

McGraw-Hill Irwin

## Chapter 10

### Global Logistics and Risk Management

Copyright © 2008 by The McGraw-Hill Companies, Inc. All rights reserved.

## 10.1 Introduction

- About one-fifth of the output of U.S. firms is produced overseas.
- One-quarter of U.S. imports are between foreign affiliates and U.S. parent companies.
- Since the late 1980s, over half of U.S. companies increased the number of countries in which they operate.

10-2

## International Supply Chain Management

- Dispersed over a larger geographical area
- Offers many more opportunities than just the domestic supply chain
- Risk factors are also present

## International Supply Chains

- **International distribution systems**
  - Manufacturing still occurs domestically, but distribution and typically some marketing take place overseas.
- **International suppliers**
  - Raw materials and components are furnished by foreign suppliers
  - Final assembly is performed domestically.
  - In some cases, the final product is then shipped to foreign markets.
- **Offshore manufacturing**
  - Product is typically sourced and manufactured in a single foreign location
  - Shipped back to domestic warehouses for sale and distribution
- **Fully integrated global supply chain**
  - Products are supplied, manufactured, and distributed from various facilities located throughout the world.

10-3

10-4

## Forces toward Globalization

- Global market forces.
- Technological forces.
- Global cost forces.
- Political and economic forces.

## Global Market Forces

- Pressures created by foreign competitors, as well as the opportunities created by foreign customers.
- Presence of foreign competitors in home markets can affect their business significantly.
- Much of the demand growth available to companies is in foreign and emerging markets.
- Increasing demand for products throughout the world through the global proliferation of information.

10-5

10-6

## Global Market Forces

- Particular markets often serve to drive technological advances in some areas.
- Companies forced to develop and enhance leading-edge technologies and products.
- Such products can be used to increase or maintain market position in other areas or regions where the markets are not as competitive

10-7

## Technological Forces

- Related to the products
- Various subcomponents and technologies available in different regions and locations
- Successful firms need to use these resources quickly and effectively.
- Locate research, design, and production facilities close to these regions.
- Frequently collaborate, resulting in the location of joint facilities close to one of the partners.
- Global location of research-and-development facilities driven by two main reasons:
  - As product cycles shrink, locate research facilities close to manufacturing facilities.
  - Specific technical expertise may be available in certain areas or regions

10-8

## Global Cost Forces

- Often dictate global location decisions
- Costs of cheaper unskilled labor more than offset by the increase in other costs associated with operating facilities in remote locations.
- In some cases cheaper labor is sufficient justification for overseas manufacturing.
- Other global cost forces have become more significant
  - Cheaper *skilled labor* is drawing an increasing number of companies overseas.

10-9

## Political and Economic Forces

- Exchange rate fluctuation
- Regional trade agreements
- Tariff system
- Trade protection mechanisms
- More subtle regulations
  - Local content requirements
  - Voluntary export restrictions
  - Government procurement policies

10-10

## 10.2 Risk Management

- Outsourcing and offshoring imply that the supply chain is geographically more diverse and hence more exposed to various risks.
- Recent trends toward cost reduction, lean manufacturing and just-in-time imply that in a progressive supply chain, low inventory levels are maintained.
  - In the event of an unforeseen disaster, adherence to this type of strategy could result in a shutdown of production lines because of lack of raw material or parts inventory.

10-11

## Sources of Risks

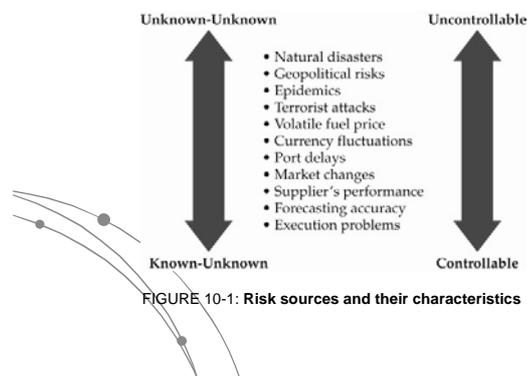
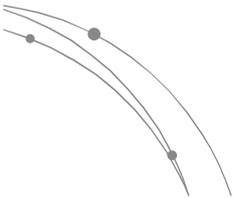


FIGURE 10-1: Risk sources and their characteristics

10-12

## Factors Impacting Exposure to Risks

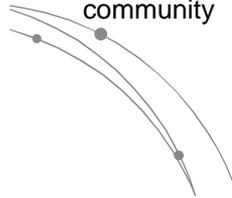
- Customer reactions
- Competitor reactions
- Supplier reactions
- Government reactions



