be carried in inventory and what products should be left at the supplier?
- What products should Grainger carry at a store?
- How should markets be allocated to DCs?
- How should replenishment of inventory be managed at various stocking locations?
- How should Web orders be handled?
- What transportation modes should be used?

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1-30

Toyota

- Where should plants be located, what degree of flexibility should each have, and what capacity should each have?
- Should plants be able to produce for all markets?
- How should markets be allocated to plants?
- What kind of flexibility should be built into the distribution system?
- How should this flexible investment be valued?
- What actions may be taken during product design to facilitate this flexibility?

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Amazon.com

- Why is Amazon building more warehouses as it grows? How many warehouses should it have and where should they be located?
- What advantages does selling books via the Internet provide? Are there disadvantages?
- Why does Amazon stock bestsellers while buying other titles from distributors?
- Does an Internet channel provide greater value to a bookseller like Borders or to an Internet-only company like Amazon?
- Should traditional booksellers like Borders integrate e-commerce into their current supply?
- For what products does the e-commerce channel offer the greatest benefits? What characterizes these products?

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Summary of Learning Objectives

- What are the cycle and push/pull views of a supply chain?
- How can supply chain macro processes be classified?
- What are the three key supply chain decision phases and what is the significance of each?
- What is the goal of a supply chain and what is the impact of supply chain decisions on the success of the firm?

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2

Supply Chain Performance

Achieving Strategic Fit and Scope



Learning Objectives

1. Explain why achieving strategic fit is critical to a company's overall success.
2. Describe how a company achieves strategic fit between its supply chain strategy and its competitive strategy.
3. Discuss the importance of expanding the scope of strategic fit across the supply chain.
4. Describe the major challenges that must be overcome to manage a supply chain successfully.

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2 - 2

Competitive and Supply Chain Strategies

- *Competitive strategy* defines the set of customer needs a firm seeks to satisfy through its products and services
- *Product development* strategy specifies the portfolio of new products that the company will try to develop
- *Marketing and sales* strategy specifies how the market will be segmented and product positioned, priced, and promoted
- *Supply chain* strategy determines the nature of material procurement, transportation of materials, manufacture of product or creation of service, distribution of product
- All functional strategies must support one another and the competitive strategy

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2 - 3

The Value Chain

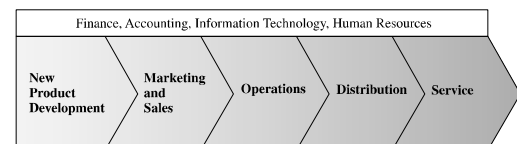


FIGURE 2-1

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2 - 4

Achieving Strategic Fit

- *Strategic fit* – competitive and supply chain strategies have aligned goals
- A company may fail because of a lack of strategic fit or because its processes and resources do not provide the capabilities to execute the desired strategy

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2 - 5

Achieving Strategic Fit

1. The competitive strategy and all functional strategies must fit together to form a coordinated overall strategy. Each functional strategy must support other functional strategies and help a firm reach its competitive strategy goal.
2. The different functions in a company must appropriately structure their processes and resources to be able to execute these strategies successfully.
3. The design of the overall supply chain and the role of each stage must be aligned to support the supply chain strategy.

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2 - 6

How is Strategic Fit Achieved?

1. Understanding the customer and supply chain uncertainty
2. Understanding the supply chain capabilities
3. Achieving strategic fit

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2 - 7

Step 1: Understanding the Customer and Supply Chain Uncertainty

- Quantity of product needed in each lot
- Response time customers will tolerate
- Variety of products needed
- Service level required
- Price of the product
- Desired rate of innovation in the product

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2 - 8

Step 1: Understanding the Customer and Supply Chain Uncertainty

- *Demand uncertainty* – uncertainty of customer demand for a product
- *Implied demand uncertainty* – resulting uncertainty for the supply chain given the portion of the demand the supply chain must handle and attributes the customer desires

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Customer Needs and Implied Demand Uncertainty

Customer Need	Causes Implied Demand Uncertainty to ...
Range of quantity required increases	Increase because a wider range of the quantity required implies greater variance in demand
Lead time decreases	Increase because there is less time in which to react to orders
Variety of products required increases	Increase because demand per product becomes less predictable
Number of channels through which product may be acquired increases	Increase because the total customer demand per channel becomes less predictable
Rate of innovation increases	Increase because new products tend to have more uncertain demand
Required service level increases	Increase because the firm now has to handle unusual surges in demand

TABLE 2-1

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Implied Uncertainty and Other Attributes

1. Products with uncertain demand are often less mature and have less direct competition. As a result, margins tend to be high.
2. Forecasting is more accurate when demand has less uncertainty.
3. Increased implied demand uncertainty leads to increased difficulty in matching supply with demand. For a given product, this dynamic can lead to either a stockout or an oversupply situation.
4. Markdowns are high for products with greater implied demand uncertainty because oversupply often results.

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Implied Uncertainty and Other Attributes

	Low Implied Uncertainty	High Implied Uncertainty
Product margin	Low	High
Average forecast error	10%	40% to 100%
Average stockout rate	1% to 2%	10% to 40%
Average forced season-end markdown	0%	10% to 25%

TABLE 2-2

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Impact of Supply Source Capability

Supply Source Capability	Causes Supply Uncertainty to...
Frequent breakdowns	Increase
Unpredictable and low yields	Increase
Poor quality	Increase
Limited supply capacity	Increase
Inflexible supply capacity	Increase
Evolving production process	Increase

TABLE 2-3

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Implied Uncertainty (Demand and Supply) Spectrum

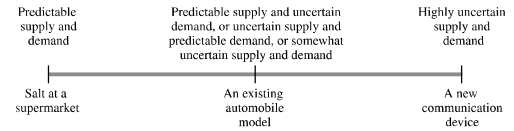


FIGURE 2-2

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Key Point

The first step in achieving strategic fit between competitive and supply chain strategies is to understand customers and supply chain uncertainty. Uncertainty from the customer and the supply chain can be combined and mapped on the implied uncertainty spectrum.

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Step 2: Understanding Supply Chain Capabilities

- How does the firm best meet demand?
- Supply chain responsiveness is the ability to
 - Respond to wide ranges of quantities demanded
 - Meet short lead times
 - Handle a large variety of products
 - Build highly innovative products
 - Meet a high service level
 - Handle supply uncertainty

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Step 2: Understanding Supply Chain Capabilities

- Responsiveness comes at a cost
- *Supply chain efficiency* is the inverse to the cost of making and delivering the product to the customer
- The *cost-responsiveness efficient frontier* curve shows the lowest possible cost for a given level of responsiveness

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Cost-Responsiveness Efficient Frontier

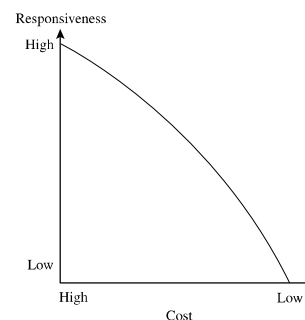


FIGURE 2-3

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Responsiveness Spectrum

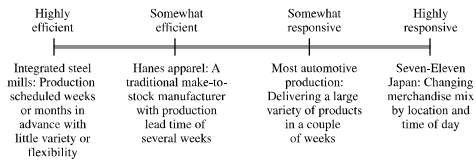


FIGURE 2-4

Key Point

The second step in achieving strategic fit between competitive and supply chain strategies is to understand the supply chain and map it on the responsiveness spectrum.

Step 3: Achieving Strategic Fit

- Ensure that the degree of supply chain responsiveness is consistent with the implied uncertainty
- Assign roles to different stages of the supply chain that ensure the appropriate level of responsiveness
- Ensure that all functions maintain consistent strategies that support the competitive strategy

Zone of Strategic Fit

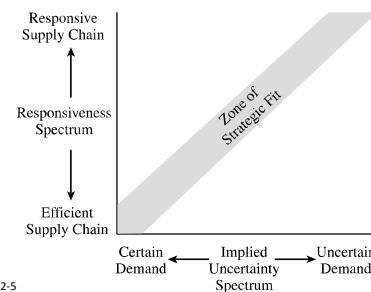


FIGURE 2-5

Roles and Allocations

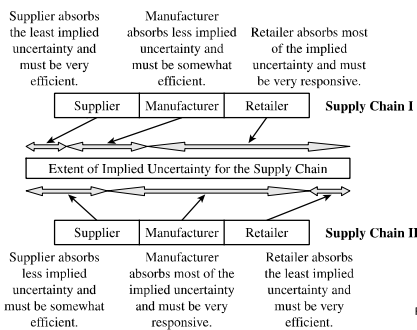


FIGURE 2-6

Efficient and Responsive Supply Chains

	Efficient Supply Chains	Responsive Supply Chains
Primary goal	Supply demand at the lowest cost	Respond quickly to demand
Product design strategy	Maximize performance at a minimum product cost	Create <i>modularity</i> to allow postponement of product differentiation
Pricing strategy	Lower margins because price is a prime customer driver	Higher margins because price is not a prime customer driver
Manufacturing strategy	Lower costs through high utilization	Maintain capacity flexibility to buffer against demand/supply uncertainty
Inventory strategy	Minimize inventory to lower cost	Maintain <i>buffer inventory</i> to deal with demand/supply uncertainty
Lead-time strategy	Reduce, but not at the expense of costs	Reduce aggressively, even if the costs are significant
Supplier strategy	Select based on cost and quality	Select based on speed, flexibility, reliability, and quality

TABLE 2-4

Key Point

The final step in achieving strategic fit is to match supply chain responsiveness with the implied uncertainty from demand and supply. The supply chain design and all functional strategies within the firm must also support the supply chain's level of responsiveness.

