



# Logistics Management Introduction

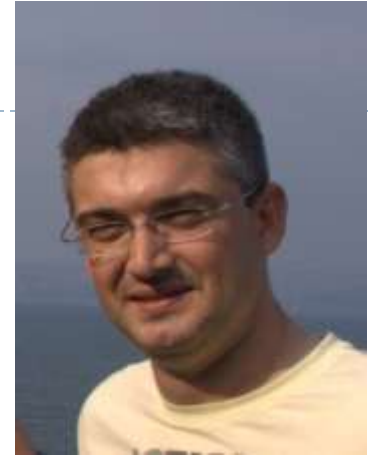


Özgür Kabak, Ph.D.

# Instructor

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- ▶ Industrial Engineering Dept.
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# Who am I?

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- ▶ 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**

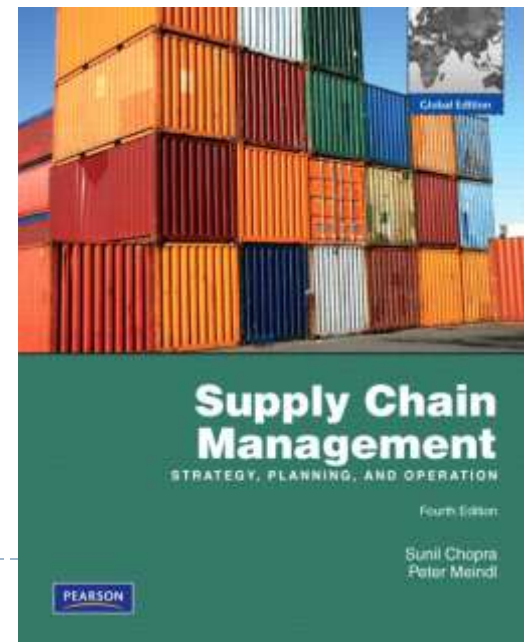
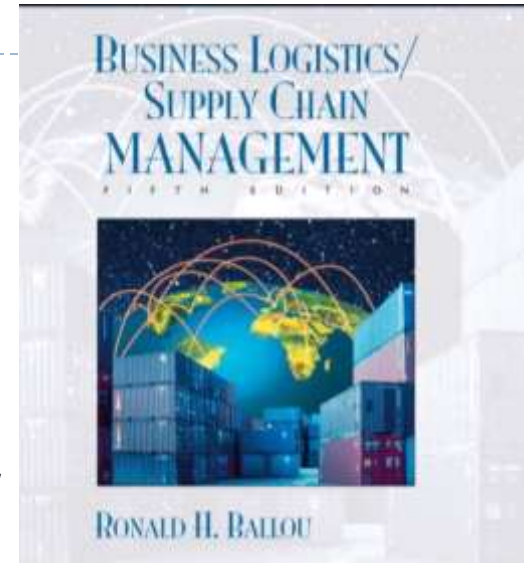
- ▶ <http://web.itu.edu.tr/kabak/dersler/MHN521E>

▶ **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

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- ▶ 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

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- ▶ 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

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- ▶ 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

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- ▶ 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

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

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## ▶ 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

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

# Grading

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



# Final Course Grades

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- ▶ 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

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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)

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▶ 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: 18<sup>th</sup> and 19<sup>th</sup> Annual State of Logistics Report – Logistics Magazine*

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# Traditional View: Logistics in the Manufacturing Firm

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- ▶ Profit 4%
- ▶ Logistics Cost 21%
- ▶ Marketing Cost 27%
  
- ▶ Manufacturing Cost 48%

<b>Profit</b>
<b>Logistics Cost</b>
<b>Marketing Cost</b>
<b>Manufacturing Cost</b>





# Supply Chain Management: The Magnitude in the Traditional View

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- ▶ 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

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- ▶ 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?

