

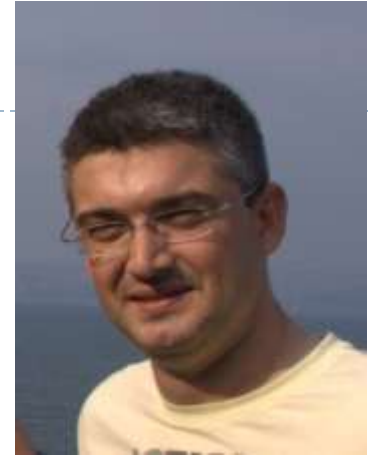
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Logistics Management Introduction

Özgür Kabak, Ph.D.

Instructor

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Who am I?

- ▶ Özgür Kabak, PhD.
 - ▶ Assistant Professor at Industrial Engineering Dept. of Istanbul Technical University (ITU)
 - ▶ Ph.D. from ITU
 - ▶ 2008
 - ▶ Modeling supply chain network using possibilistic linear programming and an application
 - ▶ Postdoc at Belgium Nuclear Research Centre (SCK.CEN), Mol, Belgium
 - ▶ Feb. 2009 – Feb. 2010
 - ▶ A fuzzy multiple attribute decision-making approach for nuclear safeguards information management
 - ▶ Research Interests
 - ▶ Mathematical Programming
 - ▶ Supply Chain Management
 - ▶ Fuzzy Modeling
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▶ **Course webpage**

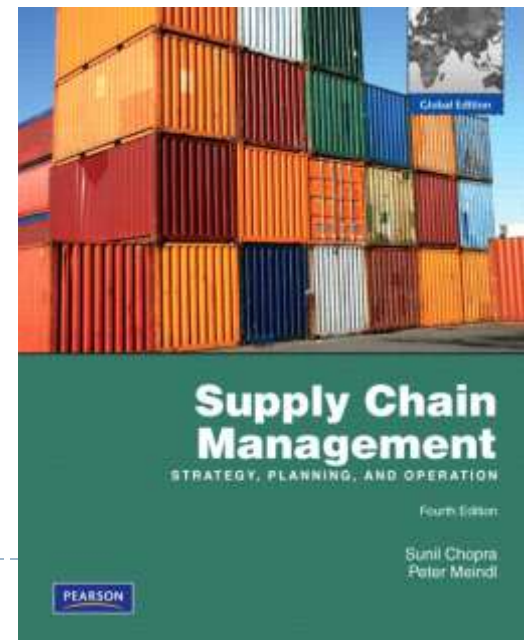
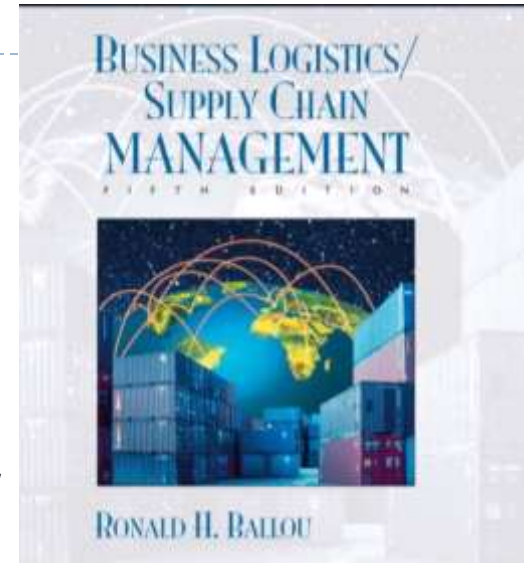
- ▶ <http://web.itu.edu.tr/kabak/dersler/MHN521E>

▶ **Textbooks**

- ▶ Ballou, R.H. 2004, Business Logistics / Supply chain Management, Pearson Prentice Hall, New Jersey
- ▶ Chopra, S., Meindl, P. 2010, Supply chain management: Strategy, planning, and operation, Pearson, Boston

▶ **Other books**

- ▶ Sanders N.R. 2010, Supply Chain Management: A Global Perspective, Wiley, USA



Course Description

- ▶ This Class is about the vital subjects of business logistics / supply chain – an area of management that can be essential to a firm's competitive strategy and revenue generation.
- ▶ Physical distribution / Materials management / Transportation management / Logistics / Supply chain management
- ▶ The business activities of concern
 - ▶ Transportation, inventory maintenance, order processing, purchasing, warehousing, materials handling, packaging, customer service standards, and production.



Course Organization

- ▶ Introduction to Logistics and Supply Chain
- ▶ SC Performance, SC Drivers and Metrics
- ▶ Customer Service
- ▶ Transport Fundamentals
- ▶ Transport Decisions
- ▶ Forecasting Supply Chain Requirements
- ▶ Inventory Policy Decisions
- ▶ Purchasing Decisions
- ▶ Location Strategy



Exams

- ▶ There will be a midterm exam during the semester (6th week).
 - ▶ It exam will cover all the topics that are introduced before the exam.
- ▶ The final exam will be at the end of the semester
 - ▶ It will cover all topics of the course.
- ▶ Exams may include a mix of short answer, multiple choice, and quantitative questions, as well as short cases.

