

# Chapter 4. Supply Chain Management

Basic references:

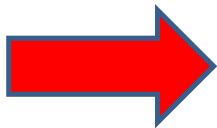
- 📖 Heizer, J. & Render, B. (2009): Operations Management. New Jersey: Pearson Prentice Hall
- 📖 Moscoso, P; Lago,A.(2016):Gestión de operaciones para directivos, Madrid, McGraw Hill

# Chapter 4. Supply Chain Management

- 4.1 Supply chain management - logistics: definitions and subsystems.
- 4.2 Decisions and trade-offs in the SCM
- 4.3 Management of the supply chain
- 4.4 Purchasing management
- 4.5 Facilities location

## 4.1 Supply chain management - logistics: definitions and subsystems.

- A single company cannot control the whole of the value chain of a product.
- Even so, vertically integrated firms purchase raw materials, or subcontract distribution of their products.



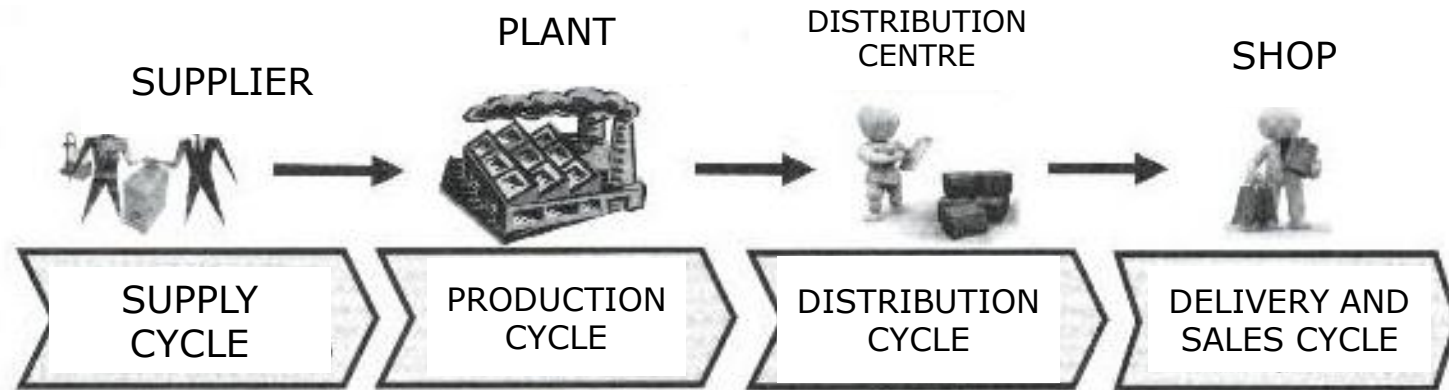
Ops Management should therefore consider coordination with the companies involved in the supply chain.

- **Supply chain (SC):** activities and resources necessary for:
  - Supply
  - Production and
  - Distribution of a product.
  
- **Complex supply networks, that connect:**
  - Suppliers
  - Production centres
  - Distribution centres
  - Points near end customers (shops)
  
- **Its design and management important because:**
  - Increase of globalisation (supply and sales)
  - Increase of subcontracting between firms
  - Importance of service to the customer (reliability, speed) is a key point.

- Three features that make the supply chain management (SCM) a challenge:
  1. Decisions are of a strategic and tactical nature:
    - Model of supplier management.
    - Design of the distribution network.
    - Model of information management.
  2. Decisions are holistic: consider the whole of the system: suppliers, factories, dealers and customers alike.
  3. A high degree of uncertainty:
    - Demand level.
    - Raw materials prices.
    - Impact of new technologies.

- **Key concept**: in every SC we need to manage:
- Material flows.
- Information flows.
- Value flows (value split) among members of SC.

# CYCLES IN THE SUPPLY CHAIN: DECISIONS AND FRAMING DATA



**Type and location of suppliers (stock and purchasing policies)**

- Purchasing and logistic costs.
- Flexibility in volumes.
- Alternative sources in case of need.

**Type and location of plants (centralisation + specialisation)**

- Labour costs, productivity
- Economies of scale
- Pooling of demands.
- Transport costs.
- Resilience of the cycle.

**Production plan and batches**

- Production batches (economies of scale)
- Flexibility against changes in product mix.

**Type and location of warehouses (centralisation of inventories)**

- Product range, demand uncertainty.
- Geographic area.
- Service level (time)
- Transport costs.

**Core transport (selection of mode)**

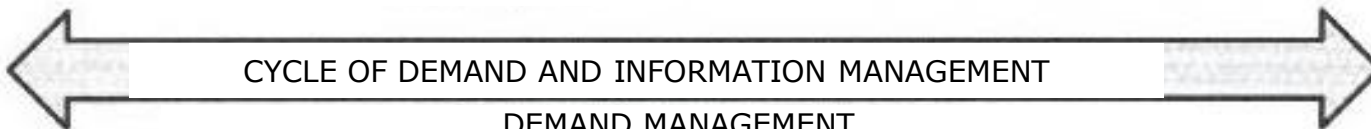
- Possibility to merge loads.
- Transport costs.
- Value of stock in transit.

**Capillary transport (routes, frequency)**

- Capillarity of destinations and volumes.
- Time slots.
- Transport costs.

**Service level and inventory level**

- Product range and required service level.
- Control over demand.



DEMAND MANAGEMENT  
COORDINATION MECHANISMS  
INVESTMENT MANAGEMENT, VALUE FLOWS

➤ ***Supply cycle: selection and location of suppliers***

➤ Key points to consider:

I. *Location and lead times.*

II. *Flexibility, reliability, and response from suppliers.*

III. We should consider strategic issues in supplier management.



➤ ***Production cycle: plant location***

➤ Key points to consider:

I. Facilities location.

II. Allocation of products and volumes per centre.

III. Remember to leave some **redundancies** to add robustness in case of delivery problems.

- ***Distribution cycle: warehouse locations and transport modes.***

- The design of the model is complex and depends on how the firm wants to compete:

- Breadth of its offer.
- Geographical area of distribution.
- Service level offered to the customer.