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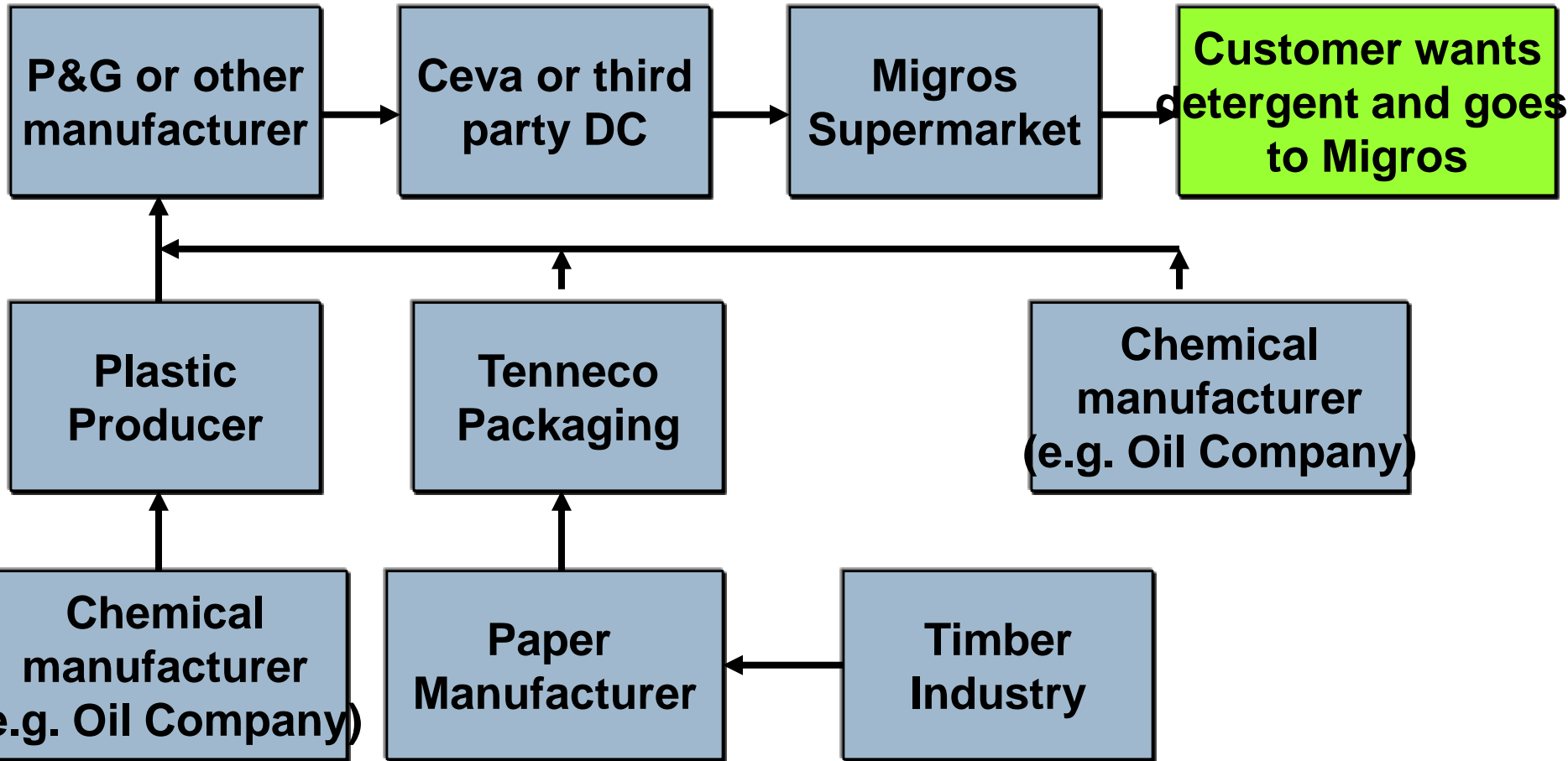
- ▶ All stages involved, directly or indirectly, in **fulfilling a customer request**
- ▶ Includes manufacturers, suppliers, transporters, warehouses, retailers, and customers
- ▶ Within each company, the supply chain includes all functions involved in fulfilling a customer request (product development,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