Assignments

- ▶ Two assignments;
 - ▶ To be announced: April 25, due date: May 2
 - ▶ To be announced: May 30, June 6
- ▶ You can constitute a group of **max. three members** to submit assignments.



Class Sessions

- ▶ There will be two sessions every week on Wednesday.
 - ▶ 19:00 – 20:20 1st session
 - ▶ 20:20 – 20:35 break
 - ▶ 20:35 – 22:00 2nd session
- ▶ Please **be on time** to participate in sessions

▶ Class Participation

- ▶ Students are expected and encouraged to participate the class through questions, statements, and comments.
- ▶ It is the quality of these contributions that is more important than the quantity.

▶ Attendance

- ▶ Attendance is not mandatory.

Academic Misconduct

- ▶ Academic misconduct or cheating will not be tolerated.
- ▶ Do not Cheat!
 - ▶ In exams
 - ▶ In assignments!

Grading

- ▶ 2 Assignments 20%
- ▶ Midterm exam 30 %
 - ▶ May 16
- ▶ Final exam 50%
 - ▶ June 27



Final Course Grades

- ▶ Final course grades will be based on weighted average of points earned during the semester:

Point total	Grade
Depends on the Curve!	AA
	BA
	BB
	CB
	CC
<40	F

Course Schedule

Week	Date	Topic
1	11-Apr	Introduction to Logistics and Supply Chain
2	18-Apr	SC Performance, SC Drivers and Metrics
3	25-Apr	Customer Service
4	2-May	Transport Fundamentals
5	9-May	Transport Decisions
6	16-May	MIDTERM EXAM
7	23-May	Forecasting Supply Chain Requirements
8	30-May	Inventory Policy Decisions
9	6-Jun	Purchasing Decisions
10	13-Jun	Location strategy
11	20-Jun	Discussions on selected topics
12	27-Jun	FINAL EXAM

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



Traditional View: Logistics in the Manufacturing Firm

- ▶ Profit 4%
- ▶ Logistics Cost 21%
- ▶ Marketing Cost 27%

- ▶ Manufacturing Cost 48%

Profit
Logistics Cost
Marketing Cost
Manufacturing Cost



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



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



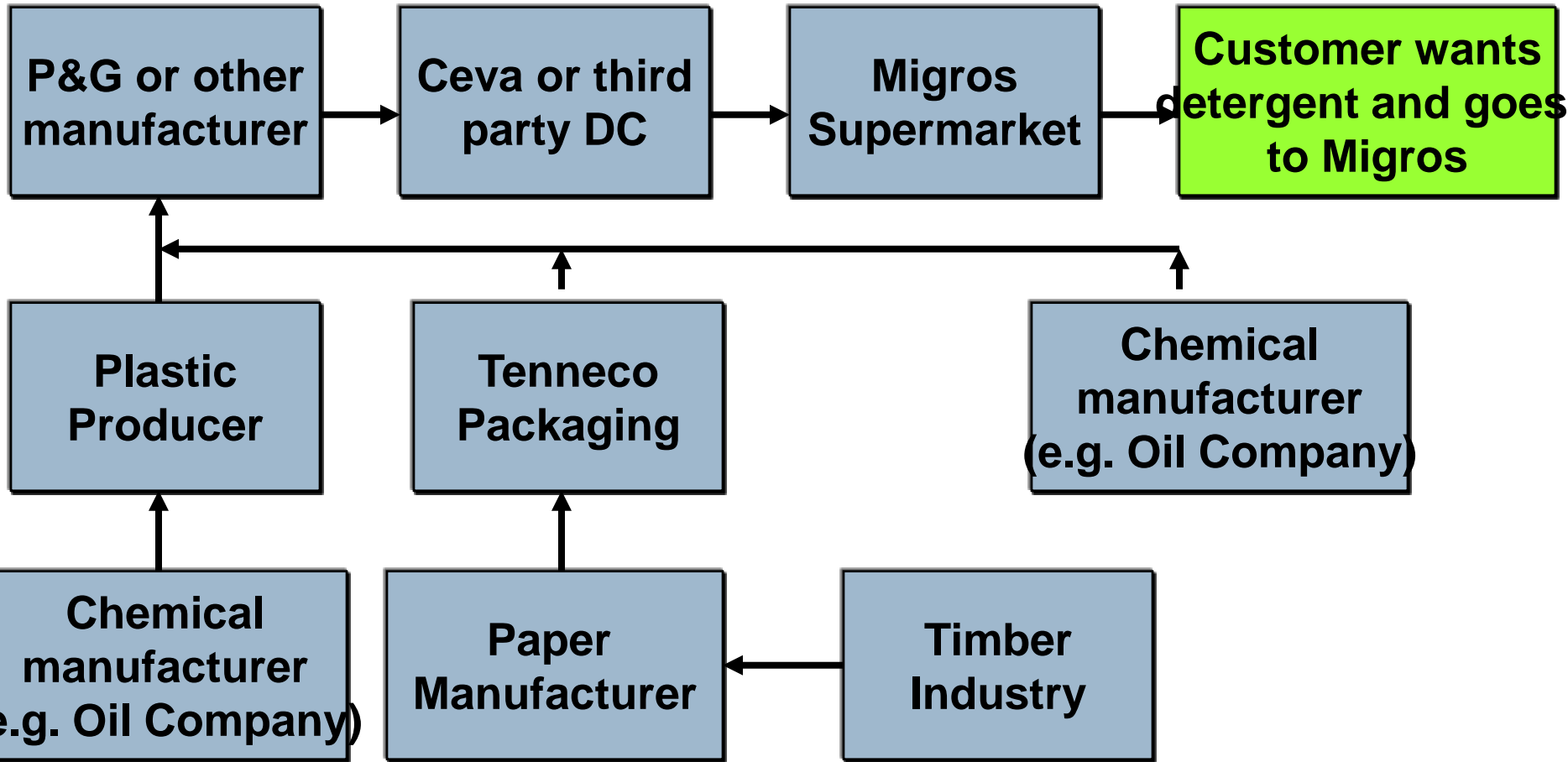
What is a Supply Chain?