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Tailoring the Supply Chain

- Achieve strategic fit while serving many customer segments with a variety of products across multiple channels
- Requires sharing some links in the supply chain with some products, while having separate operations for other links

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Changes Over Product Life Cycle

- Beginning stages
 1. Demand is very uncertain, and supply may be unpredictable
 2. Margins are often high, and time is crucial to gaining sales
 3. Product availability is crucial to capturing the market
 4. Cost is often a secondary consideration

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Changes Over Product Life Cycle

- Later stages
 1. Demand has become more certain, and supply is predictable
 2. Margins are lower as a result of an increase in competitive pressure
 3. Price becomes a significant factor in customer choice

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Key Point

When supplying multiple customer segments with a wide variety of products through several channels, a firm must tailor its supply chain to achieve strategic fit.

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Expanding Strategic Scope

- *Scope of strategic fit* – the functions within the firm and stages across the supply chain that devise an integrated strategy with an aligned objective
- Intraoperation Scope: Minimize Local Cost View
 - Each stage of the supply chain devises strategy independently

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Expanding Strategic Scope

- **Intrafunctional Scope: Minimizing Total Functional Cost**
 - Firms align all operations within a function
- **Interfunctional Scope: Maximize Company Profit**
 - Functional strategies are developed to align with one another and the competitive strategy

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Expanding Strategic Scope

- **Intercompany Scope: Maximize Supply Chain Surplus**
 - Supplier and customer work together and share information to reduce total cost and increase supply chain surplus
- **Agile intercompany scope** – a firm's ability to achieve strategic fit when partnering with supply chain stages that change over time

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Key Point

The intercompany scope of strategic fit requires firms to evaluate every action in the context of the entire supply chain. This broad scope increases the size of the surplus to be shared among all stages of the supply chain. The intercompany scope of strategic fit is essential today because the competitive playing field has shifted from company versus company to supply chain versus supply chain. A company's partners in the supply chain may well determine the company's success, as the company is intimately tied to its supply chain.

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Challenges

- **Increasing product variety and shrinking life cycles**
 - Greater product variety and shorter life cycles increase uncertainty while reducing the window of opportunity within which the supply chain can achieve fit
- **Globalization and increasing uncertainty**
 - Significant fluctuations in exchange rates, global demand, and the price of crude oil affecting supply chain performance

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Challenges

- **Fragmentation of supply chain ownership**
 - Firms are less vertically integrated
 - Take advantage of supplier and customer competencies they did not have
 - New ownership structure makes aligning and managing the supply chain more difficult
 - Aligning all members of a supply chain has become critical to achieving supply chain fit

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2 – 35

Challenges

- **Changing technology and business environment**
 - Changes in customer needs and technology may force a firm to rethink their supply chain strategy to maintain strategic fit
- **The environment and sustainability**
 - Growing in relevance and must be accounted for when designing supply chain strategy
 - Opportunities may require coordination across different members of the supply chain

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Key Point

Many challenges, such as rising product variety and shorter product life cycles, have made it increasingly difficult for supply chains to achieve strategic fit. Overcoming these challenges offers a tremendous opportunity for firms to use supply chain management to gain competitive advantage.

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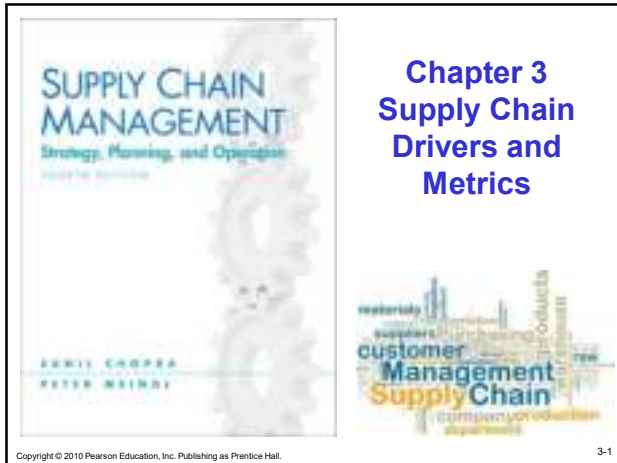
1 - 37

Summary of Learning Objectives

1. Explain why achieving strategic fit is critical to a company's overall success
2. Describe how a company achieves strategic fit between its supply chain strategy and its competitive strategy
3. Discuss the importance of expanding the scope of strategic fit across the supply chain
4. Describe the major challenges that must be overcome to manage a supply chain successfully

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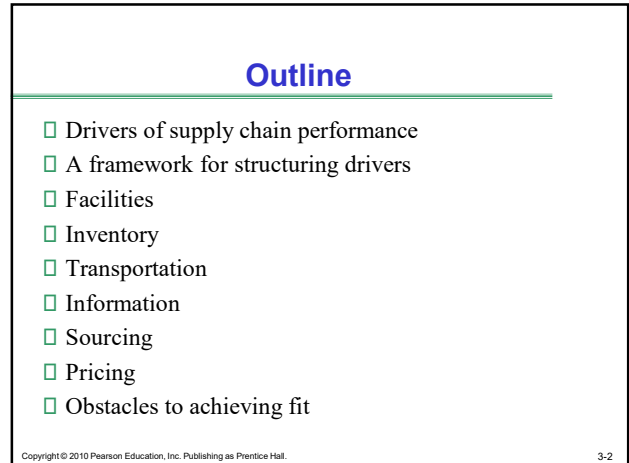
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Chapter 3 Supply Chain Drivers and Metrics

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3-1

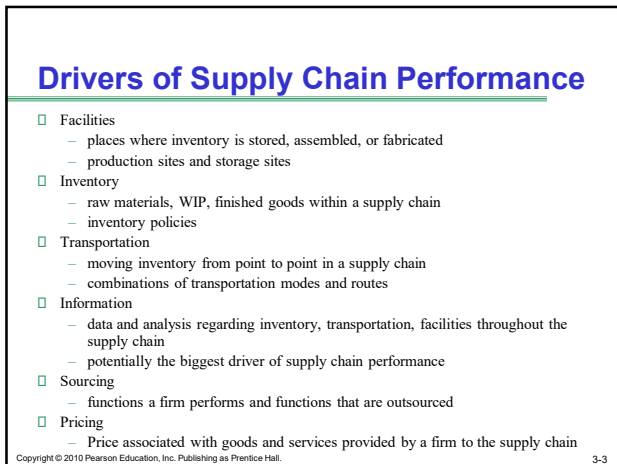


Outline

- Drivers of supply chain performance
- A framework for structuring drivers
- Facilities
- Inventory
- Transportation
- Information
- Sourcing
- Pricing
- Obstacles to achieving fit