# What is a Supply Chain?

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## Detergent supply chain



# What is a Supply Chain?

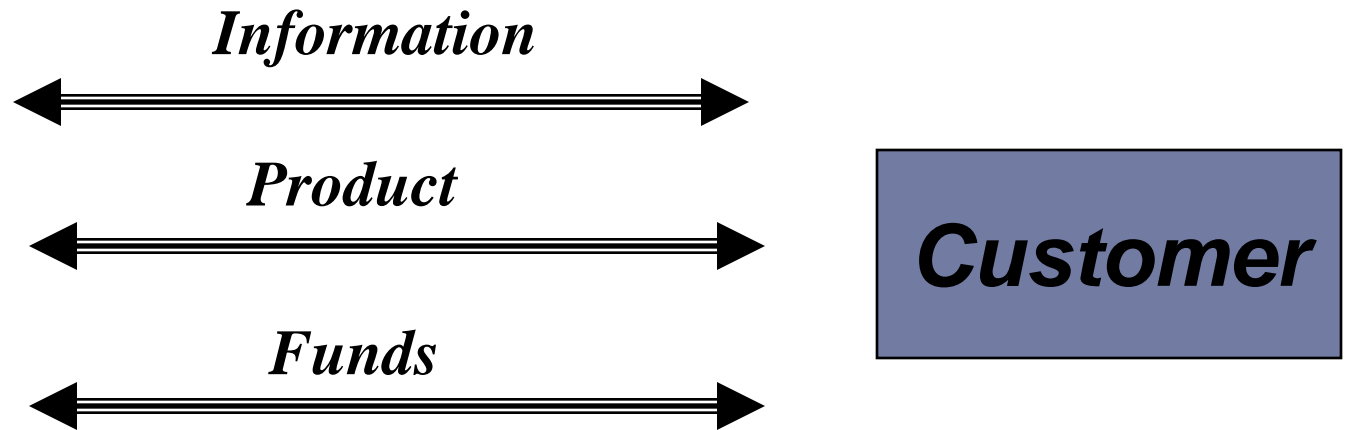
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- ▶ Customer is an integral part of the supply chain
- ▶ Includes **movement of products from suppliers to manufacturers to distributors**, but also includes **movement of information, funds, and products in both directions**
- ▶ Probably more accurate 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

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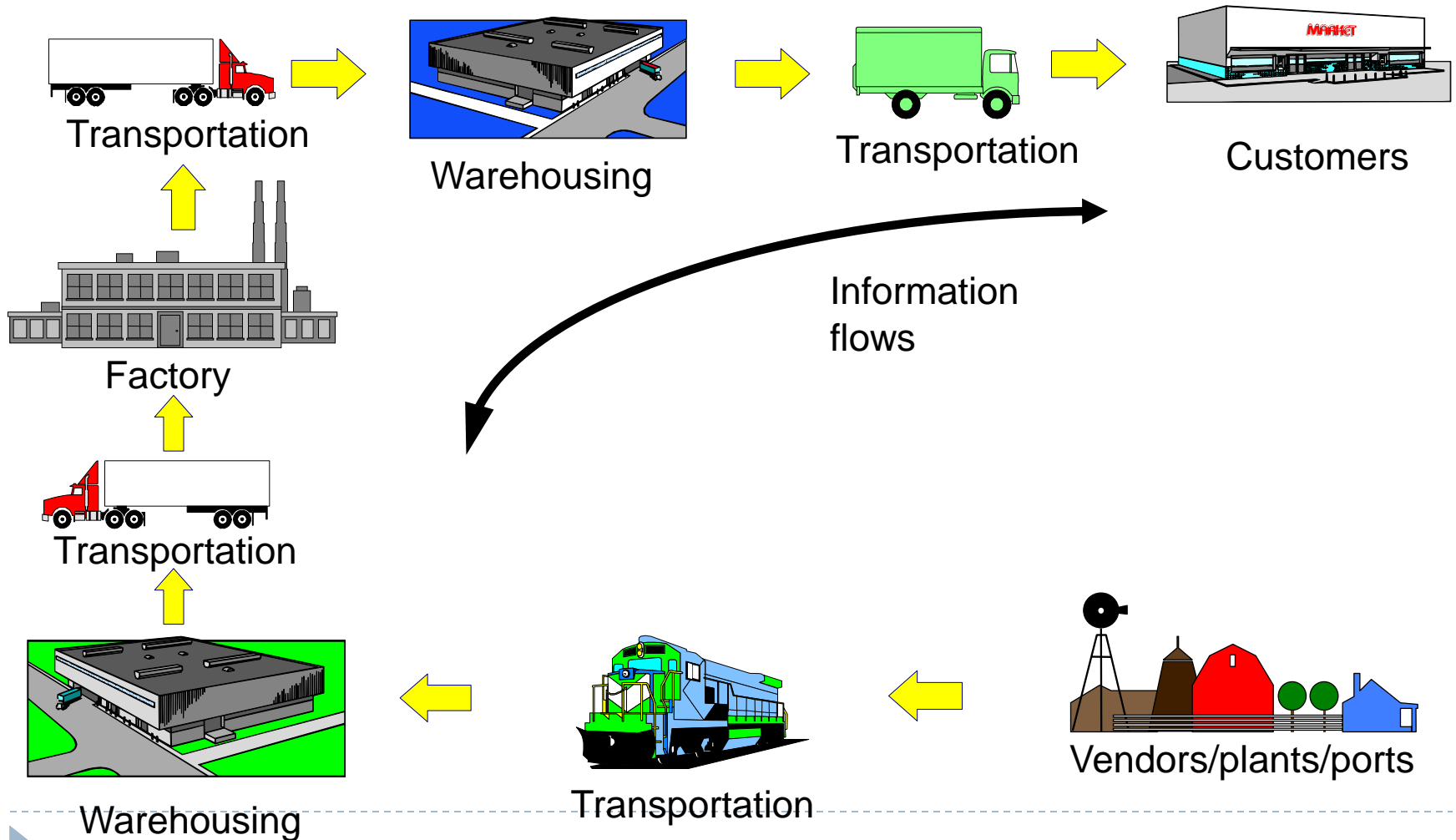