- ▶ 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)
- ▶ Example: Detergent supply chain



What is a Supply Chain?

Detergent supply chain

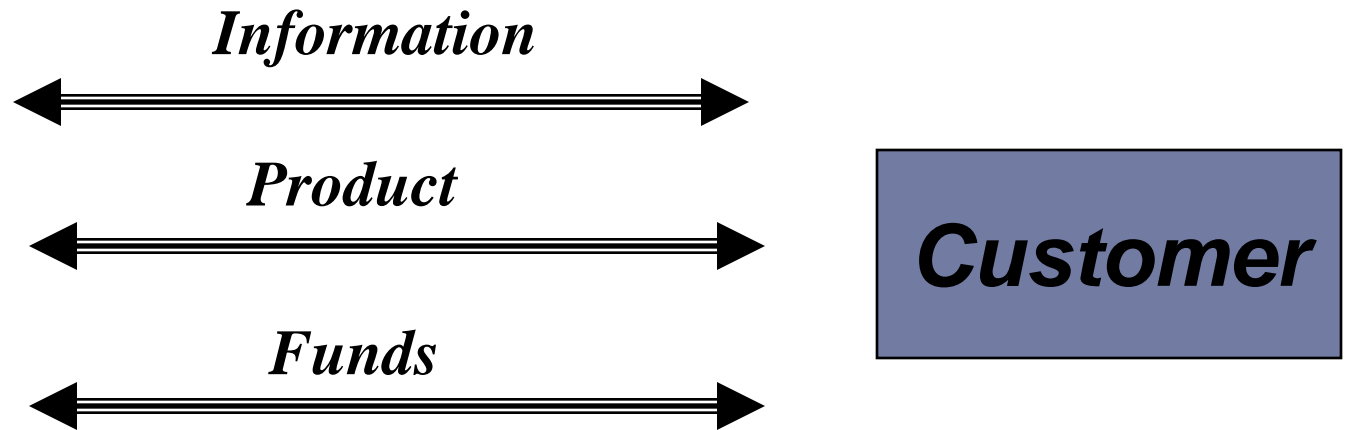


What is a Supply Chain?

- ▶ 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
- ▶ All stages may not be present in all supply chains (e.g., no retailer or distributor for Dell)



