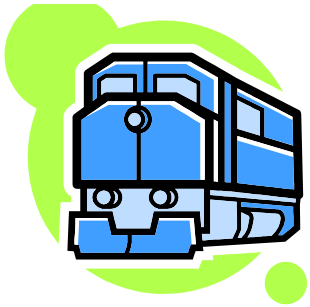
REPUBLIC POLYTECHNIC

## E216 Distribution and Transportation

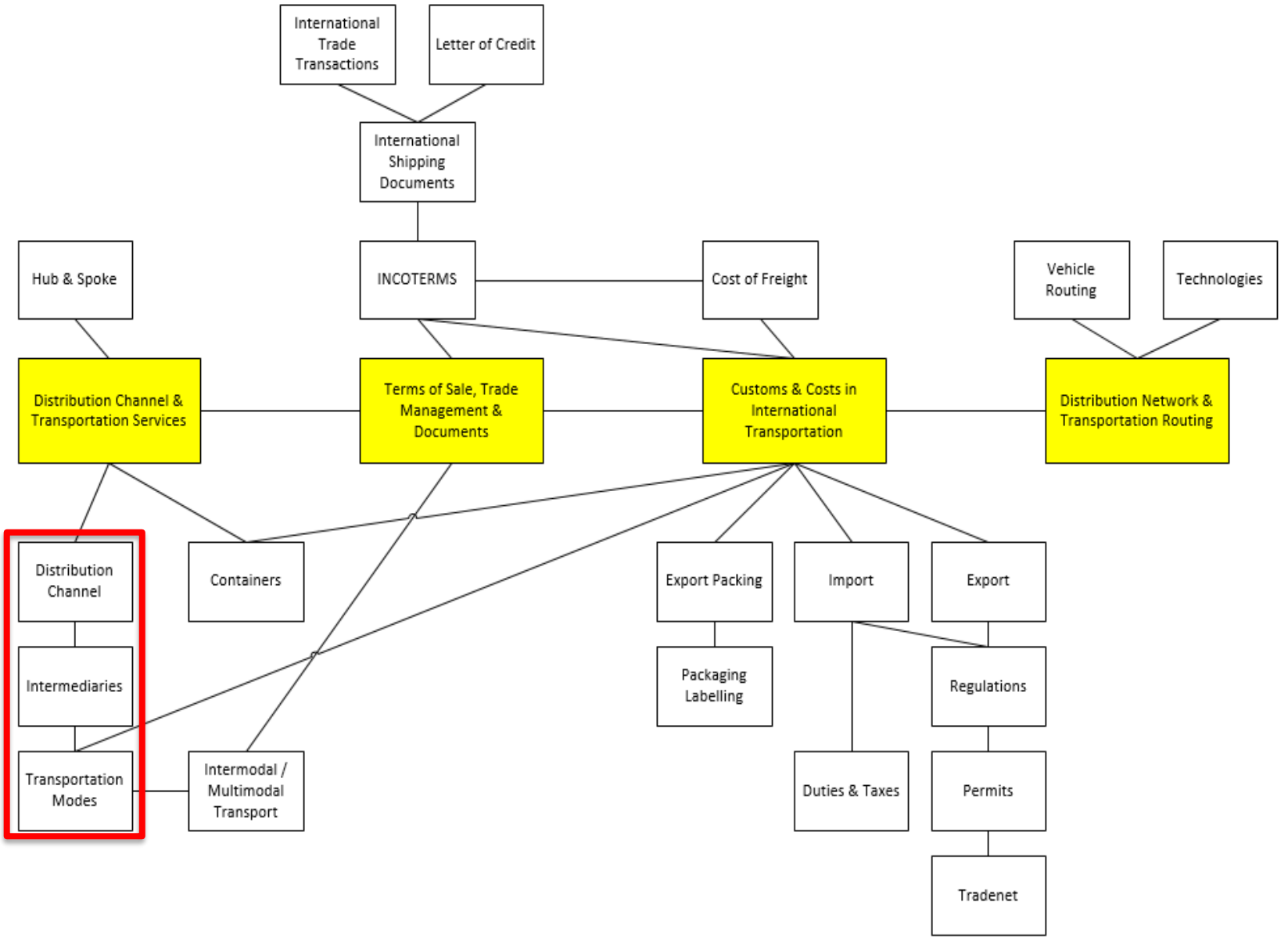
# Problem 01

## Ship to the Customers



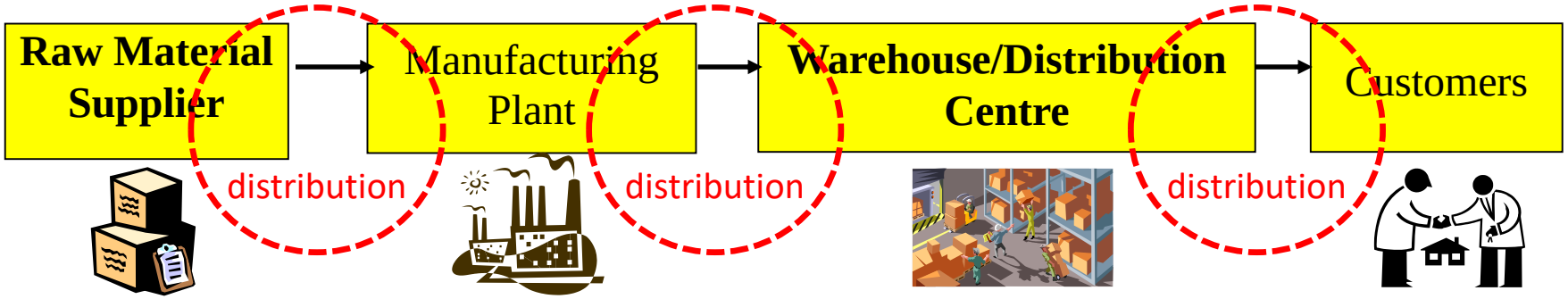
SCHOOL OF ENGINEERING

# E216 Distribution & transportation - Topic Tree



# Distribution

- Distribution refers to the steps taken to move and store products from the supplier stage to a customer stage of the supply chain
  - Concerned with ensuring the product/intermediate product is in the right place at the right time
- Distribution occurs between every pair of stages in the supply chain
  - Raw materials moved from suppliers to manufacturers.
  - Finished products moved from manufacturer to customer



# What is a Distribution Channel?

- A channel of distribution is a series of firms or individuals that facilitates the movement of a product from the producer to the final customer

# Direct Channel

**Producer (E.g. Dell Computer, Tailor Shops)**

**Customers**

# Indirect Channel

- May include one or more channel intermediaries to help move the product to the end-consumers

**Producer**

**E.g. Toy factory**

**Retailers**

**Toy shops**

**Customers**

**Customers (Children & Parents)**

# Number of Channels Without Intermediary

**Products (P)**

- Kleenex – Tissue Papers
- Energizer - Batteries
- Everbloom -Mushrooms
- Tupperware – Food Containers
- Ayam brand – Can Sardines
- Nestle - Cereals

**Customers (C)**

- Mary 
- Annie 
- Sam 
- Sean 
- Bruce 

**6 X 5 = 30 Transactions**

# Number of Channels With Intermediary

**Products (P)**

Kleenex - Tissues

Energizer - Batteries

Everbloom -Mushrooms

Tupperware – Food Containers

Ayam brand – Can Sardines

Nestle - Cereals

**6 + 5 = 11**
**Transactions Only**

**Supermarket**

**Customers (C)**

Mary

Annie

Sam

Sean

Bruce

**Transactions reduced drastically with intermediary**

# Channel Intermediaries (Wholesalers/Distributors)

- Break down ‘bulk’
- Buy from producers and sell small quantities to retailers
- Provide storage facilities
- Reduce contact cost between producer and consumer
- Wholesaler takes some of the marketing responsibility e.g. sales force, promotions
- Distribution Centre can be owned by retailer