- These decisions influence others, for instance, do we produce against stock or against orders, and does our business consists of direct sales (B2C) or sales through dealers (B2B)

- We can split distribution in:

- Core distribution network.
- Capillary distribution.

- Warehouses in core networks:
  - ✓ Act as load splitters and concentrators: to ensure best transport efficiency.
  - ✓ Keep stock: to give shorter delivery times to the customer and better availability.
  
- Firms can delegate responsibility of distribution management to dealers (distributors), who play several key roles:
  - **Operations**: they are 'product aggregators', giving customers a single contact point ('one stop' sales process) for a wide offer. They also consolidate customer orders.
  
  - **Sales**: they maintain the relationship with the end customers and help sell the product. They assume the costs of keeping stock and the financial risks of sales.

- ***Delivery cycle: management of capillarity and shop inventories.***

- The capillary distribution or end customer's delivery (shop) is the last step of a SC, the 'last mile'.
- It is made from warehouses, and examples are the re-supply of supermarkets and bars and logistics companies who handle delivery of web sales.
- Difficult organisation because:

1. ***High capillarity***: many destinations and small and variable quantities: good route planning is key for efficiency.
2. ***Stock management and location*** near the customers for a quick response, but this is bad for the efficiency of the SC.

- Efficiency is taken for granted in supply chains: they need to be agile in the short term and adaptable in the medium and long term.
- **Agility** is the ability to deliver a flexible service to the customer in an efficient and coordinated way. It has to be measured in three dimensions:
  - Customer service.
  - Investment and cost efficiency.
  - Coordination.
- On top of this feature, it is considered that a well designed SC must be **adaptable** in the medium and long term.

## 4.2 Decisions and trade-offs in the supply chain

- The SC so complicated that it is simplistic to offer some quick solutions to design it.
- We propose to analyse four trade-offs, that are key in the design and management of the chain.
- Trade-offs are listed from more operating to more structural (strategic).

- **Trade-off #1: Planning: batches vs. response ability**
- In every production or transport process, efficiency is higher when working with large batches of products, but this presents some disadvantages:
  - Stocks and cycle times are higher. Products have to wait longer to be manufactured or transported, compared to an individual batch.
  - Response to demand is slower.
- The higher the batch change cost, the more the interest in big batches. Contrarily, the higher the individual value of the product or the value of the customer waiting time, the bigger the incentive to have smaller batches, or individual ones.

- **Trade-off #1: Planning: batches vs. response ability**
- Impact of batches will be less in firms with higher throughput: the efficient batch will be small when compared with the throughput.
- Small companies can overcome this sharing production or transport volumes with other firms: logistic companies for transport, or subcontracting a part of the production to bigger companies.



○ **Trade-off #2: *Transport modes: transport costs versus stocks.***

○ Using quicker transport modes (plane vs ship) and/or ship in smaller volumes (pallet vs full lorry loads) is more expensive, but has some positive impacts:

- reduces stock in transit.
- reduces safety stocks.

○ Taking into account the shorter product life cycles, firms need to prioritise agility in their SC. Best solutions go in the direction of reducing inventories and adding agility to the chain: made-to-order products or postponement (delay in the differentiation of the product)

○ **Trade-off #3: *Plant and warehouse location: centralisation vs response.***

There is a logical trend to centralise operations to make full use of:

- Economies of scale in production.
- Specialisation; to quickly get economies of experience.

In the case of SC, the most important advantage of centralisation is the aggregation of demand: by pooling the demand the variations in the demand tend to compensate, making safety stocks less necessary.

○ **Trade-off #3: *Plant and warehouse location: centralisation vs response***

The centralisation level does vary. Cheap products with a high transport cost (refreshments, beer) tend to have local plants and warehouses with short SC.

On the contrary, products with more complexity and those where economies of scale are important (cars, smartphones) tend to centralise production in a handful of places and transport the finished products where they're sold.