Supply Chain

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# The Immediate Supply Chain for an Individual Firm



# Logistics VS Supply Chain Management

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## 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***

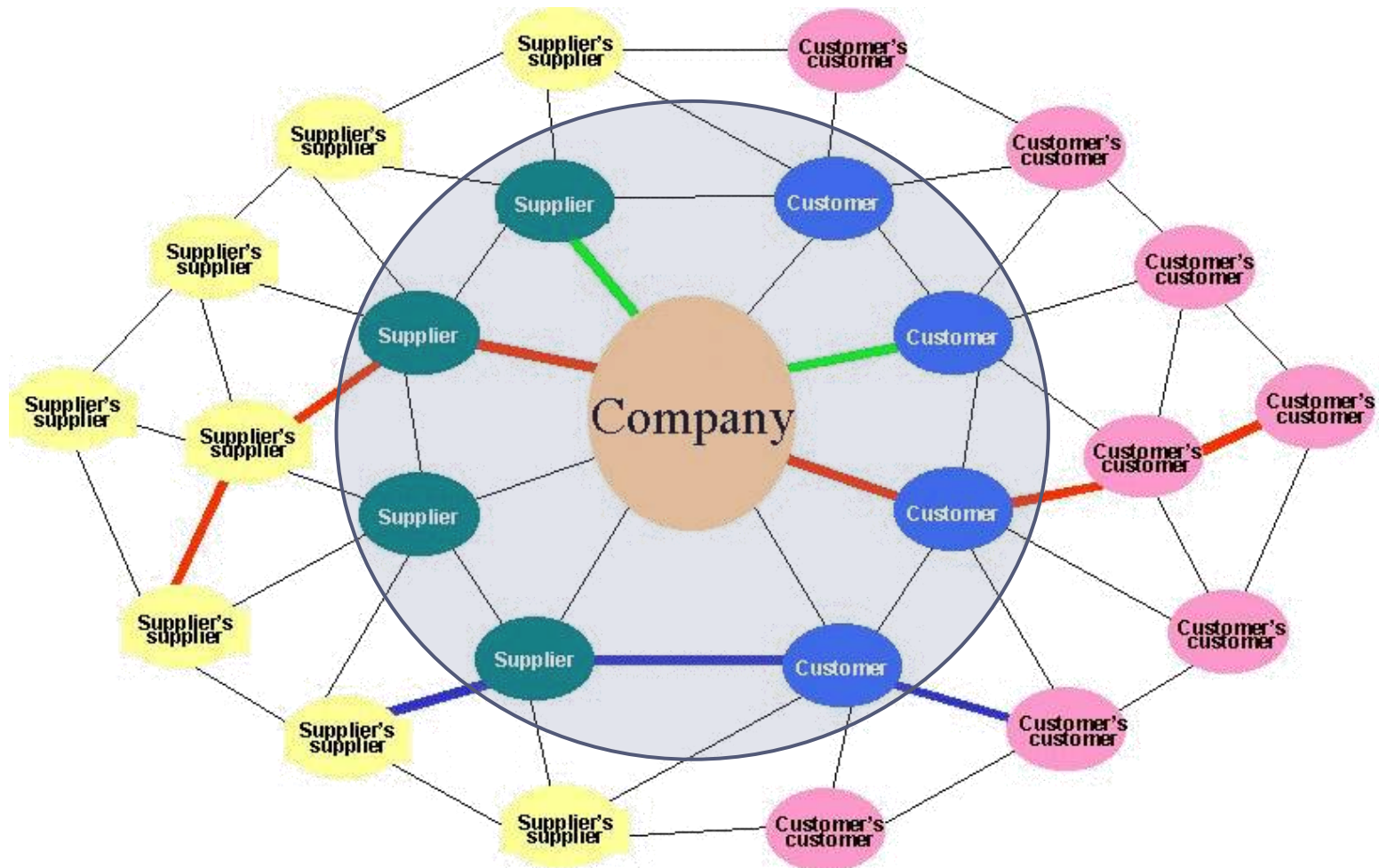




# Logistics VS SCM

## Focus of Interest

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# The Logistics / SC Mission