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3-2

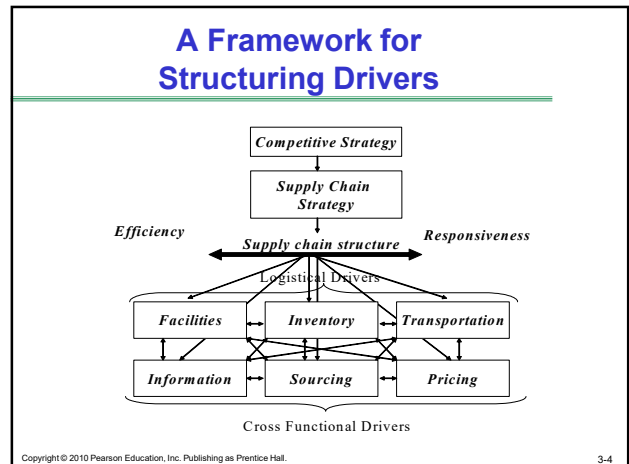


Drivers of Supply Chain Performance

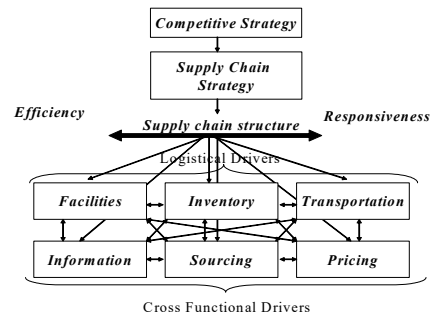
- Facilities
 - places where inventory is stored, assembled, or fabricated
 - production sites and storage sites
- Inventory
 - raw materials, WIP, finished goods within a supply chain
 - inventory policies
- Transportation
 - moving inventory from point to point in a supply chain
 - combinations of transportation modes and routes
- Information
 - data and analysis regarding inventory, transportation, facilities throughout the supply chain
 - potentially the biggest driver of supply chain performance
- Sourcing
 - functions a firm performs and functions that are outsourced
- Pricing
 - Price associated with goods and services provided by a firm to the supply chain

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3-3

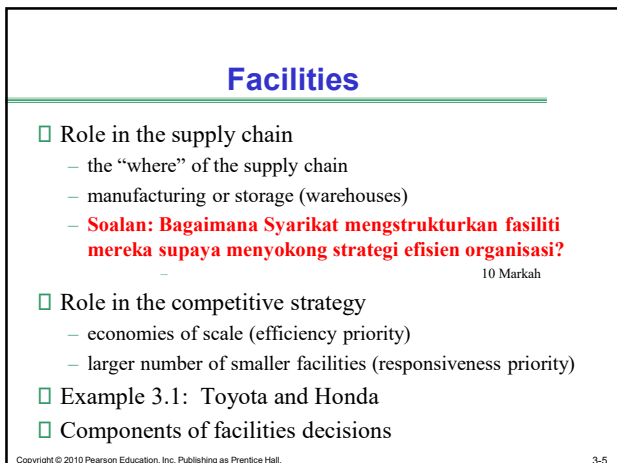


A Framework for Structuring Drivers



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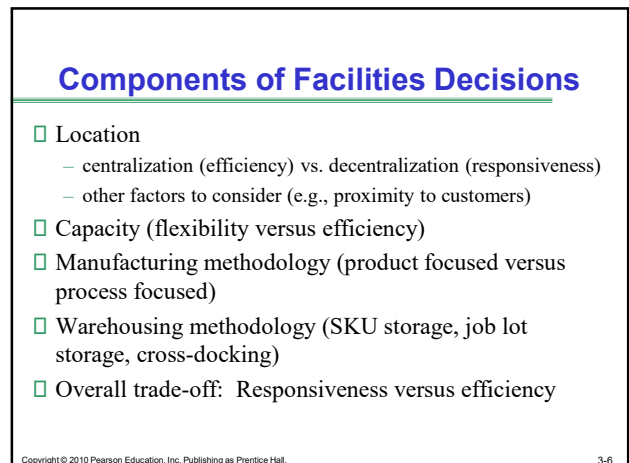
Facilities

- Role in the supply chain
 - the “where” of the supply chain
 - manufacturing or storage (warehouses)
 - **Soalan: Bagaimana Syarikat mengstrukturkan fasiliti mereka supaya menyokong strategi efisien organisasi?**
- Role in the competitive strategy
 - economies of scale (efficiency priority)
 - larger number of smaller facilities (responsiveness priority)
- Example 3.1: Toyota and Honda
- Components of facilities decisions

10 Markah

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Components of Facilities Decisions

- Location
 - centralization (efficiency) vs. decentralization (responsiveness)
 - other factors to consider (e.g., proximity to customers)
- Capacity (flexibility versus efficiency)
- Manufacturing methodology (product focused versus process focused)
- Warehousing methodology (SKU storage, job lot storage, cross-docking)
- Overall trade-off: Responsiveness versus efficiency

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Inventory

- Role in the supply chain
- Role in the competitive strategy
- Components of inventory decisions

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Inventory: Role in the Supply Chain

- Inventory exists because of a mismatch between supply and demand
- Source of cost and influence on responsiveness
- Impact on
 - material flow time: time elapsed between when material enters the supply chain to when it exits the supply chain
 - throughput
 - » rate at which sales to end consumers occur
 - » $I = DT$ (Little's Law)
 - » I = inventory; D = throughput; T = flow time
 - » Example
 - » Inventory and throughput are "synonymous" in a supply chain

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Inventory: Role in Competitive Strategy

- If responsiveness is a strategic competitive priority, a firm can locate larger amounts of inventory closer to customers
- If cost is more important, inventory can be reduced to make the firm more efficient
- Trade-off
- Example 3.2 – Nordstrom

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Components of Inventory Decisions

- Cycle inventory
 - Average amount of inventory used to satisfy demand between shipments
 - Depends on lot size
- Safety inventory
 - inventory held in case demand exceeds expectations
 - costs of carrying too much inventory versus cost of losing sales
- Seasonal inventory
 - inventory built up to counter predictable variability in demand
 - cost of carrying additional inventory versus cost of flexible production
- Overall trade-off: Responsiveness versus efficiency
 - more inventory: greater responsiveness but greater cost
 - less inventory: lower cost but lower responsiveness

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Transportation

- Role in the supply chain
- Role in the competitive strategy
- Components of transportation decisions

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Transportation: Role in the Supply Chain

- Moves the product between stages in the supply chain
- Impact on responsiveness and efficiency
- Faster transportation allows greater responsiveness but lower efficiency
- Also affects inventory and facilities

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Transportation: Role in the Competitive Strategy

- If responsiveness is a strategic competitive priority, then faster transportation modes can provide greater responsiveness to customers who are willing to pay for it
- Can also use slower transportation modes for customers whose priority is price (cost)
- Can also consider both inventory and transportation to find the right balance
- Example 3.3: Blue Nile

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Components of Transportation Decisions

- Mode of transportation:
 - air, truck, rail, ship, pipeline, electronic transportation
 - vary in cost, speed, size of shipment, flexibility
- Route and network selection
 - route: path along which a product is shipped
 - network: collection of locations and routes
- In-house or outsource
- Overall trade-off: Responsiveness versus efficiency

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Information

- Role in the supply chain
- Role in the competitive strategy
- Components of information decisions

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Information: Role in the Supply Chain

- The connection between the various stages in the supply chain – allows coordination between stages
- Crucial to daily operation of each stage in a supply chain – e.g., production scheduling, inventory levels

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Information: Role in the Competitive Strategy

- Allows supply chain to become more efficient and more responsive at the same time (reduces the need for a trade-off)
- Information technology
- What information is most valuable?
- Example 3.4: Andersen Windows
- Example 3.5: Sunsweet Growers

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Components of Information Decisions

- Push (MRP) versus pull (demand information transmitted quickly throughout the supply chain)
- Coordination and information sharing
- Forecasting and aggregate planning
- Enabling technologies
 - EDI
 - Internet
 - ERP systems
 - Supply Chain Management software
- Overall trade-off: Responsiveness versus efficiency

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Sourcing

- Role in the supply chain
- Role in the competitive strategy
- Components of sourcing decisions

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Sourcing: Role in the Supply Chain

- Set of business processes required to purchase goods and services in a supply chain
- Supplier selection, single vs. multiple suppliers, contract negotiation

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Sourcing: Role in the Competitive Strategy

- Sourcing decisions are crucial because they affect the level of efficiency and responsiveness in a supply chain
- In-house vs. outsource decisions- improving efficiency and responsiveness
- Example 3.6: Cisco

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Components of Sourcing Decisions

- In-house versus outsource decisions
- Supplier evaluation and selection
- Procurement process
- Overall trade-off: Increase the supply chain profits

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Pricing

- Role in the supply chain
- Role in the competitive strategy
- Components of pricing decisions

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Pricing: Role in the Supply Chain

- Pricing determines the amount to charge customers in a supply chain
- Pricing strategies can be used to match demand and supply

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Sourcing: Role in the Competitive Strategy

- ❑ Firms can utilize optimal pricing strategies to improve efficiency and responsiveness
- ❑ Low price and low product availability; vary prices by response times
- ❑ Example 3.7: Amazon.com

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Components of Pricing Decisions

- ❑ Pricing and economies of scale
- ❑ Everyday low pricing versus high-low pricing
- ❑ Fixed price versus menu pricing
- ❑ Overall trade-off: Increase the firm profits

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Obstacles to Achieving Strategic Fit

- ❑ Increasing variety of products
- ❑ Decreasing product life cycles
- ❑ Increasingly demanding customers
- ❑ Fragmentation of supply chain ownership
- ❑ Globalization
- ❑ Difficulty executing new strategies

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Summary

- ❑ What are the major drivers of supply chain performance?
- ❑ What is the role of each driver in creating strategic fit between supply chain strategy and competitive strategy (or between implied demand uncertainty and supply chain responsiveness)?
- ❑ What are the major obstacles to achieving strategic fit?
- ❑ In the remainder of the course, we will learn how to make decisions with respect to these drivers in order to achieve strategic fit and surmount these obstacles

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4

Designing Distribution Networks and Applications to Online Sales



PowerPoint presentation
to accompany
Chopra and Meindl
Supply Chain Management, 6e

Learning Objectives

1. Identify the key factors to be considered when designing a distribution network.
2. Discuss the strengths and weaknesses of various distribution options.
3. Understand how online sales have affected the design of distribution networks in different industries.