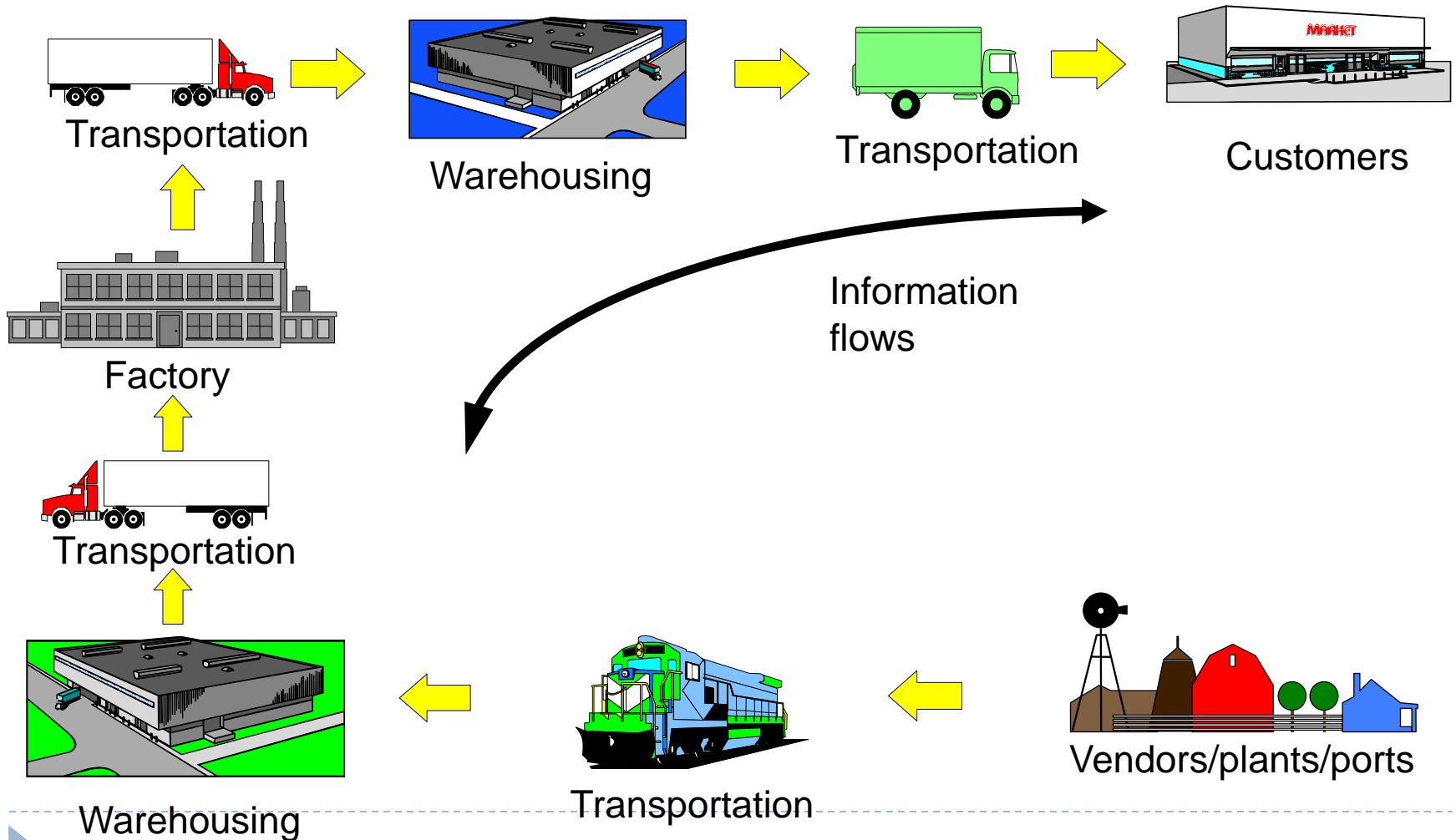
Flows in a Supply Chain



Supply Chain



The Immediate Supply Chain for an Individual Firm



Logistics VS Supply Chain Management

Logistics

- Logistics is the process of planning, implementing and controlling
- the efficient, cost-effective
- flow and storage of
- raw materials, in-process inventory, finished goods and related information
- from the point of origin to point of consumption
- for the purpose of conforming to customer requirements.

Council of Logistics Management

Supply Chain Management

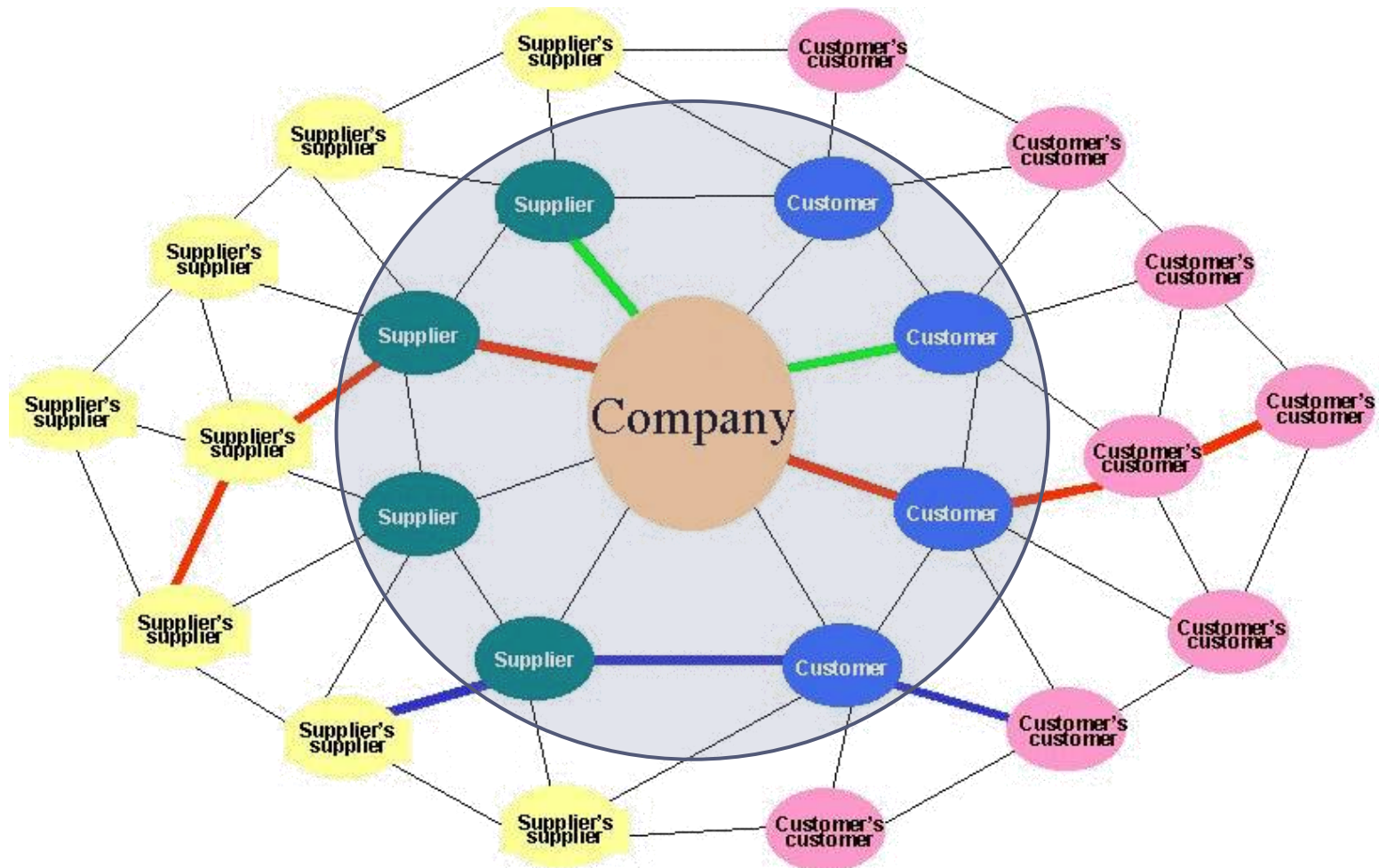
- SCM is the integration of all activities
- associated with the flow and transformation of goods
- from raw materials through to end user,
- as well as information flows,
- through improved supply chain relationships,
- to achieve a sustainable competitive advantage.