# Channel Intermediaries (Agents/ Brokers)

- Mainly used in international markets
- Commission agent - does not take title of the goods. Secures orders.
- Stockist agent - hold ‘consignment’ stock
- Main contact point for a specialist product
  - E.g. specialist telecommunication equipment
- Control may be difficult due to cultural differences
- Training, motivation, etc. are expensive

# Channel Intermediaries (Retailers)

- Much stronger personal relationship with the consumer
- Hold a variety of products
- Offer consumers credit
- Promote and merchandise products
- Price the final product
- Build retailer ‘brand’ in the high street
  - Department stores: wide product mixes e.g., hardware, clothing. Each product in different sections in the store e.g. Sears
  - Chain stores: large size enable buying of a wide variety of items in large quantity discounts; prices lower than small competitors; convenient locations; increased market share e.g. Pizza Hut

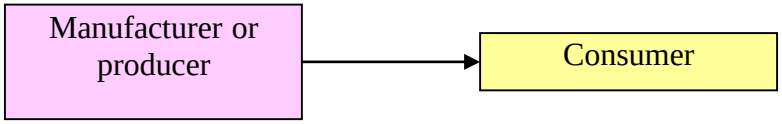
# Advantages of Channel Intermediaries

Channel intermediaries or ‘middlemen’ offer a variety of services

- Providing variety for the consumer
- Breaking bulk to easily manageable quantities
- Assisting promotional activities
- Enabling wider geographic dispersion
- Making the purchase process faster and easier for customers
  - E.g. Provide credit, repair & maintenance, communication functions

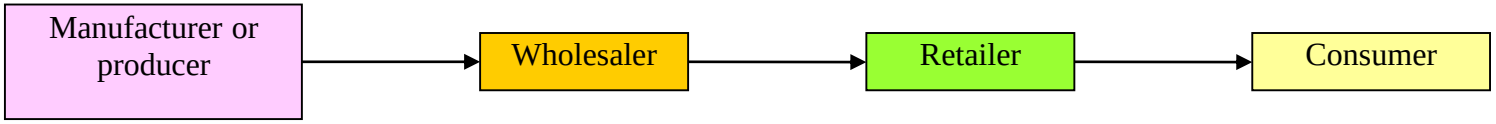
# Typical Distribution Channel Configurations

Channel 1 (e.g. factory shop / E-Commerce business to consumer (B2C) retailers)

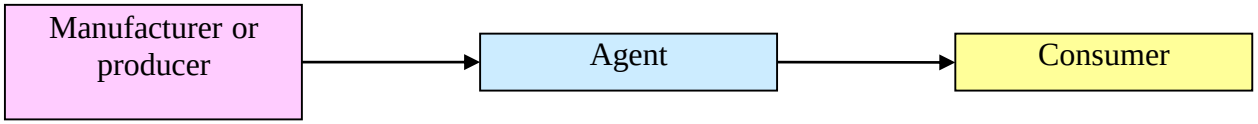



Channel 2 (e.g. supermarket / Amazon)

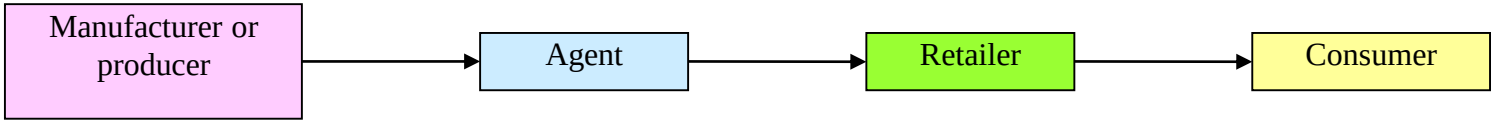

Channel 3 (e.g. small retail shops)




Channel 4 (e.g. travel agent, property agent, EZbuy)




Channel 5 (e.g. E-Commerce consumer to consumer (C2C) retailers)