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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

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- ▶ 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

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- ▶ 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

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- ▶ 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

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



# Supply Chain Strategy or Design

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- ▶ 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

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- ▶ 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

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- ▶ **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

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- ▶ 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

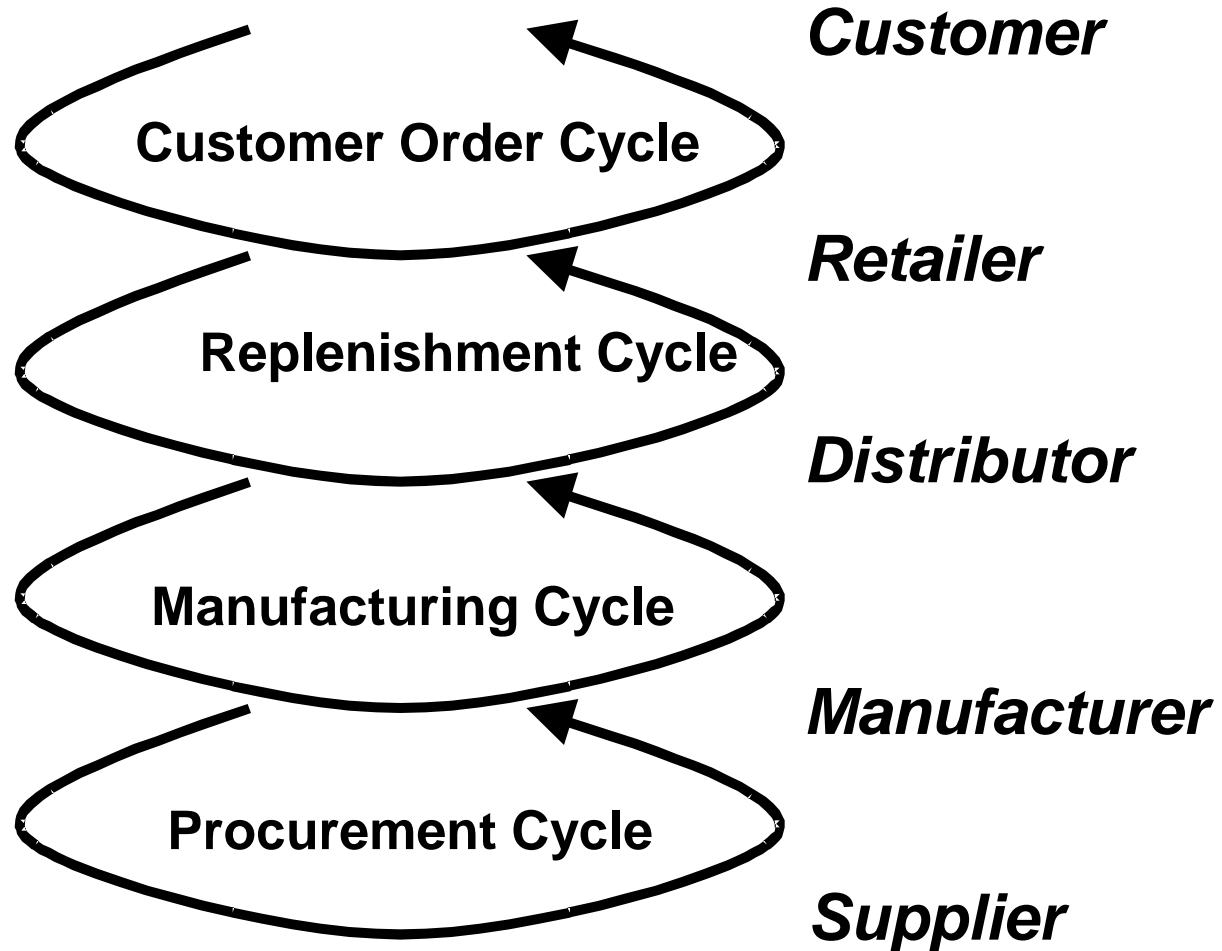
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- ▶ Cycle view: processes in a supply chain are divided into a series of cycles, each performed at the interfaces between two successive supply chain stages
- ▶ Push/pull view: processes in a supply chain are divided into two categories depending on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