Handfield and Nichols



Logistics VS SCM

Focus of Interest



The Logistics / SC Mission

Getting the *right goods* or *services* to the *right place*, at the *right time*, and in the *desired condition* at the lowest cost and highest return on investment.



The Objective of Logistics / SC

- ▶ 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 Logistics / SC

- ▶ 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



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***



Decision Phases of a Supply Chain Management

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



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



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



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**



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)

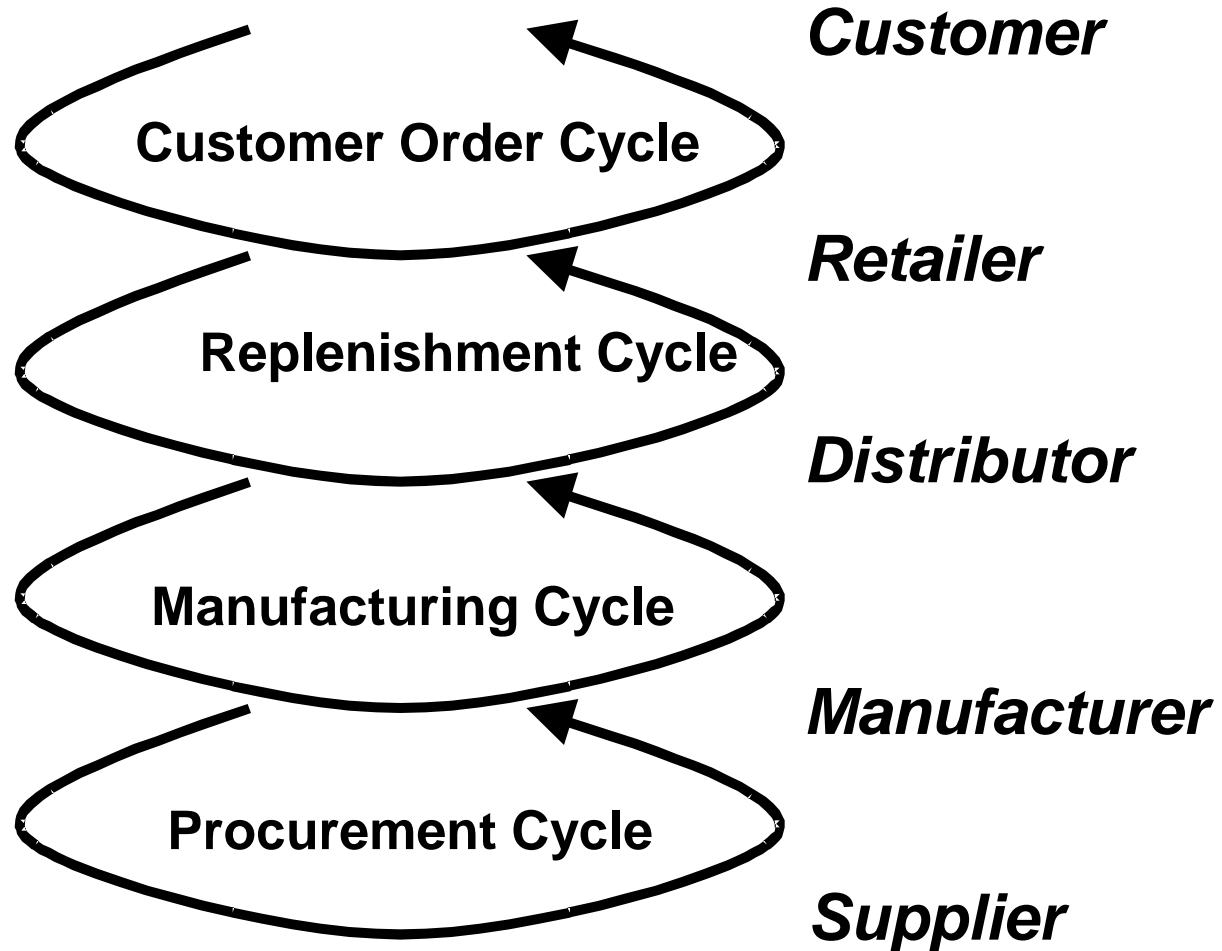


Process View of a Supply Chain

- ▶ 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)