# Channel Partners and Their Involvement

- Types of  Flow moving up and down the channels include:
  - **Physical flow:** physical movement of goods
  - **Title flow:** negotiation, ownership, risk sharing
  - **Financial flow:** financing scheme & payment
  - **Information flow:** order spec, order fulfillment etc.
  - **Promotion flow:** advertising and customer support
- Channel partners are involved in various degree for all these flows

# Channel Partners and Their Involvement

| Manufacturer | 3rd Party Logistics | Distributors | Wholesalers / Retailers |
|---|---|---|---|
| Physical | Physical | Physical | Physical |
| Ownership | Information | Ownership | Ownership |
| Risk sharing | Order processing | Information | Information |
| Information | | Financial | Financial |
| Promotion | | Negotiation | Negotiation |
| Negotiation | | Risk Sharing | Risk Sharing |
| | | Promotion | Promotions |
| | | Order Placement | Order Placement |

# Market Coverage Objectives

| Intensity Level | Objective | Number of Intermediaries |
|---|---|---|
| **Intensive** | Achieve mass market selling. Convenience goods. | Many |
| **Selective** | Work with selected intermediaries. Shopping and some specialty goods. | Several |
| **Exclusive** | Work with single intermediary. Specialty goods and industrial equipment. | One |

# Different type of Product Characteristics

- Value
  - Related to product life cycle
- Technicality
  - High tech products
  - Generally, direct channels and selective or exclusive distribution policies are used
- Perishability
  - Usually sold on a direct basis

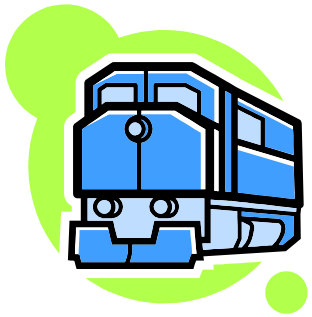
# Different type of Product Characteristics

- Seasonality
  - Products have seasonality demand patterns
  - Manufacturer must
    - Invest in warehouse,
    - Use 3rd party logistics, or
    - Provide incentives to intermediaries to provide storage function

- Product Range
  - high variety products with low per unit values
    - use intensive distribution with direct sales
    - result in a relatively large average sales volume
  - limited line of products
    - use indirect channels
    - achieve adequate market coverage at a reasonable cost

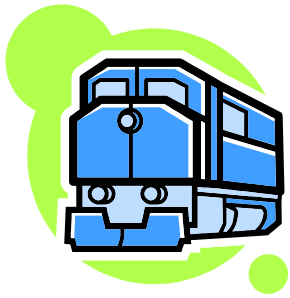
# Basic Modes of Transportation

- There are 5 basic modes of transportation
  - Rail
  - Motor
  - Water
  - Pipeline
  - Air


# Mode of Transport – Rail

- Rail is a long haul, large volume system
  - High fixed costs; own rights-of-way
- Capable of carrying a wide variety of products
  - E.g. Raw materials such as coal, lumber or low-valued manufactured products such as paper and wood products
- Reliability and safety are improving and are generally good
- Accessibility can be a problem
- Transit times are spotty and generally long