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The Role of Distribution in the Supply Chain

- *Distribution* – the steps taken to move and store a product from the supplier stage to the customer stage in a supply chain
- Drives profitability by directly affecting supply chain cost and the customer value
- Choice of distribution network can achieve supply chain objectives from low cost to high responsiveness

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Factors Influencing Distribution Network Design

- Distribution network performance evaluated along two dimensions
 1. Value provided to the customer
 2. Cost of meeting customer needs
- Evaluate the impact on customer service and cost for different distribution network options
- Profitability of the delivery network determined by revenue from met customer needs and network costs

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Factors Influencing Distribution Network Design

- Elements of customer service influenced by network structure:
 - Response time
 - Product variety
 - Product availability
 - Customer experience
 - Time to market
 - Order visibility
 - Returnability

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Factors Influencing Distribution Network Design

- Supply chain costs affected by network structure:
 - Inventories
 - Transportation
 - Facilities and handling
 - Information

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Desired Response Time and Number of Facilities

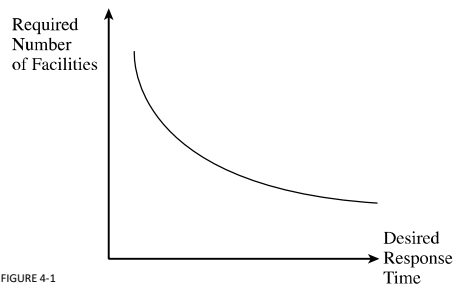


FIGURE 4-1

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Inventory Costs and Number of Facilities

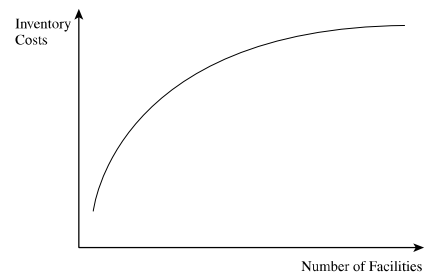


FIGURE 4-2

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Transportation Costs and Number of Facilities

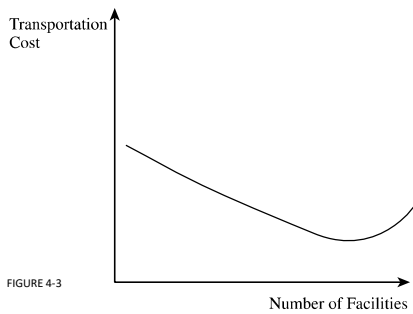


FIGURE 4-3

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Facility Costs and Number of Facilities

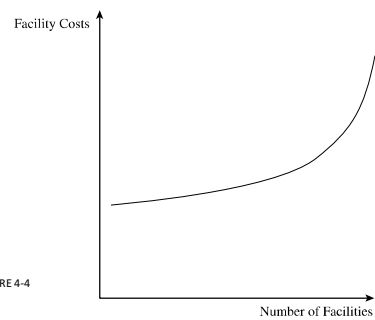


FIGURE 4-4

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Logistics Cost, Response Time, and Number of Facilities

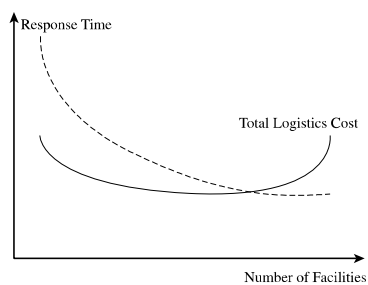


FIGURE 4-5

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Design Options for a Distribution Network

- Distribution network choices from the manufacturer to the end consumer
- Two key decisions
 1. Will product be delivered to the customer location or picked up from a prearranged site?
 2. Will product flow through an intermediary (or intermediate location)?

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Design Options for a Distribution Network

- One of six designs may be used
 1. Manufacturer storage with direct shipping
 2. Manufacturer storage with direct shipping and in-transit merge
 3. Distributor storage with carrier delivery
 4. Distributor storage with last-mile delivery
 5. Manufacturer/distributor storage with customer pickup
 6. Retail storage with customer pickup

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4 - 13

Manufacturer Storage with Direct Shipping

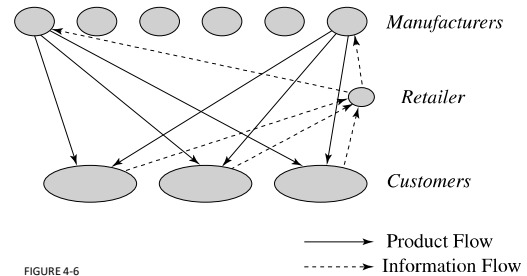


FIGURE 4-6

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Manufacturer Storage with Direct Shipping Network

Cost Factor	Performance
Inventory	Lower costs because of aggregation. Benefits of aggregation are highest for low-demand, high-value items. Benefits are large if product customization can be postponed at the manufacturer.
Transportation	Higher transportation costs because of increased distance and disaggregate shipping.
Facilities and handling	Lower facility costs because of aggregation. Some saving on handling costs if manufacturer can manage small shipments or ship from production line.
Information	Significant investment in information infrastructure to integrate manufacturer and retailer.

TABLE 4-1

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Manufacturer Storage with Direct Shipping Network

Service Factor	Performance
Response time	Long response time of one to two weeks because of increased distance and two stages for order processing. Response time may vary by product, thus complicating receiving.
Product variety	Easy to provide a high level of variety.
Product availability	Easy to provide a high level of product availability because of aggregation at manufacturer.
Customer experience	Good in terms of home delivery but can suffer if order from several manufacturers is sent as partial shipments.
Time to market	Fast, with the product available as soon as the first unit is produced.
Order visibility	More difficult but also more important from a customer service perspective.
Returnability	Expensive and difficult to implement.

TABLE 4-1 continued

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In-Transit Merge Network

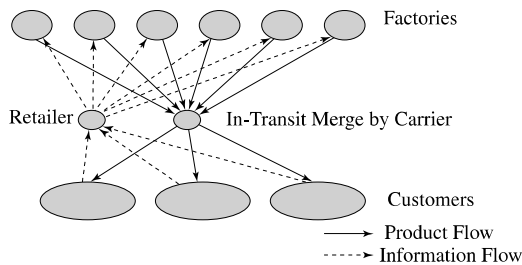


FIGURE 4-7

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In-Transit Merge

Cost Factor	Performance
Inventory	Similar to drop-shipping.
Transportation	Somewhat lower transportation costs than drop-shipping.
Facilities and handling	Handling costs higher than drop-shipping at carrier; receiving costs lower at customer.
Information	Investment is somewhat higher than for drop-shipping.

TABLE 4-2

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In-Transit Merge

Service Factor	Performance
Response time	Similar to drop-shipping; may be marginally higher.
Product variety	Similar to drop-shipping.
Product availability	Similar to drop-shipping.
Customer experience	Better than drop-shipping because only a single delivery is received.
Time to market	Similar to drop-shipping.
Order visibility	Similar to drop-shipping.
Returnability	Similar to drop-shipping.

TABLE 4-2 continued

Distributor Storage with Carrier Delivery

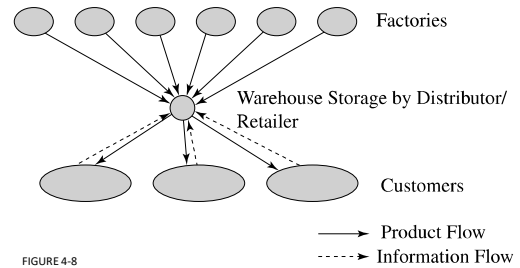


FIGURE 4-8

Distributor Storage with Carrier Delivery

Cost Factor	Performance
Inventory	Higher than manufacturer storage. Difference is not large for faster moving items but can be large for very slow-moving items.
Transportation	Lower than manufacturer storage. Reduction is highest for faster moving items.
Facilities and handling	Somewhat higher than manufacturer storage. The difference can be large for very slow-moving items.
Information	Simpler infrastructure compared to manufacturer storage.