Cycle View of Supply Chains

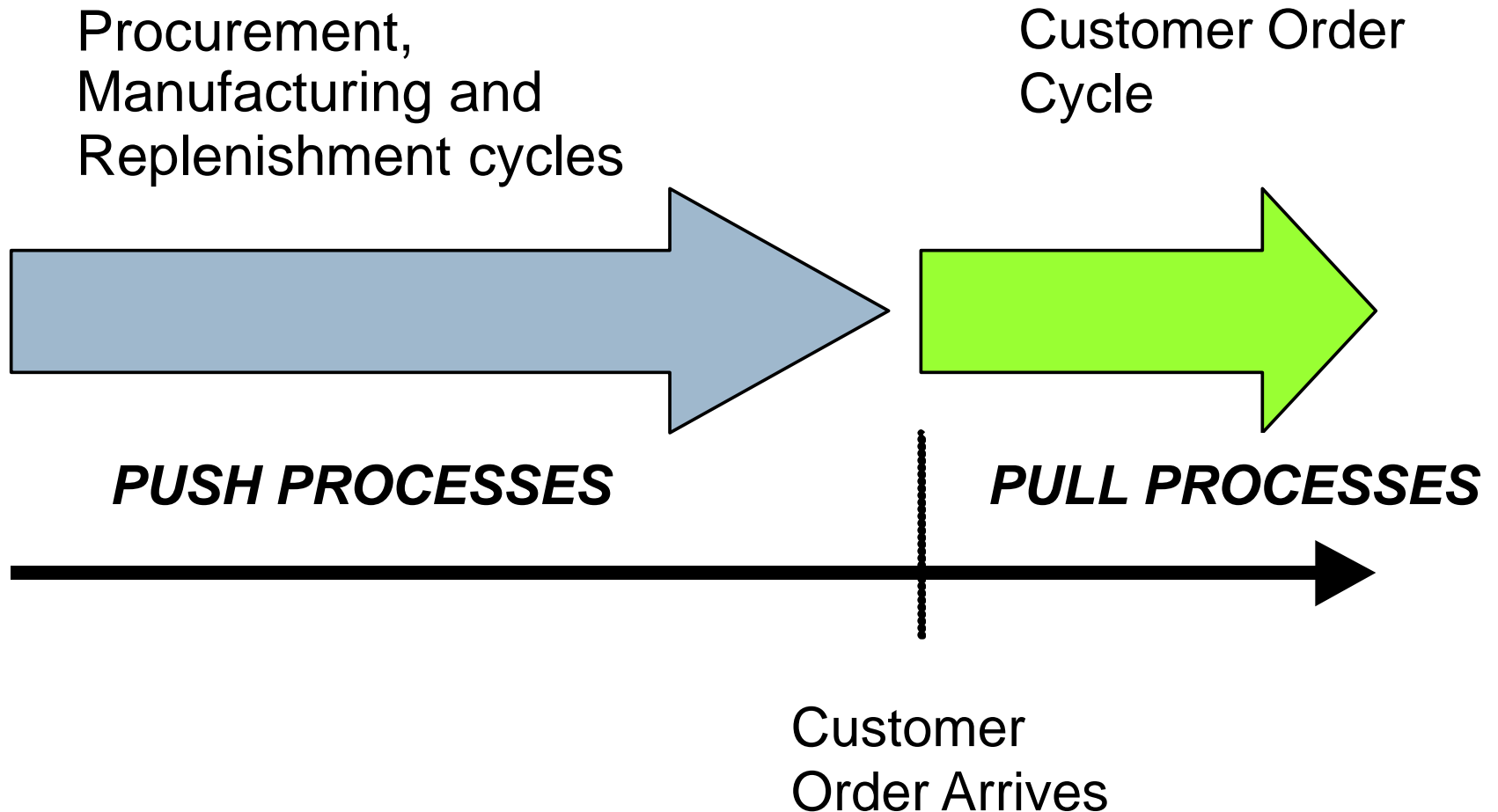


Cycle View of a Supply Chain

- ▶ 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.



Push/Pull View of Supply Chains



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



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
- ▶ The relative proportion of push and pull processes can have an impact on supply chain performance