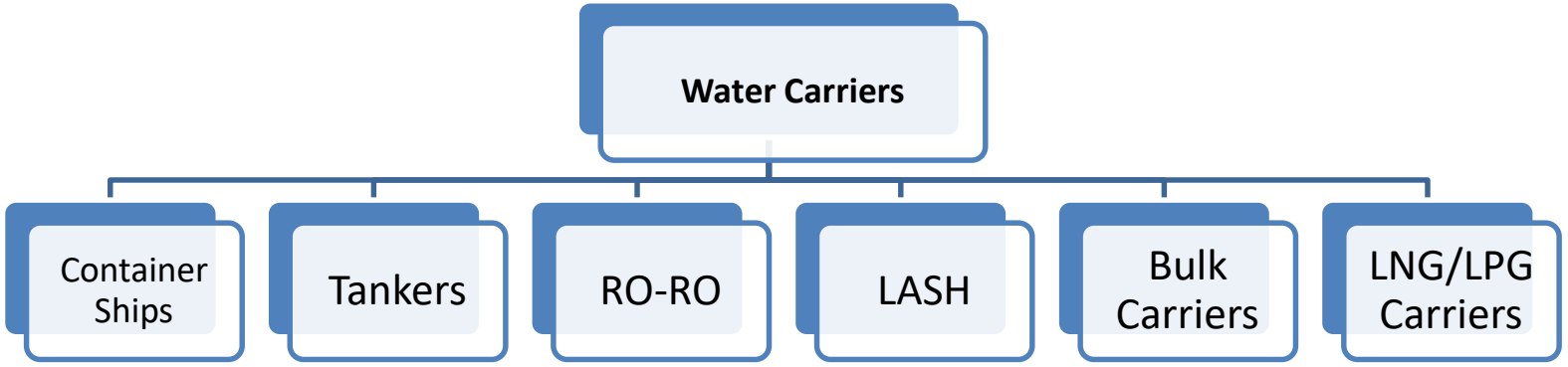


# Mode of Transport – Motor Carriers

- Low cost of entry
  - Consists of for-hire and private carriers
- Characterized by low fixed costs and high variable costs
- Do not own their rights-of-way
- Limited operating authority regarding service areas, routes, rates and products carried
- High accessibility; can offer door-to-door, speed and convenience
- Transit times faster than rail or water
- Reliability can be affected greatly by weather
- Relatively high cost compared to rail and water
  - More labor intensive
  - Trade-off is faster service

# Mode of Transport — Water Carriers

- Relatively low cost mode; do not own rights-of-way; easy entry and exit.
- Typically a long distance mover of low value, bulk-type mineral, agricultural and forest products
- Low rates but long transit times
- Low accessibility
- Vessels can operate according to a fixed schedule, called liner vessels, or only when it is chartered (or hired) from the ship operator, thus called tramp vessels



# Types of Water Carriers

- Container Ships
  - Specifically designed to carry 20 or 40 foot long containers
  - Containerization speed up the process of loading and unloading, minimizing idle time
  - Measured according to number of 20 foot equivalent unit (TEUs)

- Tankers
  - Specially designed for liquid cargoes, e.g. crude oil and refined petroleum
  - Fitted with pumps and pipes to load and discharge liquid cargo

# Types of Water Carriers

- RO-RO (Roll on-Roll off)
  - Basically a large ferry that facilitates the loading and unloading process by using drive on/off ramps
  - Designed to carry automobiles and heavy trucks as primary cargo

- LASH (Lighter Aboard Ship)
  - Designed to carry lighters (barges), where they are lifted by crane over the stern (rear) of the vessel

# Types of Water Carriers

- Bulk carriers
  - Large compartments for carrying loads of ore, grain or coal
  - Entire ship is used for the same type of cargo

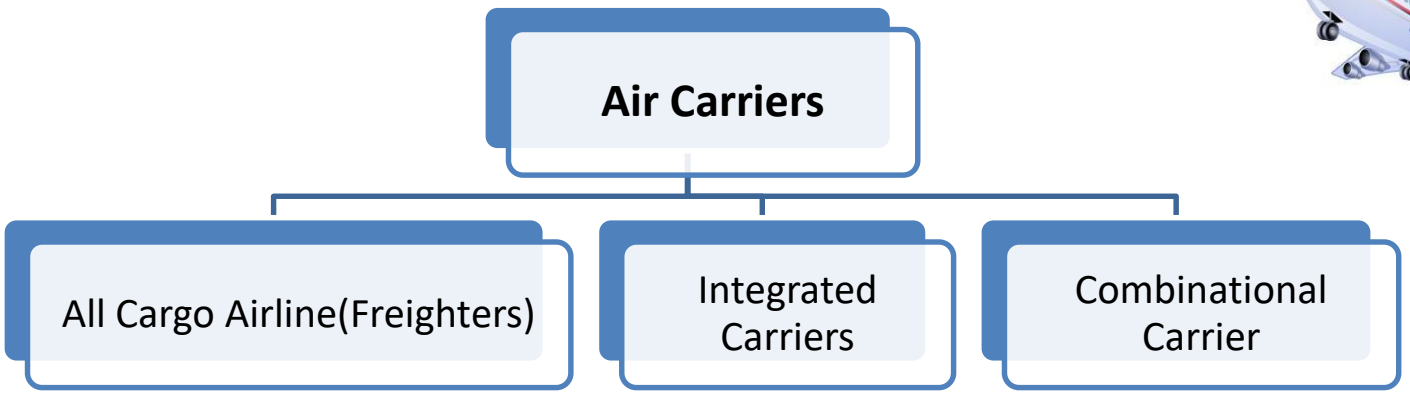
- LNG/ LPG carriers
  - Specially constructed to carry liquefied natural gas and liquefied petroleum gas in special pressurized tanks