# Cycle View of Supply Chains

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# Cycle View of a Supply Chain

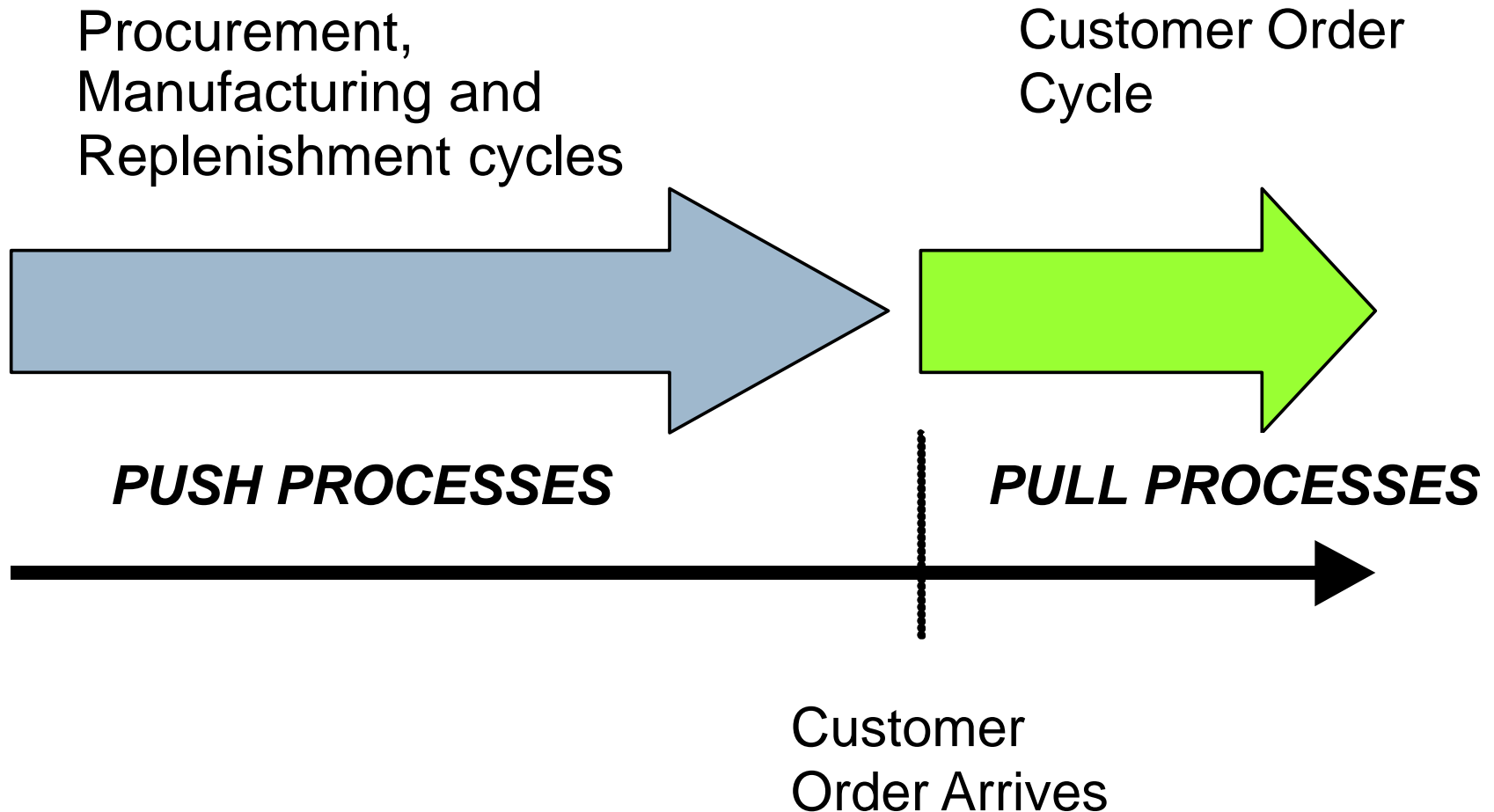
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- ▶ Each cycle occurs at the interface between two successive stages
- ▶ Customer order cycle (customer-retailer)
- ▶ Replenishment cycle (retailer-distributor)
- ▶ Manufacturing cycle (distributor-manufacturer)
- ▶ Procurement cycle (manufacturer-supplier)
- ▶ 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

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# Push/Pull View of Supply Chain Processes

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- ▶ 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

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- ▶ 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

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## ▶ Push-Pull Supply Chain(a hybrid approach)