10-13

## Managing the Unknown-Unknown

- Invest in redundancy
- Increase velocity in sensing and responding
- Create an adaptive supply chain community



10-14

## Redundancy

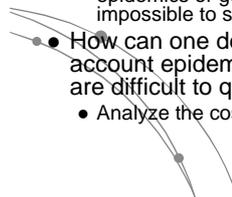
- Respond to unforeseen events
- Careful analysis of supply chain trade-offs
- Example:
  - CPG company with 40 facilities over the world
  - Initial analysis for reduction of cost by \$40M a year
    - shut down 17 of its existing manufacturing facilities
    - leave 23 plants operating
    - satisfy market demand all over the world.



10-15

## Decision Was Risky

- New design left no plant in North America or Europe
  - Long and variable supply lead times
  - Higher inventory levels.
- Remaining manufacturing facilities in Asia and Latin America fully utilized
  - Any disruption of supply from these countries, due to epidemics or geopolitical problems, would make it impossible to satisfy many market areas.
- How can one design the supply chain taking into account epidemics or geopolitical problems that are difficult to quantify?
  - Analyze the cost trade-offs



10-16

## Trade-Offs

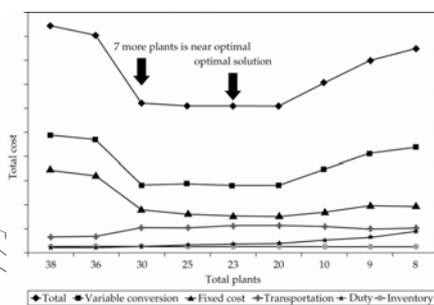
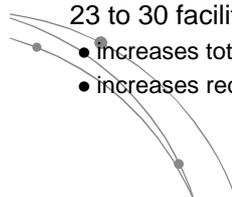


FIGURE 10-2: Cost trade-offs in supply chain design

10-17

## Analysis of the Trade-Offs

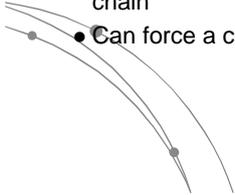
- Closing 17 plants and leaving 23 open will minimize supply chain costs.
- Total cost function is quite flat around the optimal strategy.
- Increasing the number of open plants from 23 to 30 facilities
  - increases total cost by less than \$2.5M
  - increases redundancy significantly.



10-18

## Sensing and Responding

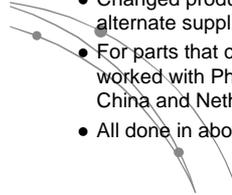
- Speed in sensing and responding can help the firm overcome unexpected supply problems
- Failure to sense could lead to:
  - Failure to respond to changes in the supply chain
  - Can force a company to exit a specific market



10-19

## Sensing and Responding Example

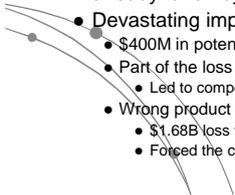
- Different responses of Nokia and Ericsson on a fire at one of the supplier's facility
  - Supplier was Philips Semiconductors in Albuquerque, NM
- Nokia:
  - Changed product design to source components from alternate suppliers
  - For parts that could not be sourced from elsewhere, worked with Philips to source it from their plants in China and Netherlands
  - All done in about five days



10-20

## Sensing and Responding Example

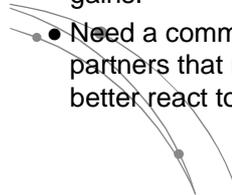
- Ericsson's experience was quite different
  - Took 4 weeks for the news to reach upper management
  - Realized five weeks after the fire regarding the severity of the situation.
  - By that time, the alternative supply of chips was already taken by Nokia.
- Devastating impact on Ericsson
  - \$400M in potential sales was lost
  - Part of the loss was covered by insurance.
    - Led to component shortages
  - Wrong product mix and marketing problems caused:
    - \$1.68B loss to Ericsson Cell Phone Division in 2000
    - Forced the company to exit the cell phone market



10-21

## Adaptability

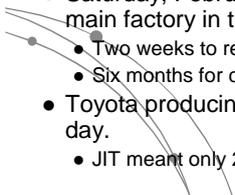
- The most difficult risk management method to implement effectively.
- Requires all supply chain elements to share the same culture, work towards the same objectives and benefit from financial gains.
- Need a community of supply chain partners that morph and reorganize to better react to sudden crisis