# Mode of Transport – Pipeline

- Limited range of services and capabilities, thus not suitable for general transportation
- Accessibility is very low
- Cost structure is highly fixed with low variable costs.
- Own rights-of-way much like the railroads.
- High dependability due to few interruptions to cause transit time variability
- High capacity and products are able to move 24/7/365

# Mode of Transport – Air Carriers

- Constitutes the newest and the least used method of transporting cargo
- Cost structure is highly variable; do not own rights-of-way
- Transit times are fastest but rates are also highest
  - Well-suited to carrying valuable, fragile and perishable cargoes
- Air-service dependability can be rated as good under normal operating conditions, and has a distinct advantage in terms of loss and damage



# Types of Air Carriers

- All-Cargo Airline (Freighters)
  - Provide point-to-point service for air freight forwarders, either as common carriers or under guaranteed-space agreements
    - E.g. SIA Cargo, Lufthansa Cargo, Cathay Pacific Cargo
  - Some others, like Atlas Air and Air Transport International, primarily operate aircraft on a contract basis for other airlines



# Types of Air Carriers

- Integrated carriers (Express Carriers)
  - Operate door to door freight transportation networks that include own cargo aircraft, delivery vehicles, sorting hubs, and advance info systems to provide international delivery service

    E.g. FedEx, UPS, DHL



- Combinational Carrier
  - Carries passengers and cargo
  - Primarily offers point-to-point services on wholesale basis
  - Relying on Freight Forwarders for pickups, delivery, sales to shippers and customer service

# Transportation Desirability Criteria

| | Cost | Speed | Reliability | Capability | Accessibility | Security |
|---|---|---|---|---|---|---|
| **Rail** | 3 | 3 | 4 | **5** | 4 | 3 |
| **Road** | 2 | 4 | **5** | 4 | **5** | 4 |
| **Water** | 4 | 2 | 2 | 2 | 2 | 2 |
| **Air** | **1** | **5** | 3 | 3 | 3 | **5** |
| **Pipeline** | **5** | -- | -- | **1** | -- | -- |

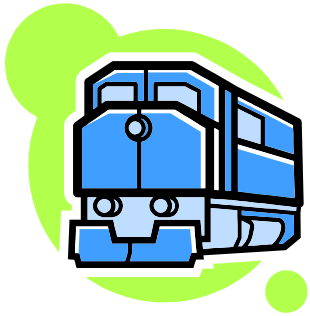
**1 = Least desirable  5= Most desirable**

Source: *"Building Competitive Operations Planning and Logistics",* APICS , 2007, pp.2-166

# Transportation Mode Selection

**Transportation Mode Selection**

- **Characteristics in Transportation Service Selection**
- **Basic Cost Trade-Offs**
- **Competitive Considerations**