TABLE 4-3

Distributor Storage with Carrier Delivery

Service Factor	Performance
Response time	Faster than manufacturer storage.
Product variety	Lower than manufacturer storage.
Product availability	Higher cost to provide the same level of availability as manufacturer storage.
Customer experience	Better than manufacturer storage with drop-shipping.
Time to market	Higher than manufacturer storage.
Order visibility	Easier than manufacturer storage.
Returnability	Easier than manufacturer storage.

TABLE 4-3 continued

Distributor Storage with Last Mile Delivery

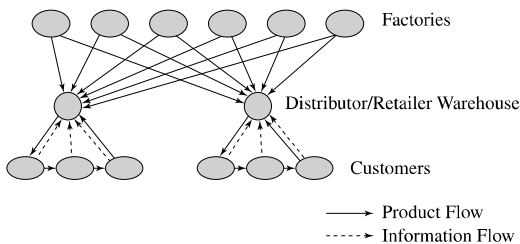


FIGURE 4-9

Distributor Storage with Last Mile Delivery

Cost Factor	Performance
Inventory	Higher than distributor storage with package carrier delivery.
Transportation	Very high cost given minimal scale economies. Higher than any other distribution option.
Facilities and handling	Facility costs higher than manufacturer storage or distributor storage with package carrier delivery, but lower than a chain of retail stores.
Information	Similar to distributor storage with package carrier delivery.

TABLE 4-4

Distributor Storage with Last Mile Delivery

Service Factor	Performance
Response time	Very quick. Same day to next-day delivery.
Product variety	Somewhat less than distributor storage with package carrier delivery but larger than retail stores.
Product availability	More expensive to provide availability than any other option except retail stores.
Customer experience	Very good, particularly for bulky items.
Time to market	Slightly higher than distributor storage with package carrier delivery.
Order visibility	Less of an issue and easier to implement than manufacturer storage or distributor storage with package carrier delivery.
Returnability	Easier to implement than other previous options. Harder and more expensive than a retail network.

TABLE 4-4 continued

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Manufacturer or Distributor Storage with Customer Pickup

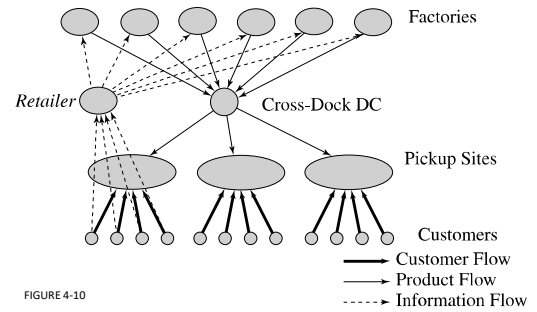


FIGURE 4-10

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Manufacturer or Distributor Storage with Customer Pickup

Cost Factor	Performance
Inventory	Can match any other option, depending on the location of inventory.
Transportation	Lower than the use of package carriers, especially if using an existing delivery network.
Facilities and handling	Facility costs can be high if new facilities have to be built. Costs are lower if existing facilities are used. The increase in handling cost at the pickup site can be significant.
Information	Significant investment in infrastructure required.

TABLE 4-5

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Manufacturer or Distributor Storage with Customer Pickup

Service Factor	Performance
Response time	Similar to package carrier delivery with manufacturer or distributor storage. Same-day delivery possible for items stored locally at pickup site.
Product variety	Similar to other manufacturer or distributor storage options.
Product availability	Similar to other manufacturer or distributor storage options.
Customer experience	Lower than other options because of the lack of home delivery. Experience is sensitive to capability of pickup location.
Time to market	Similar to manufacturer storage options.
Order visibility	Difficult but essential.
Returnability	Somewhat easier, given that pickup location can handle returns.

TABLE 4-5 continued

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Retail Storage with Customer Pickup

Cost Factor	Performance
Inventory	Higher than all other options.
Transportation	Lower than all other options.
Facilities and handling	Higher than other options. The increase in handling cost at the pickup site can be significant for online and phone orders.
Information	Some investment in infrastructure required for online and phone orders.

TABLE 4-6

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Retail Storage with Customer Pickup

Service Factor	Performance
Response time	Same-day (immediate) pickup possible for items stored locally at pickup site.
Product variety	Lower than all other options.
Product availability	More expensive to provide than all other options.
Customer experience	Related to whether shopping is viewed as a positive or negative experience by customer.
Time to market	Highest among distribution options.
Order visibility	Trivial for in-store orders. Difficult, but essential, for online and phone orders.
Returnability	Easier than other options because retail store can provide a substitute.

TABLE 4-6 continued

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Comparative Performance of Delivery Network Designs

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer Storage with Pickup
Response time	1	4	4	3	2	4
Product variety	4	1	1	2	3	1
Product availability	4	1	1	2	3	1
Customer experience	Varies from 1 to 5	4	3	2	1	5
Time to market	4	1	1	2	3	1
Order visibility	1	5	4	3	2	6
Returnability	1	5	5	4	3	2
Inventory	4	1	1	2	3	1
Transportation	1	4	3	2	5	1
Facility and handling	6	1	2	3	4	5
Information	1	4	4	3	2	5

Key: 1 corresponds to the strongest performance and 6 the weakest performance.

TABLE 4-7

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Delivery Networks for Different Product/ Customer Characteristics

	Retail Storage with Customer Pickup	Manufacturer Storage with Direct Shipping	Manufacturer Storage with In-Transit Merge	Distributor Storage with Package Carrier Delivery	Distributor Storage with Last-Mile Delivery	Manufacturer Storage with Pickup
High-demand product	+2	-2	-1	0	+1	-1
Medium-demand product	+1	-1	0	+1	0	0
Low-demand product	-1	+1	0	+1	-1	+1
Very-low-demand product	-2	+2	+1	0	-2	+1
Many product sources	+1	-1	-1	+2	+1	0
High product value	-1	+2	+1	+1	0	+2
Quick desired response	+2	-2	-2	-1	+1	-2
High product variety	-1	+2	0	+1	0	+2
Low customer effort	-2	+1	+2	+2	+2	-1

Key: +2 = very suitable; +1 = somewhat suitable; 0 = neutral; -1 = somewhat unsuitable; -2 = very unsuitable.

TABLE 4-8

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Impact of Online Sales on Customer Service

- **Response time to customers**
 - Physical products take longer to fulfill than retail store
 - No delay for information goods
- **Product variety**
 - Easier to offer larger selection
- **Product availability**
 - Aggregating inventory and better information on customer preferences improves product availability

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Impact of Online Sales on Customer Service

- **Customer experience**
 - Improved access, customization, and convenience
- **Faster time to market**
- **Order Visibility**
- **Returnability**
 - Harder with online orders
 - Proportion of returns likely to be much higher

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Impact of Online Sales on Customer Service

- **Direct Sales to Customers**
 - Social networking channels allow firms to directly pitch products and promotion
- **Flexible Pricing, Product Portfolio, and Promotions**
 - Manage revenues from product portfolio more effectively than traditional channels
 - Promotion information can be conveyed to customers quickly and inexpensively
- **Efficient Funds Transfer**

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Impact of Online Sales on Cost

- **Inventory**
 - Lower inventory levels if customers will wait
 - Postpone variety until after the customer order is received
- **Facilities**
 - Costs related to the number and location of facilities in a network
 - Costs associated with the operations in these facilities

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Impact of Online Sales on Cost

- **Transportation**
 - Lower cost of “transporting” information goods in digital form
 - For nondigital, aggregating inventories increases outbound transportation
- **Information**
 - Share demand, planning, and forecasting information throughout its supply chain
 - Additional costs to build and maintain the information infrastructure

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Online Sales Scorecard

Area	Impact
Response time	
Product variety	
Product availability	
Customer experience	
Time to market	
Order visibility	
Direct sales	
Flexible pricing, portfolio, promotions	
Efficient funds transfer	
Inventory	
Facilities	
Transportation	
Information	

Key: +2 = very positive; +1 = positive; 0 = neutral; -1 = negative; -2 = very negative.