## ○ **Trade-off #4: *Product portfolio: variety vs inventory cost and response***

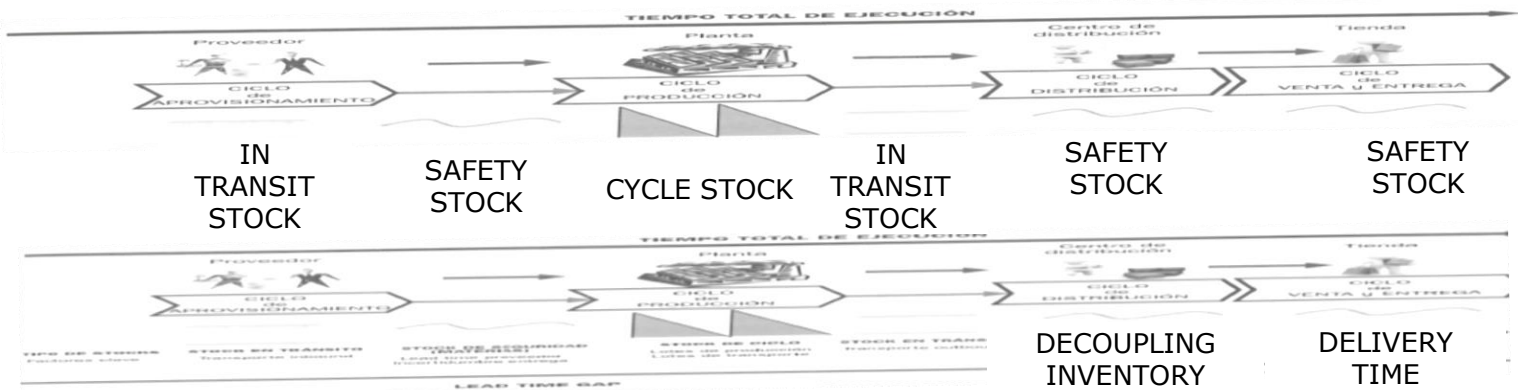
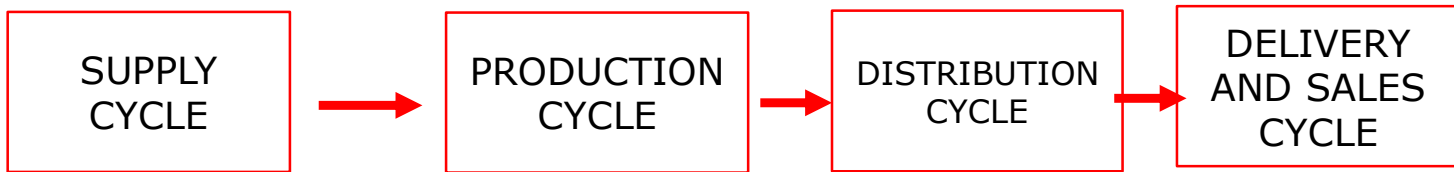
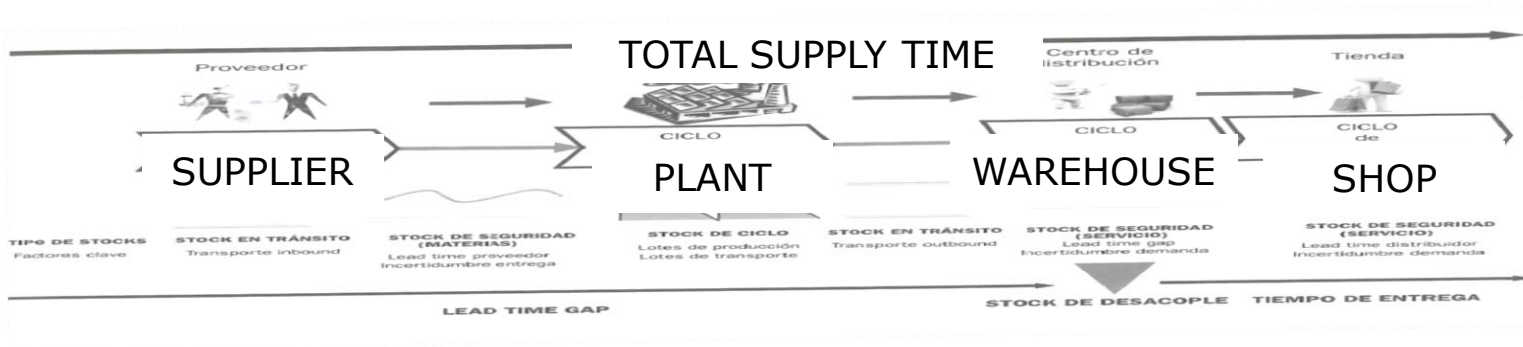
Sales departments always want a huge product variety to encourage demand.

But from an operations point of view, a large number of products complicates the management of the SC:

📦 The volumes per product plummet and it's more difficult to get efficient production and transport batches, unless we increase our consolidation time (the time we wait to start the production) and this increases the lead time for our customers.

📦 Uncertainty over the demand increases, we'll need to increase our safety stocks for each product reference.

# 4.3 The management of the supply chain



- We can see the three roles that inventories play in a supply chain:

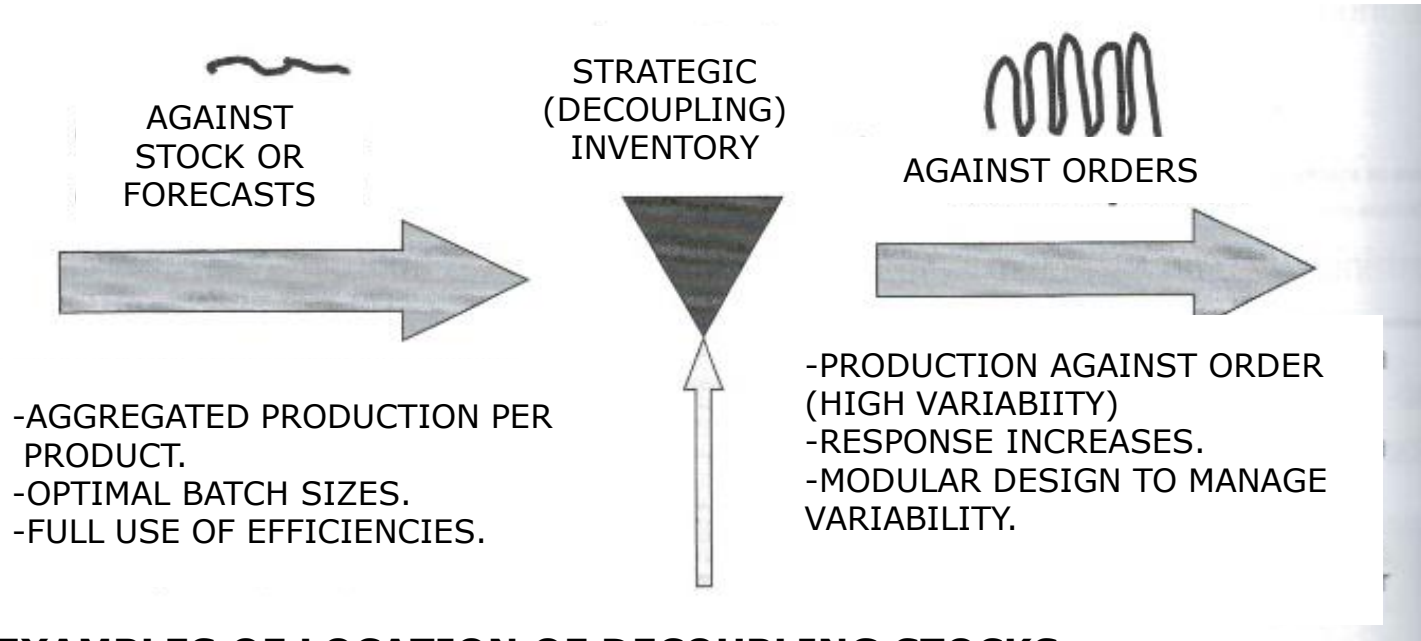
- A: *Stock in progress or in transit.*

- B: *Cycle stock due to batch operations*

- C: *Safety stock* both in origin (raw materials) to protect against supply problems, as well as in later stages (finished product) to protect against demand uncertainty.