10-22

## Adaptability Example

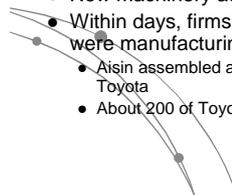
- In 1997, Aisin Seiki the sole supplier of 98% of brake fluid proportioning valves (P-valves) used by Toyota
- Inexpensive part (about \$7 each) but important in the assembly of any car.
- Saturday, February 1, 1997: Fire stopped Aisin's main factory in the industrial area of Kariya,
  - Two weeks to restart the production
  - Six months for complete recovery
- Toyota producing close to 15,500 vehicles per day.
  - JIT meant only 2-3 days of inventory supply



10-23

## Recovery Effort by Toyota

- Blueprints of valves were distributed among all Toyota's suppliers
- Engineers from Aisin and Toyota relocated to supplier's facilities
- Other manufacturers like Brother were also brought in
- Existing machinery adapted to build the valves according to original specifications
- New machinery acquired in the spot market
- Within days, firms with little experience with P-valves were manufacturing and delivering parts to Aisin
  - Aisin assembled and inspected valves before shipment to Toyota
  - About 200 of Toyota's suppliers were involved



10-24

## Vehicle Production & P-Valves Inventory

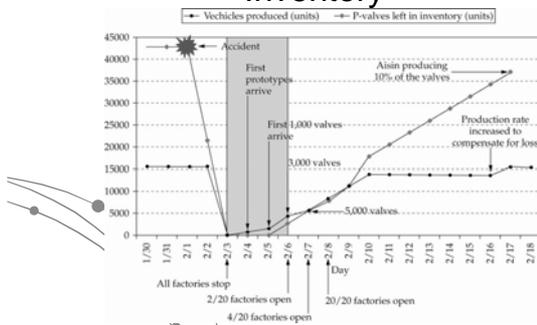


FIGURE 10-3: Vehicle production and P-valve inventory levels

10-25

## Outcome

- Accident initially cost:
  - 7.8B Yen (\$65M) to Aisin
  - 160B Yen (or \$1.3B) to Toyota
- Damage reduced to 30B Yen (\$250M) with extra shifts and overtime
- Toyota issued a \$100M token of appreciation to their providers as a gift for their collaboration

10-26

## Single Sourcing and Adaptability

- Single sourcing is risky
  - Achieves economies of scale
  - High quality parts at a low cost
- JIT mode of operation builds a culture of:
  - Working with low inventories
  - Ability to identify and fix problem quickly
  - Entire supply chain was stopped once the fire occurred
  - Prompted every company in the chain to react to the challenge

10-27

## Managing Global Risks Speculative Strategy

- A company bets on a single scenario
  - Spectacular results if the scenario is realized
  - Dismal ones, otherwise.
- Example
  - Late 1970s and early 1980s
  - Japanese automakers bet that exchange rate benefits, rising productivity would offset higher labor costs
  - Had to build plants overseas later when this equation changed

10-28

## Managing Global Risks Hedge Strategy

- Losses in part of the supply chain will be offset by gains in another part
- Example:
  - Multiple Volkswagen plants in different countries.
  - Certain plants more profitable at times than others
  - Move production between plants to be successful overall.

10-29

## Managing Global Risks Flexible Strategy

- Allows a company to take advantage of different scenarios
- Designed with multiple suppliers and excess manufacturing capacity in different countries
- Factories designed to be flexible
  - Products can be moved at minimal cost from location to location
- Factors to consider:
  - Is there enough variability in the system to justify the use of flexible strategies?
  - Do the benefits of spreading production over various facilities justify the costs?
  - Does the company have the appropriate coordination and management mechanisms in place?

10-30

## Approaches to Flexible Strategy

- **Production shifting**
  - Flexible factories and excess capacity/suppliers
  - Shift production from region to region
- **Information sharing**
  - Larger presence in many regions and markets increases availability of information
  - Can be used to anticipate market changes/find new opportunities
- **Global coordination**
  - Multiple worldwide facilities allows greater market leverage
  - Increased leverage limited by international laws/political pressures
- **Political leverage**
  - Higher political leverage in overseas operations with global operations