TABLE 4-9

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Using Online Sales to Sell Computer Hardware: Dell

- **Impact of online sales on customer service**
 - Delay in fulfilling customer request
- **Impact of online sales on cost**
 - Reduced inventory costs
 - Lower facility costs
 - Higher total transportation costs
 - Incremental increase in information costs

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Impact of Online Sales on Performance

Area	Impact for Customized Servers	Impact for Standard Laptops
Response time	-1	-2
Product variety	+2	0
Product availability	+1	+1
Customer experience	+2	+1
Time to market	+2	+1
Order visibility	+1	0
Direct sales	+2	+1
Flexible pricing, portfolio, promotions	+2	+1
Efficient funds transfer	+2	+2
Inventory	+2	+1
Facilities	+2	+1
Transportation	-1	-2
Information	+1	0

TABLE 4-10 Key: +2 = very positive; +1 = positive; 0 = neutral; -1 = negative; -2 = very negative.

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Using Online Sales to Sell Computer Hardware: Dell

- **A tailored supply chain network**
 - A hybrid model can be very effective
 - More significant as hardware becomes more of a commodity
 - Take advantage of the strengths of both online sales and traditional retail and distribution channels

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Using Online Sales to Sell Books: Amazon

- **Impact of online sales on customer service**
 - Internet has not shortened supply chains
 - Increased selection, convenience
- **Cost impact of online sales**
 - Reduced inventory costs
 - Lower facility costs
 - Higher total transportation costs
 - Increase in information costs

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Impact of Online Sales on Performance

TABLE 4-11

Area	Physical books	e-books
Response time	-1	+1
Product variety	+2	+2
Product availability	+1	+2
Customer experience	+1	+1
Time to market	+1	+2
Order visibility	0	0
Direct sales	0	+1
Flexible pricing, portfolio, promotions	+1	+1
Efficient funds transfer	0	0
Inventory	+1	+2
Facilities	+1	+1
Transportation	-2	+1
Information	-1	-1

Key: +2 = very positive; +1 = positive; 0 = neutral; -1 = negative; -2 = very negative.

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Using Online Sales to Sell Books: Amazon

- **Tailored supply chain network for books**
 - Traditional bookstores pressured from both ends
 - Amazon more efficient

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Using the Internet to Sell Groceries: Peapod

- **Impact of online sales on customer service**
 - Sell convenience and the time savings
 - Offers less variety
 - Creating a personalized shopping experience and customized advertising and promotions

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Using the Internet to Sell Groceries: Peapod

- **Impact of online sales on cost**
 - Reduced inventory costs
 - Higher facility costs due to picking operation
 - Significantly higher total transportation costs
 - Increase in information costs

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Impact of Online Sales on Performance

TABLE 4-12

Area	Impact
Response time	-1
Product variety	0
Product availability	0
Customer experience	+1
Time to market	0
Order visibility	-1
Direct sales	0
Flexible pricing, portfolio, promotions	+1
Efficient funds transfer	0
Inventory	0
Facilities	-1
Transportation	-2
Information	-1

Key: +2 = very positive; +1 = positive; 0 = neutral; -1 = negative; -2 = very negative.

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Using Internet to Sell Groceries: Peapod

- **A tailored supply chain for groceries**
 - Complement the strengths of their existing network
 - Offer an entire array of services at differing prices based on the amount of work the customer does

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Using the Internet to Rent Movies: Netflix

- **Impact of online sales on customer service**
 - Staggering selection and an excellent recommendation engine
 - Video streaming through a variety of devices
 - Customers received their DVDs within 24 hours of being shipped

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Using the Internet to Rent Movies: Netflix

- **Impact of online sales on cost**
 - Reduced inventory costs
 - Lower facility costs
 - Considerably higher total transportation costs, increased streaming will reduce transportation costs
 - Increase in information costs

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Impact of Online Sales on Performance

TABLE 4-12

Area	Impact for DVDs	Impact for Digital Content
Response time	-1	+2
Product variety	+2	+2
Product availability	+1	+2
Customer experience	+1	+1
Time to market	-1	-1
Order visibility	0	0
Direct sales	0	0
Flexible pricing, portfolio, promotions	+1	+1
Efficient funds transfer	0	0
Inventory	+2	+2
Facilities	+1	+1
Transportation	-2	0
Information	-1	-1

Key: +2 = very positive; +1 = positive; 0 = neutral; -1 = negative; -2 = very negative.

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Using the Internet to Rent Movies: Netflix

- **A tailored supply chain**
 - Centralized model to supply wide variety of movies
 - Other vendors have chosen different models

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Distribution Networks in Practice

1. The ownership structure of the distribution network can have as big an impact as the type of distribution network
2. It is important to have adaptable distribution networks
3. Product price, commoditization, and criticality affect the type of distribution system preferred by customers
4. Integrate the Internet with the existing physical network

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Distribution Networks in Practice

- Consider whether an exclusive distribution strategy is advantageous
- Product, price, commoditization, and criticality have an impact on the type of distribution system preferred by customers

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Summary of Learning Objectives

1. Identify the key factors to be considered when designing a distribution network.
2. Discuss the strengths and weaknesses of various distribution options.
3. Understand how online sales have affected the design of distribution networks in different industries.

5

Network Design in the Supply Chain



PowerPoint presentation
to accompany
Chopra and Meindl
Supply Chain Management, 6e

Learning Objectives

1. Understand the role of network design in a supply chain.
2. Identify factors influencing supply chain network design decisions.
3. Develop a framework for making network design decisions.
4. Use optimization for facility location and capacity allocation decisions.

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The Role of Network Design

- Facility role
 - What role, what processes?
- Facility location
 - Where should facilities be located?
- Capacity allocation
 - How much capacity at each facility?
- Market and supply allocation
 - What markets? Which supply sources?

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The Role of Network Design

- Revisit design decisions after market changes, mergers, or factor cost changes

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Factors Influencing Network Design Decisions

- Strategic factors
- Technological factors
- Macroeconomic factors
 - Tariffs and tax incentives
 - Exchange-rate and demand risk
 - Freight and fuel costs
- Political

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Factors Influencing Network Design Decisions

- Infrastructure factors
- Competitive factors
 - Positive externalities between firms
 - Locating to split the market
- Customer response time and local presence
- Logistics and facility costs

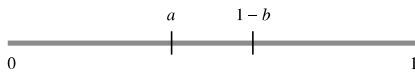
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Competitive Factors

- Positive externalities between firms
 - Collocation benefits all

FIGURE 5-1



- Locating to split the market
 - Locate to capture largest market share

$$d_1 = a + \frac{1-b-a}{2} \quad \text{and} \quad d_2 = \frac{1+b-a}{2}$$

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Framework for Network Design Decisions

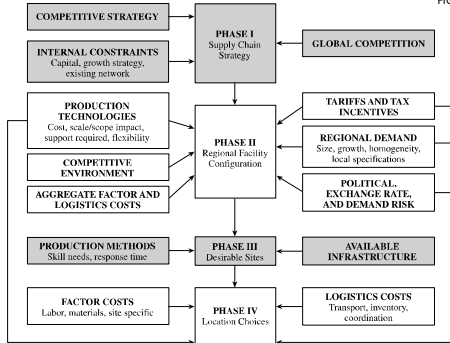
- **Phase I: Define a Supply Chain Strategy/Design**
 - Clear definition of the firm's competitive strategy
 - Forecast the likely evolution of global competition
 - Identify constraints on available capital
 - Determine broad supply strategy

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Framework for Network Design Decisions

FIGURE 5-2



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Framework for Network Design Decisions

- **Phase II: Define the Regional Facility Configuration**
 - Forecast of the demand by country or region
 - Economies of scale or scope
 - Identify demand risk, exchange-rate risk, political risk, tariffs, requirements for local production, tax incentives, and export or import restrictions
 - Identify competitors

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Framework for Network Design Decisions

- **Phase III: Select a Set of Desirable Potential Sites**
 - Hard infrastructure requirements
 - Soft infrastructure requirements
- **Phase IV: Location Choices**

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Models for Facility Location and Capacity Allocation

- Maximize the overall profitability of the supply chain network while providing customers with the appropriate responsiveness
- Many trade-offs during network design
- Network design models used
 - to decide on locations and capacities
 - to assign current demand to facilities and identify transportation lanes

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Models for Facility Location and Capacity Allocation

- Important information
 - Location of supply sources and markets
 - Location of potential facility sites
 - Demand forecast by market
 - Facility, labor, and material costs by site
 - Transportation costs between each pair of sites
 - Inventory costs by site and as a function of quantity
 - Sale price of product in different regions
 - Taxes and tariffs
 - Desired response time and other service factors

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Phase II: Network Optimization Models

FIGURE 5-3

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Capacitated Plant Location Model