- **Key concept:** the gap between what customers expect and the time we need to get the product (*lead time gap*) forces us to keep stock in the supply chain, to decouple the offer and demand flows. If the customer wants the product on the shelf, the stock necessarily will have to be a finished product. If we have time enough to assemble the product, the stock will be low-added value, adding flexibility to the chain.

# Strategic stock and decoupling point along the supply chain, per industry



## EXAMPLES OF LOCATION OF DECOUPLING STOCKS

DESIGN	SUPPLY	MANUFG.	ASSEMBLY	DISTRIB.	SALES
-Construction -Consultancy	-Airplanes -Big machinery	-Luxury cars -Customised banking services	-PCs -Fast food outlets	-Normal cars -Online retail -Consumption credits	-Shop retailing. -Travel packages (Tour operator)

- The decision of where to locate the decoupling stocks along the supply chain is profound in strategic contents. Its location will define which parts of the chain will work against stock (push mode) and which work in pull mode, against an order.

- ☞ *Upstream*: the company can produce against stock or demand forecasts. Being this part of the chain decoupled from demand fluctuations, it can be planned and operate more efficiently with batches (A paella with 50 rations in a menu restaurant)

- ☞ *Downstream*: working against an order. Production processes have to be more flexible (even producing one unit of product). We lose the cost efficiency of the batch system, but we produce to fulfill real orders (A well-done steak in a fine restaurant).



## 4.4 Purchasing management

- When trying to respond to the question of what and how should firms purchase, we must consider from a concept standpoint two main features:
  1. Define the **purchasing model** the firm will use
  2. The **externalisation of parts of the value chain** (*make or buy*). Highly strategic decisions that impact in the value chain.

# PURCHASING MODEL

- The **purchasing model** of a company is the addition of:
  - Strategies and policies
  - Processes and procedures
  - The organisational structure to perform the purchasing
- This model gets operationalised (not always in an explicit way) in a **purchasing function**, that brings together the processes and people that execute the purchasing.

oThe purchasing model should cover following items:

1. **Strategic-tactical level:** *purchasing policies and supplier management models:*
  1. Typologies of products depending on how we'll buy them.
  2. Typologies of suppliers and which relationship are we going to develop.
2. **Operative level:** processes and execution of purchasing (tactical aspects)
3. **Organisational level:** how the purchasing function will be organised

# PURCHASING POLICY: PRODUCT TYPOLOGY AND SUPPLIER MANAGEMENT

## 'Operative' classification of goods and services

	<b>DIRECT</b> (part of the finished good or service)	<b>INDIRECT</b>
PRODUCTS	<ul style="list-style-type: none"> <li>- Raw materials</li> <li>- Product components</li> <li>- Subassemblies</li> <li>- Availability: of utmost importance, lack of product stops production.</li> <li>- The group of products that gets most attention.</li> <li>- Purchases of these products are the sole responsibility of purchasing dpt., that coordinates with product department.</li> <li>- Firm spend in these products around 75-80% of overall purchasing budget.</li> </ul>	<ul style="list-style-type: none"> <li>- Maintenance, repairs, and operations (MRO) related to production.</li> <li>- Also, purchases related to support activities (sales, marketing, finances, HR)</li> <li>- These tend to be cheaper than the direct products.</li> <li>- Purchases area overlooked by the purchasing dpt., and performed by consuming dpt.</li> <li>- About 20-25% of the total purchasing budget.</li> </ul>

# PURCHASING POLICY: PRODUCT TYPOLOGY AND SUPPLIER MANAGEMENT

## 'Operative' classification of goods and services

	<b>DIRECT</b> ( part of the finished good or service)	<b>INDIRECT</b>
SERVICES	<ul style="list-style-type: none"> <li>- <b>Purchases of services</b> tend to be less structured than products. Often delegated to the incumbent dept.</li> <li>- Outsourcing pressure always present: many services are externalised this way.</li> <li>- <b>Direct services:</b> part of the finished service (e.g. customer hotlines).</li> <li>- <b>Indirect services</b> are required for the smooth functioning of the company (cleaning, security)</li> </ul> <p>Purchasing budget of service firms is around 20-40% of the revenue (for an industrial company, the figure is 50-80%)</p>	
CAPITAL EXPENDITURE (CAPEX)	<ul style="list-style-type: none"> <li>- Many firms behave differently when it comes to buying capital goods (machinery, fixed assets,...)</li> <li>- These purchases occur from time to time, and are expensive. They are normally made by the purchasing department with close cooperation of the incumbent department. And, often, close supervision from general management</li> </ul>	

# PURCHASING POLICY: PRODUCT TYPOLOGY AND SUPPLIER MANAGEMENT

## 'Strategic' classification of goods and services: Kraljic's Matrix

		Supply risk	
		LOW	HIGH
IMPORTANCE OF THE PURCHASING	HIGH	<p><b>LEVERAGED PRODUCTS</b></p> <ul style="list-style-type: none"> <li>-High impact on profits</li> <li>-Low supply risk</li> <li>-Possible substitution</li> </ul> <p>→ <u>Look for competitive offers</u></p>	<p><b>STRATEGIC PRODUCTS</b></p> <ul style="list-style-type: none"> <li>-Critical for cost of product.</li> <li>-Dependence on supplier</li> </ul> <p>→ <u>Partnership agreement or internalisation</u></p>
	LOW	<p><b>NON-CRITICAL PRODUCTS</b></p> <ul style="list-style-type: none"> <li>-Low impact on profits</li> <li>-Plentiful offer in market</li> </ul> <p>→ <u>Transactional cost: optimise overall process cost</u></p>	<p><b>BOTTLE-NECK PRODUCTS</b></p> <ul style="list-style-type: none"> <li>-Monopolistic markets</li> <li>-High entry barriers</li> </ul> <p>→ <u>Secure supply and look for alternatives</u></p>

# PURCHASING POLICY: PRODUCT TYPOLOGY AND SUPPLIER MANAGEMENT

Execise: Classify strategically the following products according to Kraljic's matrix.