10-31

## Global Integration Implementation

- **Product development**
  - Design products that can be modified easily for major markets
  - Products can be easily manufactured in various facilities
  - May be possible to design a base product or products that can be more easily adapted to several different markets
  - An international design team may be helpful
- **Purchasing**
  - Management teams should purchase important materials from many vendors around the world
  - Quality and delivery options from suppliers have to be compatible
  - Qualified team should compare pricing of various suppliers
  - Sufficient suppliers required in different regions to ensure flexibility

10-32

## Global Integration Implementation

- **Production**
  - Excess capacity and plants in several regions are essential
  - Effective communications systems must be in place
  - Centralized management is essential
  - Inter-factory communication needs to be established
  - Centralized management should make each factory aware of the system status.
- **Demand management**
  - Setting marketing and sales plans based on projected demand and available product
  - Has to have at least some centralized component.
  - Sensitive, market-based information best supplied by analysts in each region.
  - Communication is critical
- **Order fulfillment**
  - Centralized system
  - Regional customers must be able to receive deliveries from the global supply chain with the same efficiency as they do from local or regionally based supply chains

10-33

## 10.3 Issues in International Supply Chain Management

- International vs Regional Products
- Local Autonomy vs Central Control
- Miscellaneous Dangers

10-34

## International vs Regional Products

- **Region-specific products**
  - Some products have to be designed and manufactured specifically for certain regions.
  - Example: Automobile designs
    - Honda Accord has two basic body styles
      - a smaller body style tailored to European and Japanese tastes
      - a larger body style catering to American tastes
    - Nissan designates lead-country status to every model
      - Pathfinder and Maxima had U.S. as the lead-country

10-35

## International vs Regional Products

- **Global Products**
  - Truly global, i.e. no modification necessary for global sales.
    - Coca-Cola
    - Levi's jeans
    - Luxury brands such as Coach and Gucci
  - Some depend on very specific regional manufacturing and bottling facilities and distribution networks,
  - Others are essentially distributed and sold in the same way throughout the world

10-36

## Local Autonomy vs. Central Control

- Centralized control can be important
  - However, in many cases it makes sense to allow local autonomy in the supply chain
- Important to temper expectations for regional business depending on the characteristics of the region involved
  - However, temptation to follow local conventional wisdom may cause some opportunities of a global supply chain to be missed

10-37

## Miscellaneous Dangers

- Many potential dangers that firms must face as they expand their supply chains globally
  - Exchange rate fluctuations
  - Administer offshore facilities, especially in less-developed countries.
  - Promise of cheap labor masking threat of reduced productivity
    - Expensive training may be required but it may not be enough
- Local collaboration in the global supply chain. Collaborators can ultimately become competitors.
  - Hitachi, which used to manufacture under license from Motorola, now makes its own microprocessors.
  - Toshiba, which manufactured copiers for 3M, is now a major supplier of copiers under the Toshiba brand name.

10-38

## Miscellaneous Dangers

- Dangers with foreign governments.
  - Access to China's huge markets causing many companies are handing over critical manufacturing and engineering expertise to the Chinese government or to Chinese partners.
  - When these companies become competitors
    - Would overseas firms be able to compete successfully in the Chinese market?
    - Would they lose this opportunity even as Chinese companies begin to compete on the world stage?

10-39

## 10.4 Regional Differences in Logistics

	First World	Emerging	Third World
Infrastructure	Highly developed	Under development	Insufficient to support advanced logistics
Supplier operating standards	High	Variable	Typically not considered
Information system availability	Generally available	Support system not available	Not available
Human resources	Available	Available with some searching	Often difficult to find

10-40

## Cultural Differences

- *Language*
  - Expressions, gestures, and context
- *Beliefs*, or specific values about something
  - Can differ widely from culture to culture
- *Customs*
  - Vary greatly from country to country
  - Important for the businessperson to adhere to local customs to avoid offending anyone.
    - Example: the practice of gift giving varies greatly

10-41

## Performance Expectation and Evaluation

- Operating standards in First World nations uniformly high
- Operating standards vary greatly in emerging nations
  - Research and negotiations required
  - Governments usually play a large role
- In the Third World traditional performance measures have no meaning
  - Shortages are common
  - Customer service measures used in the West are irrelevant A firm has little control of the timing and availability of inventory

10-42

## SUMMARY

- Types of international supply chains
- Various forces compelling companies to develop international supply chains
- Both advantages and risks are inherent in global supply chains
  - Unknown-unknown risks to known-unknown risks
  - Variety of strategies to deal with the risks
- Issues in global supply chain management.
- Concepts of:
  - international and regional products
  - centralized versus decentralized control
  - regional logistics differences

10-43