- n = number of potential plant locations/capacity
- m = number of markets or demand points
- D_j = annual demand from market j
- K_i = potential capacity of plant i
- f_i = annualized fixed cost of keeping plant i open
- c_{ij} = cost of producing and shipping one unit from plant i to market j (cost includes production, inventory, transportation, and tariffs)
- y_i = 1 if plant i is open, 0 otherwise
- x_{ij} = quantity shipped from plant i to market j

$$\text{Min} \sum_{i=1}^n f_i y_i + \sum_{i=1}^n \sum_{j=1}^m c_{ij} x_{ij}$$

subject to

$$\sum_{i=1}^n x_{ij} = D_j \quad \text{for } j = 1, \dots, m$$

$$\sum_{j=1}^m x_{ij} = K_i y_i \quad \text{for } i = 1, \dots, n$$

$$y_i \in \{0, 1\} \quad \text{for } i = 1, \dots, n, x_{ij} \geq 0$$

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Capacitated Plant Location Model

FIGURE 5-4

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Capacitated Plant Location Model

FIGURE 5-5

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Capacitated Plant Location Model

Cell	Cell Formula	Equation	Copied to
B28	=B9 - SUM(B14:B18)	5.1	C28:F28
B22	=G14*H4 + H14*J4 - SUM(B14:F14)	5.2	B23:B26
B31	=SUMPRODUCT(B14:F18,B4:F8) + SUMPRODUCT(G14:G18,G4:G8) + SUMPRODUCT(H14:H18,I4:I8)	Objective Function	—

FIGURE 5-5

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Capacitated Plant Location Model

• Constraints

- B14:H18 ≥ 0 { All decision variables are nonnegative }
- B22:B26 ≥ 0 $\left\{ K_i y_i - \sum_{j=1}^m x_{ij} \geq 0 \text{ for } i = 1, \dots, 5 \right\}$
- B28:F28 $= 0$ $\left\{ D_j - \sum_{i=1}^n x_{ij} = 0 \text{ for } j = 1, \dots, 5 \right\}$
- G14:H18 *binary* { Location variables y_i are binary; that is, 0 or 1 }

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Capacitated Plant Location Model



FIGURE 5-6

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Capacitated Plant Location Model



FIGURE 5-7

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Phase III: Gravity Location Models

- x_n, y_n : coordinate location of either a market or supply source n
- F_n : cost of shipping one unit for one mile between the facility and either market or supply source n
- D_n : quantity to be shipped between facility and market or supply source n

(x, y) is the location selected for the facility, the distance d_n between the facility at location (x, y) and the supply source or market n is given by

$$d_n = \sqrt{(x - x_n)^2 + (y - y_n)^2}$$

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Gravity Location Model

Sources/Markets	Transportation Cost \$/Ton Mile (F_n)	Quantity in Tons (D_n)	Coordinates	
			x_n	y_n
Supply sources				
Buffalo	0.90	500	700	1,200
Memphis	0.95	300	250	600
St. Louis	0.85	700	225	825
Markets				
Atlanta	1.50	225	600	500
Boston	1.50	150	1,050	1,200
Jacksonville	1.50	250	800	300
Philadelphia	1.50	175	925	975
New York	1.50	300	1,000	1,080

TABLE S-1

Total transportation cost $TC = \sum_{n=1}^k d_n D_n F_n$

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Gravity Location Model



FIGURE 5-8

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Gravity Location Model

Cell	Cell Formula	Equation	Copied to
G5	=SQRT((SB\$16-E5)^2+(SB\$17-F5)^2)	5.1	G6:G12
B19	=SUMPRODUCT(G5:G12,D5:D12,C5:C12)	5.2	—

FIGURE 5-8

Gravity Location Model

1. For each supply source or market n , evaluate d_n
2. Obtain a new location (x', y') for the facility, where

$$x' = \frac{\sum_{n=1}^k \frac{D_n F_n x_n}{d_n}}{\sum_{n=1}^k \frac{D_n F_n}{d_n}} \quad \text{and} \quad y' = \frac{\sum_{n=1}^k \frac{D_n F_n y_n}{d_n}}{\sum_{n=1}^k \frac{D_n F_n}{d_n}}$$

3. If the new location (x', y') is almost the same as (x, y) stop. Otherwise, set $(x, y) = (x', y')$ and go to step 1

Phase IV: Network Optimization Models

Supply City	Demand City Production and Transportation Cost per Thousand Units (Thousand \$)						Monthly Capacity (Thousand Units) K_i	Monthly Fixed Cost (Thousand \$) f_i
	Atlanta	Boston	Chicago	Denver	Omaha	Portland		
Baltimore	1,675	400	985	1,630	1,160	2,800	18	7,650
Cheyenne	1,460	1,940	970	100	495	1,200	24	3,500
Salt Lake City	1,925	2,400	1,450	500	950	800	27	5,000
Memphis	380	1,355	543	1,045	665	2,321	22	4,100
Wichita	922	1,646	700	508	311	1,797	31	2,200
Monthly demand (thousand units) D_j	10	8	14	6	7	11		

TABLE 5-2

Network Optimization Models

- Allocating demand to production facilities

n = number of factory locations
 m = number of markets or demand points
 D_j = annual demand from market j
 K_i = capacity of factory i
 c_{ij} = cost of producing and shipping one unit from factory i to market j
 x_{ij} = quantity shipped from factory i to market j

$$\text{Min} \sum_{i=1}^n \sum_{j=1}^m c_{ij} x_{ij} \quad \text{subject to}$$

$$\sum_{i=1}^n x_{ij} = D_j, \text{ for } j=1, \dots, m$$

$$\sum_{j=1}^m x_{ij} \leq K_i, \text{ for } i=1, \dots, n$$

Network Optimization Models

- Optimal demand allocation

	Atlanta	Boston	Chicago	Denver	Omaha	Portland
TelecomOne	Baltimore	0	8	2		
	Memphis	10	0	12		
	Wichita	0	0	0		
HighOptic	Salt Lake			0	0	11
	Cheyenne			6	7	0

TABLE 5-3

Capacitated Plant Location Model

- Merge the companies
- Solve using location-specific costs

y_i = 1 if factory i is open, 0 otherwise
 x_{ij} = quantity shipped from factory i to market j

$$\text{Min} \sum_{i=1}^n f_i y_i + \sum_{i=1}^n \sum_{j=1}^m c_{ij} x_{ij}$$

Capacitated Plant Location Model

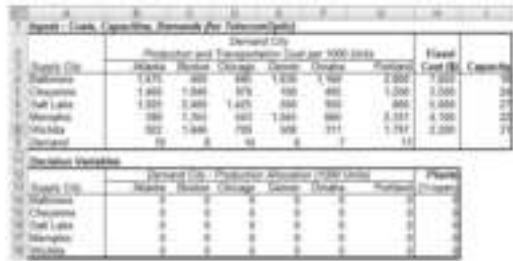


FIGURE 5-9

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Capacitated Plant Location Model



FIGURE 5-10

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Capacitated Plant Location Model

Cell	Formula	Equation	Copied to
B22	= I4*H14 - SUM(B14:G14)	5.1	B23:B26
B29	= B9 - SUM(B14:B18)	5.2	C29:G29
B32	= SUMPRODUCT(B4:G8, B14:G18) + SUMPRODUCT(H4:H8, H14:H18)	Objective function	—

FIGURE 5-10

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Capacitated Plant Location Model



FIGURE 5-11

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Capacitated Plant Location Model



FIGURE 5-12

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Capacitated Model With Single Sourcing

- Market supplied by only one factory
- Modify decision variables

$$y_i = 1 \text{ if factory } i \text{ is open, 0 otherwise}$$

$$x_{ij} = 1 \text{ if market } j \text{ is supplied by factory } i, 0 \text{ otherwise}$$

$$\text{Min} \sum_{i=1}^n f_i y_i + \sum_{i=1}^n \sum_{j=1}^m D_j c_{ij} x_{ij}$$

subject to

$$\sum_{i=1}^n x_{ij} = 1 \text{ for } j=1, \dots, m$$

$$\sum_{j=1}^m D_j x_{ij} \leq K_i y_i \text{ for } i=1, \dots, n$$

$$x_{ij}, y_i \in \{0,1\}$$

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Capacitated Model With Single Sourcing

- Optimal network configuration with single sourcing

	Open/ Closed	Atlanta	Boston	Chicago	Denver	Omaha	Portland
Baltimore	Closed	0	0	0	0	0	0
Cheyenne	Closed	0	0	0	0	0	0
Salt Lake	Open	0	0	0	6	0	11
Memphis	Open	10	8	0	0	0	0
Wichita	Open	0	0	14	0	7	0

