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Chapter 10

Global Logistics and Risk Management

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.

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.

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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.

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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

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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

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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.

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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

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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.

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Sources of Risks

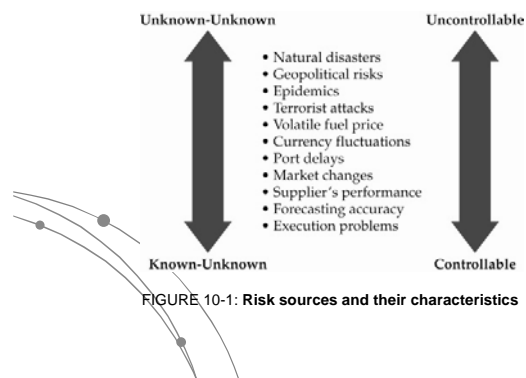
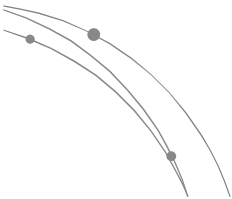


FIGURE 10-1: Risk sources and their characteristics

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Factors Impacting Exposure to Risks

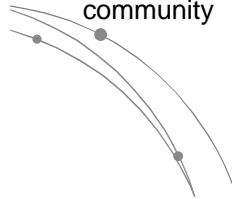
- Customer reactions
- Competitor reactions
- Supplier reactions
- Government reactions



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Managing the Unknown-Unknown

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



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Redundancy

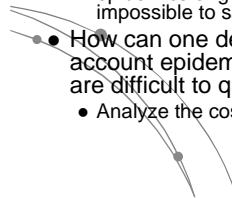
- Respond to unforeseen events
- Careful analysis of supply chain trade-offs
- Example:
 - CPG company with 40 facilities over the world
 - Initial analysis for reduction of cost by \$40M a year
 - shut down 17 of its existing manufacturing facilities
 - leave 23 plants operating
 - satisfy market demand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



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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



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Trade-Offs

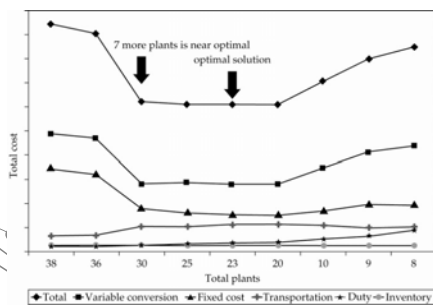
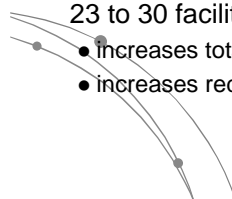


FIGURE 10-2: Cost trade-offs in supply chain design

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.

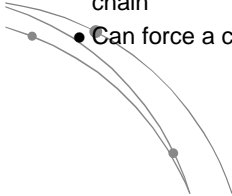


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Sensing and Responding

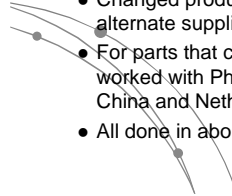
- Speed in sensing and responding can help the firm overcome unexpected supply problems
- Failure to sense could lead to:
 - Failure to respond to changes in the supply chain
 - Can force a company to exit a specific market



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Sensing and Responding Example

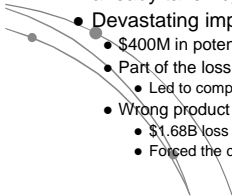
- Different responses of Nokia and Ericsson on a fire at one of the supplier's facility
 - Supplier was Philips Semiconductors in Albuquerque, NM
- Nokia:
 - Changed product design to source components from alternate suppliers
 - For parts that could not be sourced from elsewhere, worked with Philips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



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Sensing and Responding Example

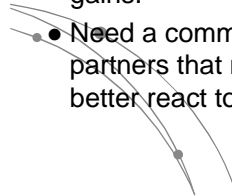
- Ericsson's experience was quite different
 - Took 4 weeks for the news to reach upper management
 - Realized five weeks after the fire regarding the severity of the situation.
 - By that time, the alternative supply of chips was already taken by Nokia.
 - Devastating impact on Ericsson
 - \$400M in 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



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Adaptability

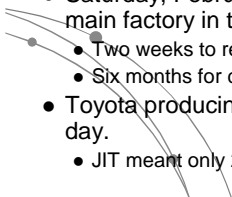
- The most difficult risk management method to implement effectively.
- Requires all supply chain elements to share the same culture, work towards the same objectives and benefit from financial gains.
- Need a community of supply chain partners that morph and reorganize to better react to sudden crisis



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Adaptability Example

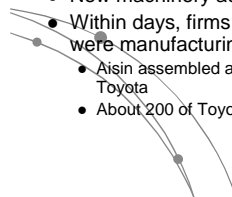
- In 1997, Aisin Seiki the sole supplier of 98% of brake fluid proportioning valves (P-valves) used by Toyota
- Inexpensive part (about \$7 each) but important in the assembly of any car.
- Saturday, February 1, 1997: Fire stopped Aisin's main factory in the industrial area of Kariya,
 - Two weeks to 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



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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



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Vehicle Production & P-Valves Inventory

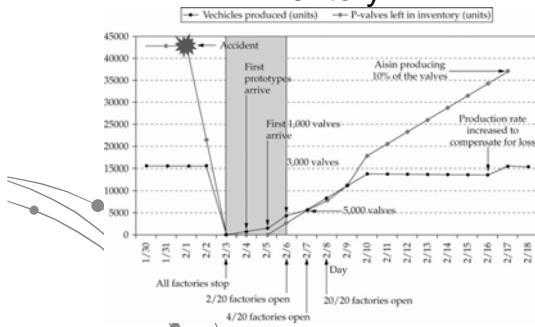


FIGURE 10-3: Vehicle production and P-valve inventory levels

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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

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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

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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

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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.

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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?

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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

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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

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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

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10.3 Issues in International Supply Chain Management

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

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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

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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

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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

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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.

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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?

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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 |

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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

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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

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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

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