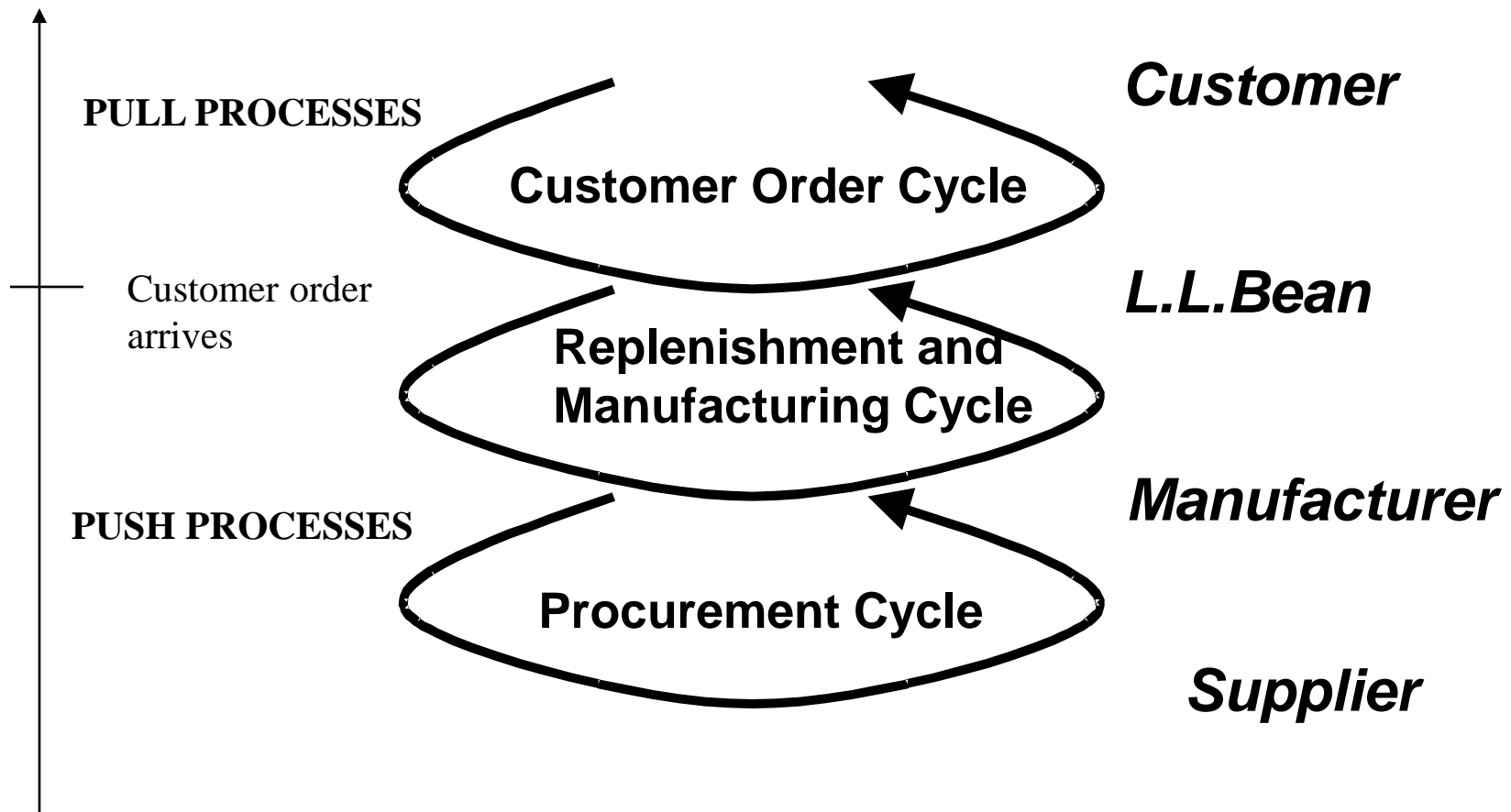
- ▶ Some stages of the supply chain, typically the initial stages are operated in a push-based manner, whereas the remaining stages employ a pull-based strategy
- ▶ The interface between the push-based stages and the pull-based stages is known as the *push-pull boundary*
- ▶ *Example: personal computer 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