## **For a car-making firm:**

- Complete door modules for cars.
- Office supplies.
- Transport of finished cars to the port depot.
- Electricity supply.

## **For a city hotel:**

- Purchases of bedroom furniture.
- Purchases of 'good' wine.
- Electricity and gas supply.
- Listing of hotel in reservation networks.
- Laundry services.

## Models in relationship with suppliers

KEY OBJECTIVES	MAIN ITEMS TO DEVELOP	TYPE OF RELATIONSHIP (FOCUS)	TIME FRAME
REDUCE PURCHASE PRICE	<ul style="list-style-type: none"> <li>• Savings in spot prices</li> <li>• Auctions</li> <li>• Pressure over margins</li> </ul>	<ul style="list-style-type: none"> <li>• Transactional</li> <li>• Many suppliers</li> </ul>	<ul style="list-style-type: none"> <li>• Short term</li> <li>• Each new order, a new scenario</li> </ul>
REDUCE TOTAL PURCHASE COSTS	<ul style="list-style-type: none"> <li>• Take advantage of supplier economies of scale</li> <li>• Reduce transactional costs</li> <li>• Location with low labour costs</li> </ul>	<ul style="list-style-type: none"> <li>• Competitive pressure</li> <li>• A preferred supplier, others as alternatives.</li> </ul>	<ul style="list-style-type: none"> <li>• Medium-term contracts (preferred), and spot orders to alternative ones</li> </ul>
REDUCE RISKS, INCREASE ADDED VALUE	<ul style="list-style-type: none"> <li>• Share planning information</li> <li>• Joint work teams</li> <li>• Share insights (know-how,...)</li> </ul>	<ul style="list-style-type: none"> <li>• One or several suppliers</li> <li>• Partners (on a tactical level)</li> </ul>	<ul style="list-style-type: none"> <li>• Long-term contracts (1 to 3 years)</li> </ul>
GENERATE COMPETITIVE ADVANTAGE, DIFFERENTIATE	<ul style="list-style-type: none"> <li>• Joint brand</li> <li>• Joint capex, cost visibility</li> <li>• Joint development of technology</li> <li>• Joint access to customers</li> </ul>	<ul style="list-style-type: none"> <li>• Strategic alliances</li> <li>• A sole supplier (or a joint venture)</li> </ul>	<ul style="list-style-type: none"> <li>• Framework agreements (3-5 years)</li> </ul>



## A word or two about suppliers

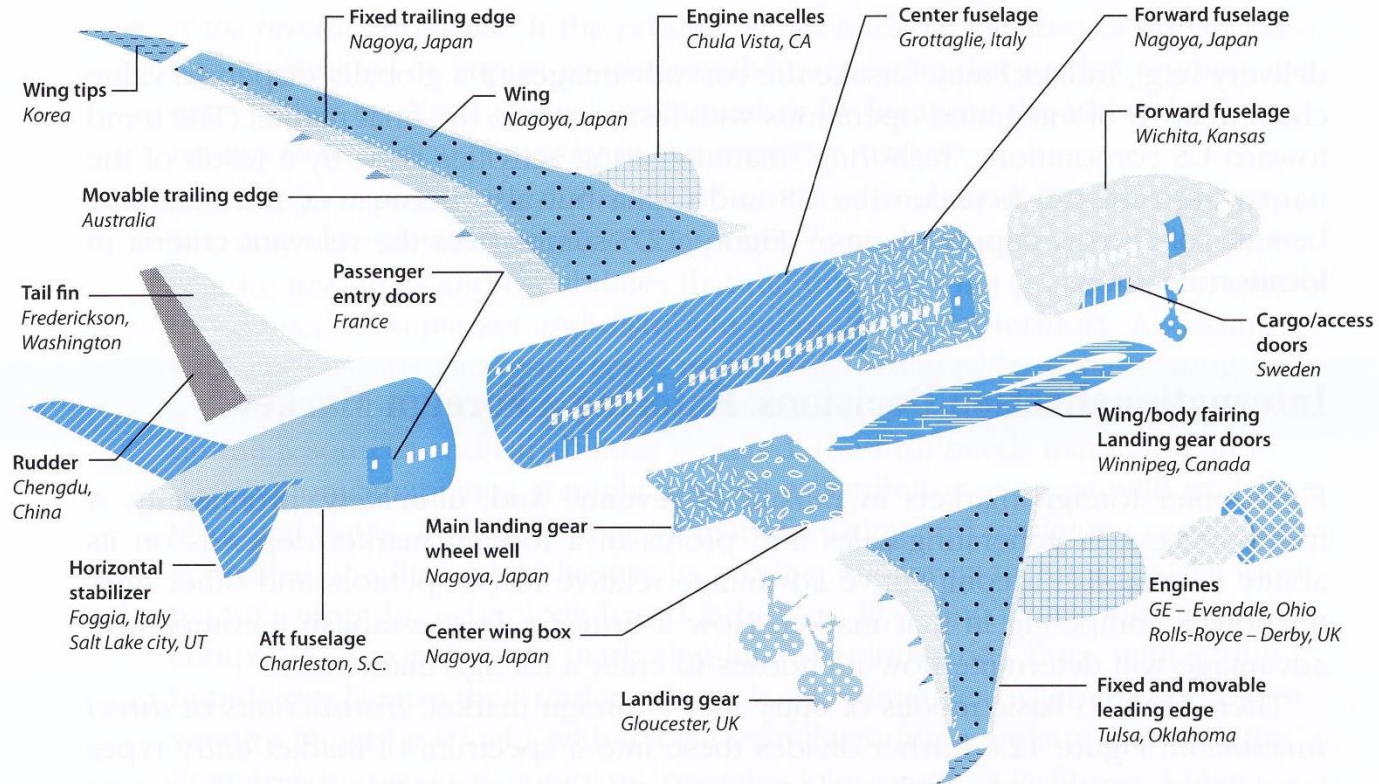
Where does the iPhone 4 come from?