TABLE 5-4

Locating Plants and Warehouses Simultaneously

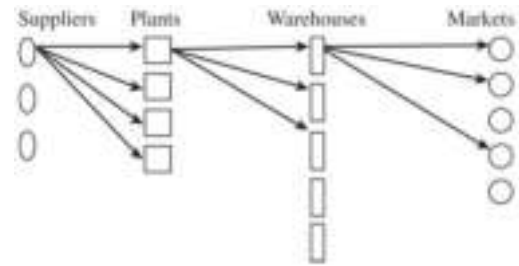


FIGURE 5-13

Locating Plants and Warehouses Simultaneously

- Model inputs

m = number of markets or demand points
 n = number of potential factory locations
 l = number of suppliers
 t = number of potential warehouse locations
 D_j = annual demand from customer j
 K_i = potential capacity of factory at site i
 S_h = supply capacity at supplier h
 W_e = potential warehouse capacity at site e
 F_i = fixed cost of locating a plant at site i
 f_e = fixed cost of locating a warehouse at site e
 c_{hi} = cost of shipping one unit from supply source h to factory i
 c_{ie} = cost of producing and shipping one unit from factory i to warehouse e
 c_{ej} = cost of shipping one unit from warehouse e to customer j

Locating Plants and Warehouses Simultaneously

- Goal is to identify plant and warehouse locations and quantities shipped that minimize the total fixed and variable costs

y_i = 1 if factory is located at site i , 0 otherwise
 y_e = 1 if warehouse is located at site e , 0 otherwise
 x_{ej} = quantity shipped from warehouse e to market j
 x_{ie} = quantity shipped from factory at site i to warehouse e
 x_{hi} = quantity shipped from supplier h to factory at site i

$$\text{Min } \sum_{i=1}^n F_i y_i + \sum_{e=1}^t f_e y_e + \sum_{h=1}^l \sum_{i=1}^n c_{hi} x_{hi} + \sum_{i=1}^n \sum_{e=1}^t c_{ie} x_{ie} + \sum_{e=1}^t \sum_{j=1}^m c_{ej} x_{ej}$$

Locating Plants and Warehouses Simultaneously

subject to

$$\sum_{i=1}^n x_{hi} \leq S_h \text{ for } h=1, \dots, l$$

$$\sum_{j=1}^m x_{ej} \leq W_e y_e \text{ for } e=1, \dots, t$$

$$\sum_{h=1}^l x_{hi} - \sum_{e=1}^t x_{ie} \geq 0 \text{ for } i=1, \dots, n$$

$$\sum_{e=1}^t x_{ej} = D_j \text{ for } j=1, \dots, m$$

$$\sum_{e=1}^t x_{ie} \leq K_i y_i \text{ for } i=1, \dots, n$$

$$y_i, y_e \in \{0, 1\}, x_{ej}, x_{ie}, x_{hi} \geq 0$$

$$\sum_{i=1}^n x_{ie} - \sum_{j=1}^m x_{ej} \geq 0 \text{ for } e=1, \dots, t$$

Accounting for Taxes, Tariffs, and Customer Requirements

- A supply chain network should maximize profits after tariffs and taxes while meeting customer service requirements
- Modified objective and constraint

$$\text{Max } \sum_{j=1}^m r_j \sum_{i=1}^n x_{ij} - \sum_{i=1}^n F_i y_i - \sum_{i=1}^n \sum_{j=1}^m c_{ij} x_{ij}$$

$$\sum_{i=1}^n x_{ij} \leq D_j \text{ for } j=1, \dots, m$$

Making Network Design Decisions In Practice

- *Do not underestimate the life span of facilities*
- *Do not gloss over the cultural implications*
- *Do not ignore quality-of-life issues*
- *Focus on tariffs and tax incentives when locating facilities*

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Summary of Learning Objectives

1. Understand the role of network design in a supply chain
2. Identify factors influencing supply chain network design decisions
3. Develop a framework for making network design decisions
4. Use optimization for facility location and capacity allocation decisions

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What is a Supply Chain?

- Customer is an integral part of the supply chain
- Includes movement of products from suppliers to manufacturers to distributors, but also includes movement of information, funds, and products in both directions
- Probably more accurate to use the term "supply network" or "supply web"
- Typical supply chain stages: customers, retailers, distributors, manufacturers, suppliers (Fig. 1.2)
- All stages may not be present in all supply chains (e.g., no retailer or distributor for Dell)

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The Objective of a Supply Chain

- Example: Dell receives \$2000 from a customer for a computer (revenue)
- Supply chain incurs costs (information, storage, transportation, components, assembly, etc.)
- Difference between \$2000 and the sum of all of these costs is the supply chain profit
- Supply chain profitability is total profit to be shared across all stages of the supply chain
- Supply chain success should be measured by total supply chain profitability, not profits at an individual stage

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Components of Inventory Decisions

- Cycle inventory
 - Average amount of inventory used to satisfy demand between shipments
 - Depends on lot size
- Safety inventory
 - Inventory held to cover demand exceeds expectations
 - cost of carrying too much inventory versus cost of losing sales
- Seasonal inventory
 - Inventory built up to counter predictable variability in demand
 - cost of carrying additional inventory versus cost of flexible production
- Overall trade-off: Responsiveness versus efficiency
 - more inventory: greater responsiveness but greater cost
 - less inventory: lower cost but lower responsiveness

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www.hsantika.com

PENERIMAAN KONTAN
CASH RECEIPT

FDA No. 52293

Telah terima dari
Received from

P.K. Nana / Ibu Yenny

Kamar No.
Room No.

Uang sebanyak
The Amount of

Satu juta enam ratus lima puluh Ribu Rupiah

Guna membayar
In payment for

Room for 2 nights

Guest Bill No.

Bogor, 6.10.23

Rp.

1.650.000,-

HS
Hotel Santika
BOGOR



Hotel Santika

Hotel Santika Bogor

Botani Square Bogor, Jl. Raya Pajajaran, Kota
Bogor 16127
Phone : +62-251-8400707
Email : bogor@reservation.santika.com

BOOKING CONFIRMATION

Booking No : 75458

Thank you for your reservation and herewith we are pleased to confirm your stay as below details:

Guest Details

Booker Name : yuary farradia
Guest Name : yuary farradia
SIP / MyValue No. :
Company : Personal Account
Number of Guest : Adult: 2 / Child: 0
Check In Date : Friday, 06 October 2023
Check Out Date : Sunday, 08 October 2023
Room Type : Superior Queen
Number of Room : 1 Room
Extra Bed : 0
Special Request :
Deposit : 0
Payment Method : CASH

**Payment can be made through the following account
BCA-IN No. 5735007090 PT. Grahawita Cendekia**

Daily Rate

Date	Room Rate	Extra Bed
10/06/2023	825,000	0
10/07/2023	825,000	0
	1,650,000	0

Total Stay Cost 1,650,000

Rate Inclusion Room rate is included breakfast, service and tax charge.
Free Wi-Fi access during stay.

Terms and Conditions

Normal check in time will be after 14:00 in the afternoon
Normal check out time will be before 12:00 in the afternoon
Request for change bed type and room allocation will be subject to room availability upon arrival

Cancellation and No Show Policy

NON GUARANTEED RESERVATION - 17:00 WIB RELEASE

We will maintain your reservation until 17:00 WIB on the day of arrival and will be automatically released without prior notice, unless if you wish the room to be held beyond this time, Hotel Santika Bogor would required a guarantee in the form of payment in advanced then this reservation will be the changed automatically as a guaranteed reservation.

GUARANTEED RESERVATION

Your reservation has been guaranteed by payment in advance or corporate guaranteed letter, Hotel Santika Bogor will hold your room for the first night of your reservation until you arrive. Hotel will charge for one night on the arrival date if the guest does not show up. This reservation does not need your acknowledgement if mentioned above has been full fill in advance.

Should there be any further queries or assistance required please do not hesitate to contact us.

Warm Regards,

Reservation Hotel Santika Bogor



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Universitas Pakuan
Sekolah Pascasarjana

Kepuasan, Integritas, Kreativitas, Kualitas, Harmoni
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Web: www.pasca.umpak.ac.id



Kuitansi

Telah terima dari : Prodi Manajemen
Uang sejumlah : *Tiga juta lima ratus ribu rupiah*
Untuk pembayaran : Honor Mengajar 3 Sesi 7 Jam x Rp. 500.000
Rp.3.500.000,-

Mengetahui:
Dekan,

Menyetujui:
Wadek II,

Bogor, 7 Oktober 2023
Yang Menerima,

Prof. Dr. Ing. Soewarto Hardhienata

Dr. Dadang Jaenudin, M. Si.

Prof. Dr. Abdul Thalib Bin Bon