Supply Chain Integration

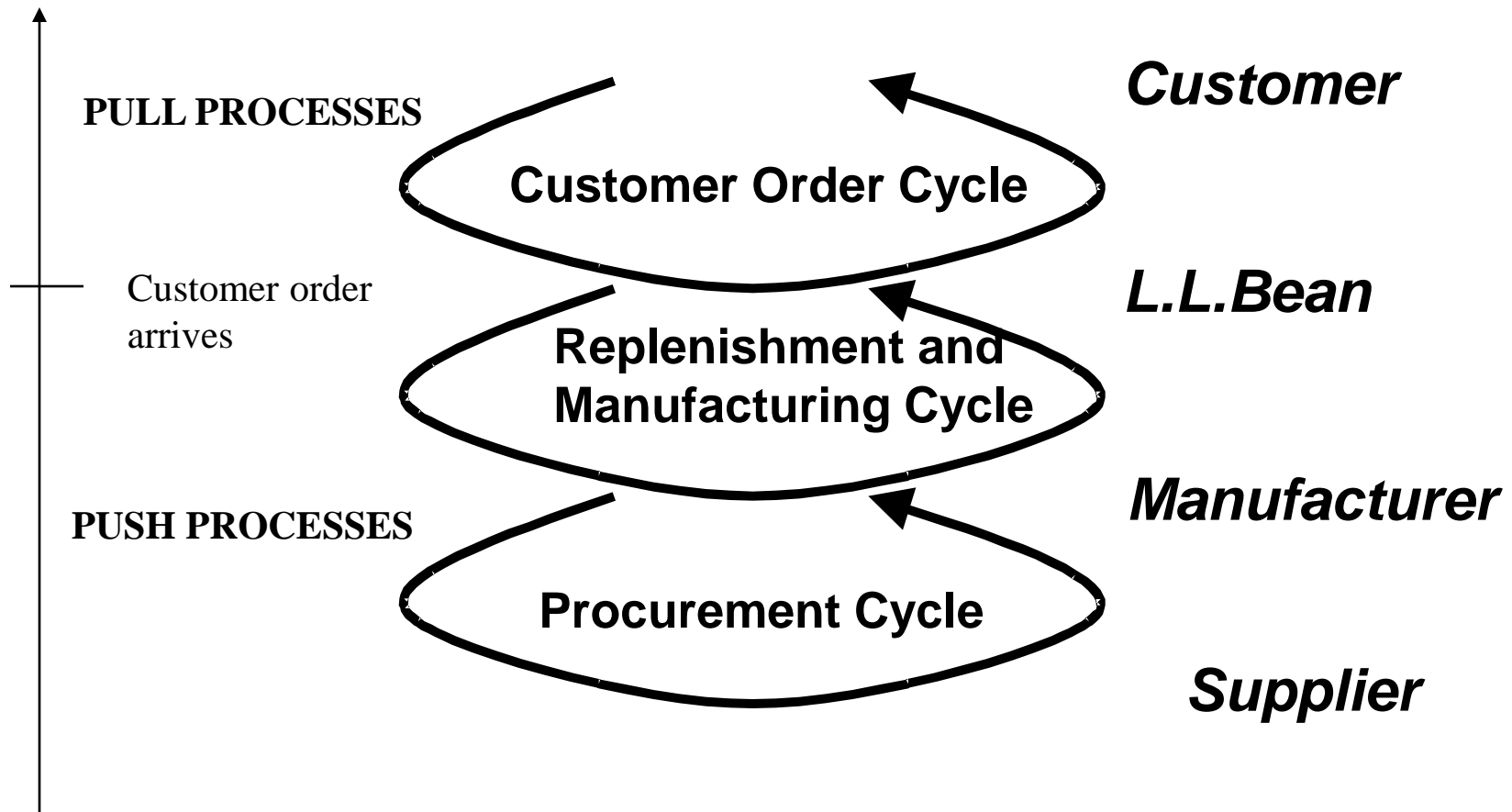
▶ Push-Pull Supply Chain(a hybrid approach)

- ▶ Some stages of the supply chain, typically the initial stages are operated in a push-based manner, whereas the remaining stages employ a pull-based strategy
- ▶ The interface between the push-based stages and the pull-based stages is known as the *push-pull boundary*
- ▶ *Example: personal computer manufacturer*
 - *Component inventory is managed based on forecast but final assembly is in response to a specific customer request*
 - *The **push portion** is prior to assembly, whereas the **pull** part starts with assembly and is performed based on actual customer demand*