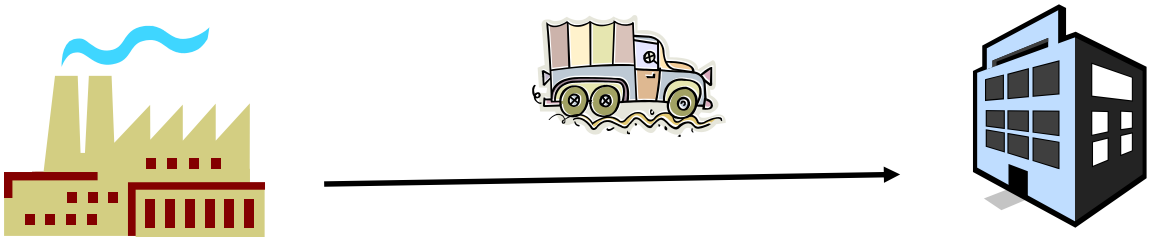


# Basic Cost Trade-Offs

Steps:

- Find the transportation costs for each mode with in-transit inventory
- Find the In-transit inventory costs for each mode
- Sum both of the above to find the total cost
- Select the lowest total cost transport mode

# Basic Cost Trade-Offs



**Production Plant** **Customer**

- The longer the door-to-door transit time, the higher the inventory cost in transit
- Annual cost of carrying this in-transit inventory is ***I*C*D*T/365***
  - I : Inventory Carrying cost of 1 unit per year
  - C : Value of one unit
  - D : Annual Demand
  - T : Time in Transit ( in days)

# Today's Problem

**Products (P)**

Kang Kong

Beef

Chinese Cabbage

Fish

Chicken

**Retailers (R)**

Tasty Vegetable & Meat Pte Ltd

K&S Supermarket

Best Vegetable & Meat Pte Ltd

AY Supermarket

**Consumers (C)**

**Total number of transactions = 5 x 4 = 20**

# Proposed Solution

**Products (P)**

Kang Kong

Beef

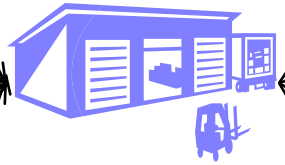
Chinese Cabbage

Fish

Chicken

**9 transactions with wholesaler compared to 20 transactions without → Substantial Cost Saving**

ABC Food Trading Pte Ltd



**E.g. Break Bulk, Create Assortment**

**Retailers (R)**

Tasty Vegetable & Meat Pte Ltd

K&S Supermarket

Best Vegetable & Meat Pte Ltd

AY Supermarket

**Consumers (C)**

**If the farmers sell M products to N retailers, no. of transactions will be M x N without wholesalers, compared to M + N transactions with wholesalers**

# Today's Problem

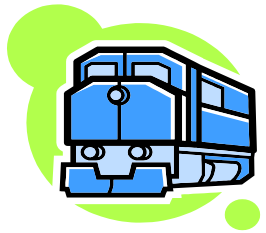
## Basic Cost Trade-Offs for Fish

| Mode | Rail | Sea | Truck | Air |
|---|---|---|---|---|
| Transportation Costs per kg ($) | $0.20 | $0.15 | $0.30 | $1.20 |
| Door-to-Door Transit Time in days (T) | 4 | 6 | 3 | 2 |
| **Calculation** | **Rail** | **Sea** | **Truck** | **Air** |
| Transportation Costs ($) = R x D | $400.00 | $300.00 | $600.00 | $2,400.00 |
| In-Transit Inventory Costs = ICDT/365 | $9.86 | $14.79 | $7.40 | $4.93 |
| **Total Costs** | **$409.86** | **$314.79** | **$607.40** | **$2,404.93** |

- **Sea transport mode** offers the **lowest total cost** even though air transport mode offers the lowest In-Transit Inventory cost

# Proposed Solution

- John can perform Transportation Desirability Criteria to analyze the pros and cons of each transportation mode
- Besides Transportation Desirability Criteria, he can also preform Basic Cost Trade-Offs for cost analysis
- In reality, besides the cost and profit consideration, other considerations like lead time, security, nature of product may also be taken into consideration



# Learning Objectives

- Discuss the functions of distribution channels
- Explain the types of channel intermediaries
- Describe channel partners and their involvement
- Select and evaluate distribution channels
- Discuss the basic modes of transportation
- Explain the types of air and ocean carriers and its characteristics