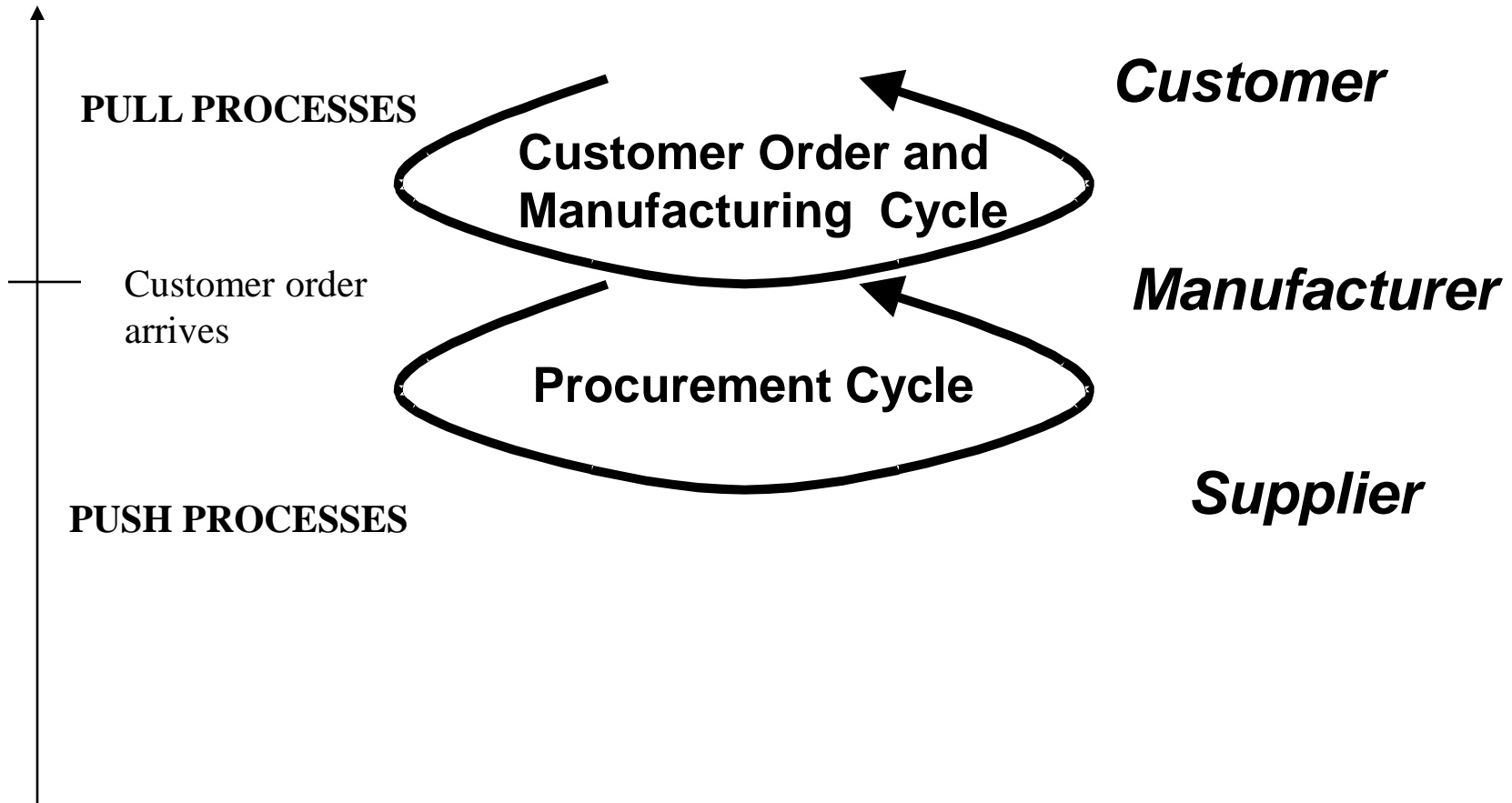
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# Ex: Dell Computers

## Built-to-Order

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# Characteristics of the Pull and Push Portions of the Supply Chain

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



# Examples of Supply Chains

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- ▶ Toyota
- ▶ Amazon
- ▶ Zara



# Toyota

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- ▶ 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

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- ▶ 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

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- ▶ 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

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- ▶ 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

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Source:

[www.3isite.com/articles/ImagesFashion\\_Zara\\_Part\\_I.pdf](http://www.3isite.com/articles/ImagesFashion_Zara_Part_I.pdf)

# Zara: Apparel Manufacturing and Retail

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- ▶ 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

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- ▶ 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

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- ▶ Visit the course website
- ▶ <http://web.itu.edu.tr/kabak/dersler/MHN521E>
  
- ▶ Topic:
  - ▶ SC Performance, drivers and metrics.