Item	Supplier	Location
Design and operating system	Apple	US
Flash memory	Samsung Electronics	S. Korea
DRAM memory	Samsung Electronics	S. Korea
	Micron Technology	US
Application processor	Murata	Japan/Taiwan
Baseband	Infineon	Taiwan
	Skyworks	US
	TriQuint	
Power management	Dialog Semiconductor	Taiwan
Audio	Texas Instruments	US
Touchscreen control	Cirrus Logic	US
Accel and gyroscope	STMicroelectronics	Italy
E-compass	AKM Semiconductor	Japan
Assembly	Foxconn	China

**Source:** "Slicing an Apple," *Economist* (August 10, 2011), <http://www.economist.com/node/21525685>.

# A word or two about suppliers

## INTERNATIONAL DECISIONS: LOCATING PRODUCTION Boeing 787 Dreamliner



U.S.	Canada	Australia	Asia	Europe
Boeing	Boeing	Boeing	Kawasaki	Messier-Dowty
Spirit	Messier-Dowty		Mitsubishi	Rolls-Royce
Vought			Fuji	Latecoere
GE			KAL-ASD	Alenia
Goodrich			Chengdu Aircraft Industrial	Saab

## 4.5 Facilities location

- ☑ One of the most important long-term decisions a firm makes.
- ☑ Increasingly global in nature
- ☑ Significant impact on fixed and variable costs
- ☑ Decisions made relatively infrequently
- ☑ The objective is to maximise the benefit of location to the firm

# Location and costs

- ☑ Location decisions based on low cost require careful consideration
- ☑ Once in place, location-related costs are fixed in place and difficult to reduce
- ☑ Determining optimal facility location is important

# Location and innovation

- ✓ Cost is not always the most important aspect of a strategic decision
- ✓ Four key attributes when strategy is based on innovation
  - ✓ High-quality and specialised inputs
  - ✓ An environment that encourages investment and local rivalry
  - ✓ A sophisticated local market
  - ✓ Local presence of related and supporting industries

# Location decisions

## *Country decision*



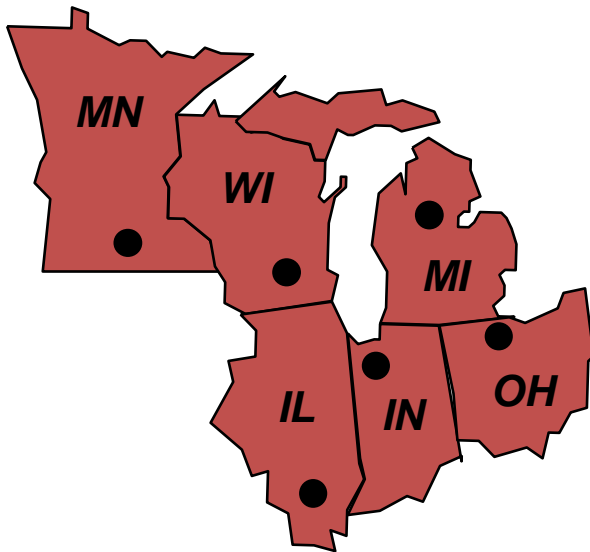
## *Critical success factors*

- 1. Political risks, government regulations, attitudes, incentives***
- 2. Cultural and economic issues***
- 3. Location of markets***
- 4. Labour talent, attitudes, productivity, costs***
- 5. Availability of supplies, communications, energy***
- 6. Exchange rates and currency risks***



# Location decisions

## *Region/ community decision*

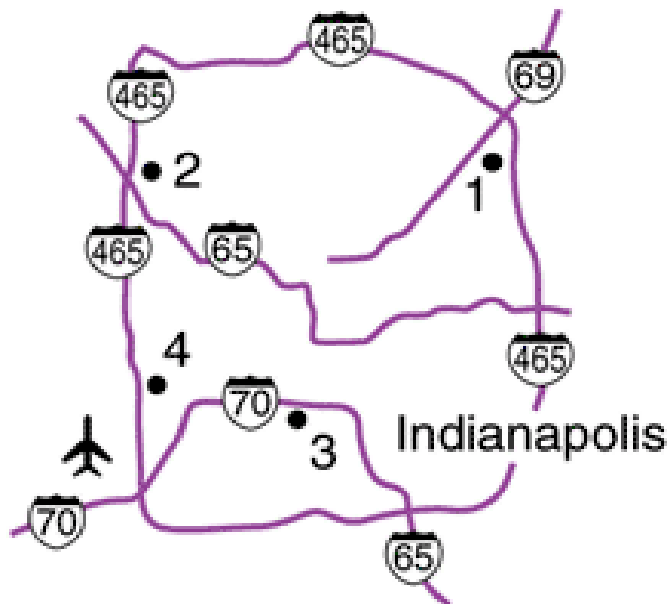


## *Critical success factors*

- 1. Corporate desires*
- 2. Attractiveness of region*
- 3. Labour availability, costs, attitudes towards unions*
- 4. Costs and availability of utilities*
- 5. Environmental regulations*
- 6. Government incentives and fiscal policies*
- 7. Proximity to raw materials and customers*
- 8. Land/construction costs*