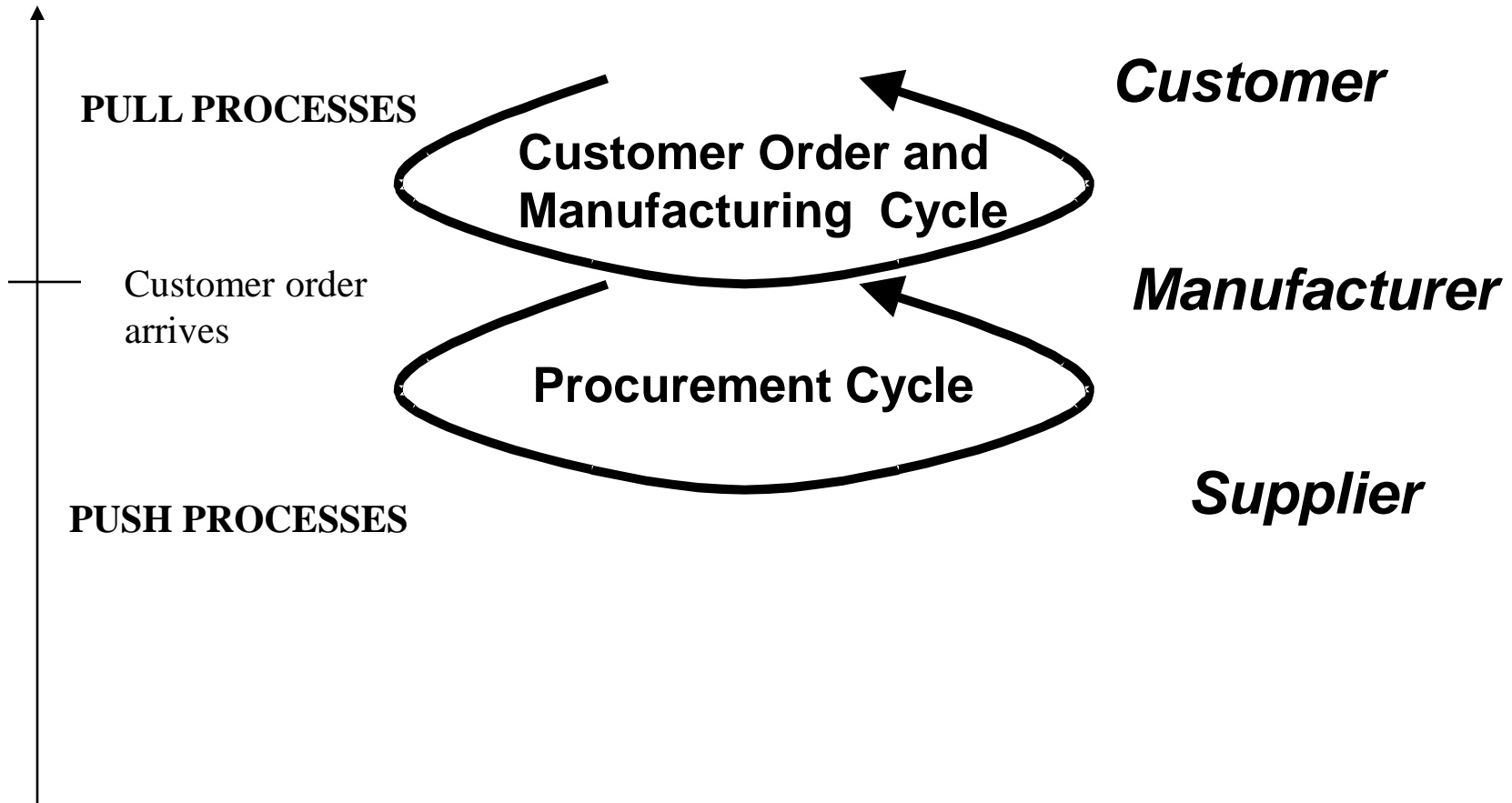
Ex: L.L. Bean, an Apparel Company

Make-to-Stock



Ex: Dell Computers

Built-to-Order



Characteristics of the Pull and Push Portions of the Supply Chain

	Push	Pull
Objective	Minimize cost	Maximize service level
Complexity	High	Low
Focus	Resource allocation	Responsiveness
Lead Time	Long	Short
Processes	Supply chain planning	Order fulfillment



Examples of Supply Chains

- ▶ Toyota
- ▶ Amazon
- ▶ Zara



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?



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?



Zara: Apparel Manufacturing and Retail

- ▶ Zara is a chain of fashion stores owned by Inditex.
- ▶ In 2007:
 - ▶ Sales : 9.5 million euros
 - ▶ 3600 retail outlets in 68 countries
- ▶ In an industry in which customer demand is fickle, Zara has grown rapidly with a strategy to be highly responsive to changing trends with affordable prices.
- ▶ Whereas design to sales cycle times in apparel industry have traditionally averaged more than 6 months, Zara has achieved cycle times of four to six weeks.
 - ▶ Change 75% of its merchandise display every 3-4 weeks
 - ▶ Sells most of its products at full price

Z A R A



KEY of Zara's success

- ▶ Inditex Chief Executive J.M.Castellano:
 - ▶ «This business is all about **reducing response time**. In fashion, stock is like food. It goes bad quick»
- ▶ Three winning formulae to bake its fashions:
 - ▶ Short lead time = More Fashionable clothes
 - ▶ Lower quantities = Scarce supply
 - ▶ More styles = More choice, and more chances of hitting it right

Source:

www.3isite.com/articles/ImagesFashion_Zara_Part_I.pdf

Zara: Apparel Manufacturing and Retail

- ▶ Zara manufactures its apparel using combination of flexible and quick resources in Europe (mostly in Portugal and Spain) and low cost sources in Asia.
 - ▶ 40% of the manufacturing capacity is owned by Inditex, with rest outsourced.
 - ▶ Products with highly uncertain demand are sourced out of Europe
 - ▶ Products that are more predictable are sourced from its Asian Locations
 - ▶ More than 40% of its finished-goods purchases and most of in-house production occur after the sales season starts. (less than 20% for typical retailer)
 - ▶ This responsiveness and the postponement of the decisions until after trends are known allow Zara to reduce inventories and forecast errors.
- ▶ Invested highly in IT to ensure that the latest sales data are available to drive replenishment and production decisions.



Zara: Apparel Manufacturing and Retail

- ▶ 8 distribution centers in Spain
- ▶ The group claimed delivery times (order received in the Distribution center to the time it is delivered to store) of
 - ▶ 24 hours for European Stores
 - ▶ Up to a maximum of 40 hours for stores in America and Asia.
- ▶ In 2007 Inditex distributed 627 million garments globally.



Next Class

- ▶ Visit the course website
- ▶ <http://web.itu.edu.tr/kabak/dersler/MHN521E>

- ▶ Topic:
 - ▶ SC Performance, drivers and metrics.