# Location decisions

## *Site decision*



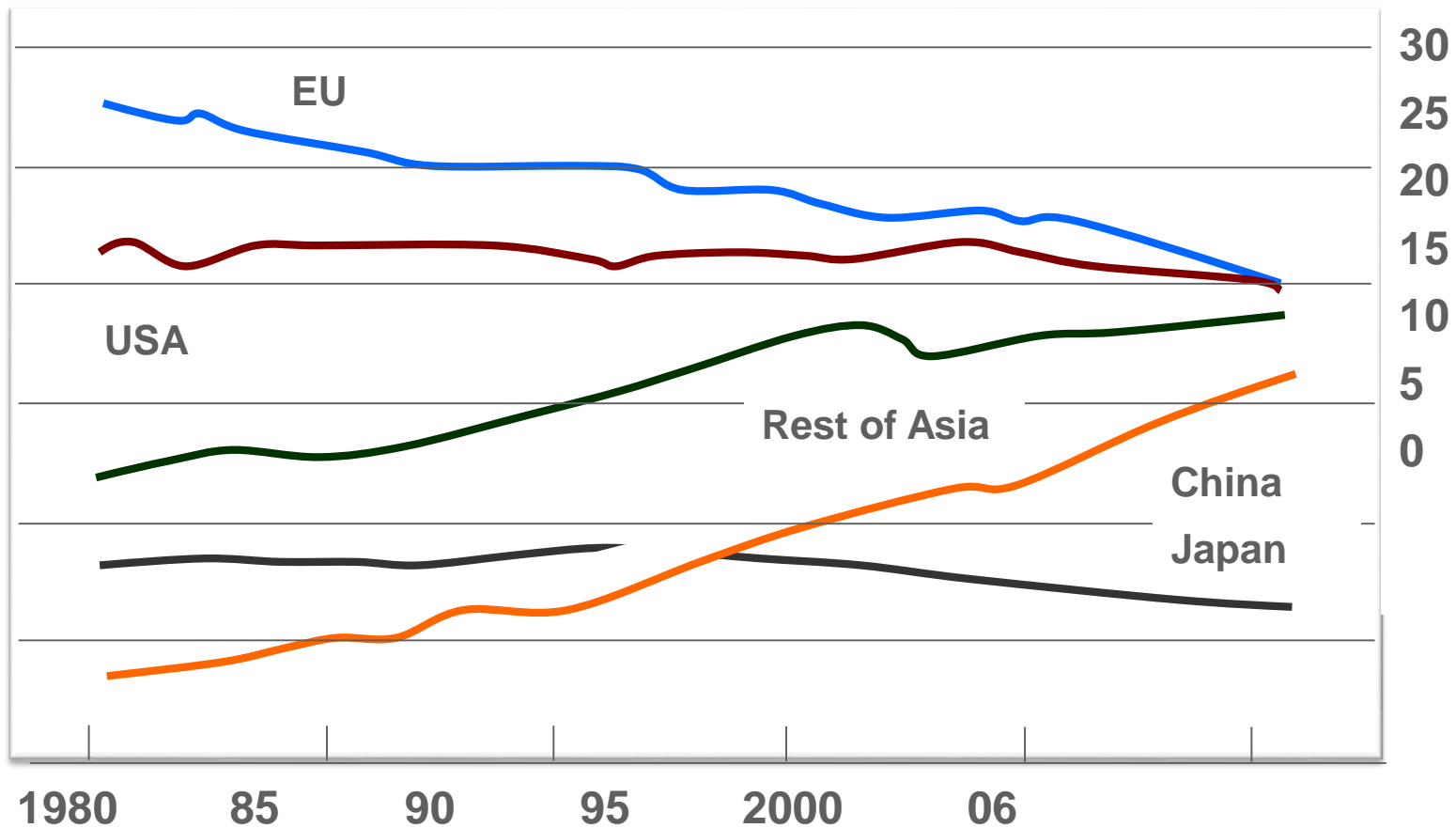
## *Critical success factors*

- 1. Site size and cost**
- 2. Air, rail, highway, and waterway systems**
- 3. Land zoning restrictions**
- 4. Proximity of services/ supplies needed**
- 5. Environmental impact issues**



# Location decisions and globalisation

Participation in the World National Product %



# Location decisions and globalisation



# Location decisions and globalisation

## OM in Action

### Trunki Cases Roll Back to the United Kingdom

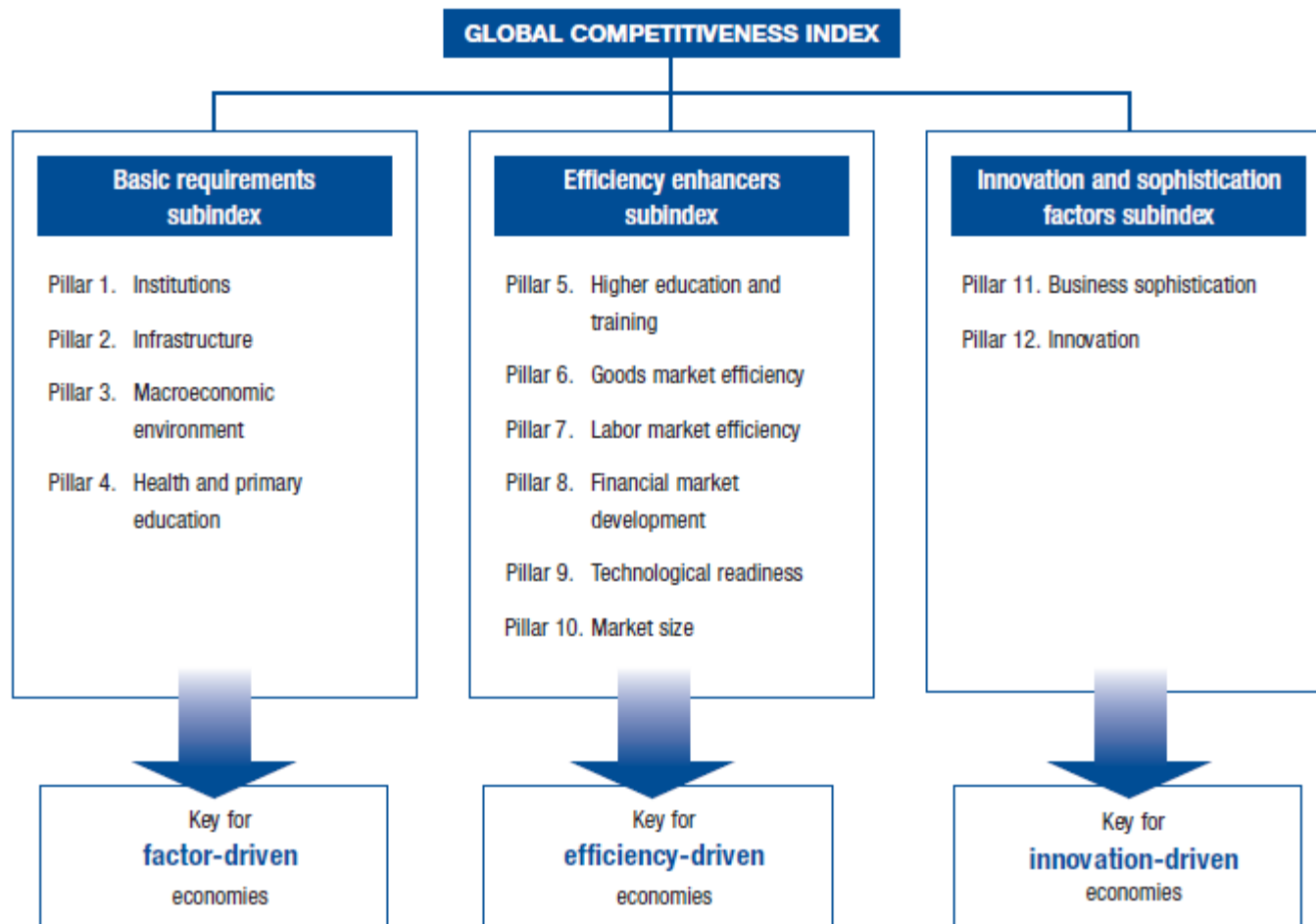
Like many other manufacturers, Trunki is following the new reshoring trend. The British manufacturer produces children's ride-on suitcases and is now rolling its operations from China back to Devon in the United Kingdom. While this move may be more costly initially, Trunki will see a number of benefits.

While the cost of production in China is less and the original reason why Trunki produced its products in China, prices are constantly rising due to inflation, labor, and currency appreciation. Other businesses are also reshoring, according to the CEO of the flooring business Amtico, which has recently ceased its operations in China. The manufacturing costs in China are increasing by 8% to 10% every year because wages are also increasing and the renminbi is appreciating.

Trunki's manufacturing in the United Kingdom will benefit the business, lead times will be reduced from 120 days to only 30, and there has been a promise of NOOS (never out of stock) by the factory. Not only will there be a significant cost saving on freight and logistics, the carbon footprint of Trunki's products will be significantly reduced due to the reduction in sea and road miles as well as a much more environmentally friendly factory than the coal-powered ones in China.

*Sources: Bristol Business News (March 20, 2012, and May 10, 2012); BBC News (March 19, 2012); and Department for Business Innovation & Skills (2012).*

# Growth competitiveness index of countries



# The Global Competitiveness Index 4.0 2018 Rankings

Covering 140 economies, the Global Competitiveness Index 4.0 measures national competitiveness—defined as the set of institutions, policies and factors that determine the level of productivity.

Rank	Economy	Score1	Diff. from 20172	
			Rank	Score
1	United States	85.6	—	+0.8
2	Singapore	83.5	—	+0.5
3	Germany	82.8	—	+0.2
4	Switzerland	82.6	—	+0.2
5	Japan	82.5	+3	+0.9
6	Netherlands	82.4	-1	+0.2
7	Hong Kong SAR	82.3	—	+0.3
8	United Kingdom	82.0	-2	-0.1
9	Sweden	81.7	—	+0.1
10	Denmark	80.6	+1	+0.7
11	Finland	80.3	+1	+0.5
12	Canada	79.9	-2	-0.1
13	Taiwan, China	79.3	—	+0.1
14	Australia	78.9	+1	+0.7
15	Korea, Rep.	78.8	+2	+0.8
16	Norway	78.2	-2	-0.8
17	France	78.0	+1	+0.6
18	New Zealand	77.5	-2	-0.6
19	Luxembourg	76.6	+3	+0.6
20	Israel	76.6	—	+0.4
21	Belgium	76.6	-2	—
22	Austria	76.3	-1	+0.2
23	Ireland	75.7	—	-0.3
24	Iceland	74.5	—	-0.1
25	Malaysia	74.4	+1	+1.1
26	Spain	74.2	-1	+0.4

27	United Arab Emirates	73.4	—	+1.1
28	China	72.8	—	+0.9
29	Czech Republic	71.2	—	+0.3
30	Qatar	71.0	+2	+0.6
31	Italy	70.8	—	+0.3
32	Estonia	70.8	-2	—
33	Chile	70.3	+1	+0.9
34	Portugal	70.2	-1	+0.5
35	Slovenia	69.6	—	+1.1
36	Malta	68.8	—	+0.3
37	Poland	68.2	—	+0.2
38	Thailand	67.5	+2	+1.3
39	Saudi Arabia	67.5	+2	+1.6
40	Lithuania	67.1	-2	+0.7
41	Slovak Republic	66.8	-2	+0.6
42	Latvia	66.2	—	+1.4
43	Russian Federation	65.6	+2	+1.7
44	Cyprus	65.6	-1	+0.9
45	Indonesia	64.9	+2	+1.4
46	Mexico	64.6	-2	+0.5
47	Oman	64.4	+14	+3.4

# Factors that affect location decisions

- ✓ **Labour productivity**
  - ✓ **Wage rates are not the only cost**
  - ✓ **Lower production may increase total cost**

$$\frac{\text{Labour cost per day}}{\text{Production (units per day)}} = \text{Cost per unit}$$

**Connecticut**

$$\frac{\$70}{60 \text{ units}} = \$1.17 \text{ per unit}$$

**Juarez**

$$\frac{\$25}{20 \text{ units}} = \$1.25 \text{ per unit}$$

# Factors that affect location decisions

- ☑ Exchange rates and currency risks
  - ☑ Can have a significant impact on cost structure
  - ☑ Rates change over time
  
- ☑ Costs
  - ☑ Tangible - easily measured costs such as utilities, labour, materials, taxes
  - ☑ Intangible - less easy to quantify and include education, public transportation, community, quality-of-life



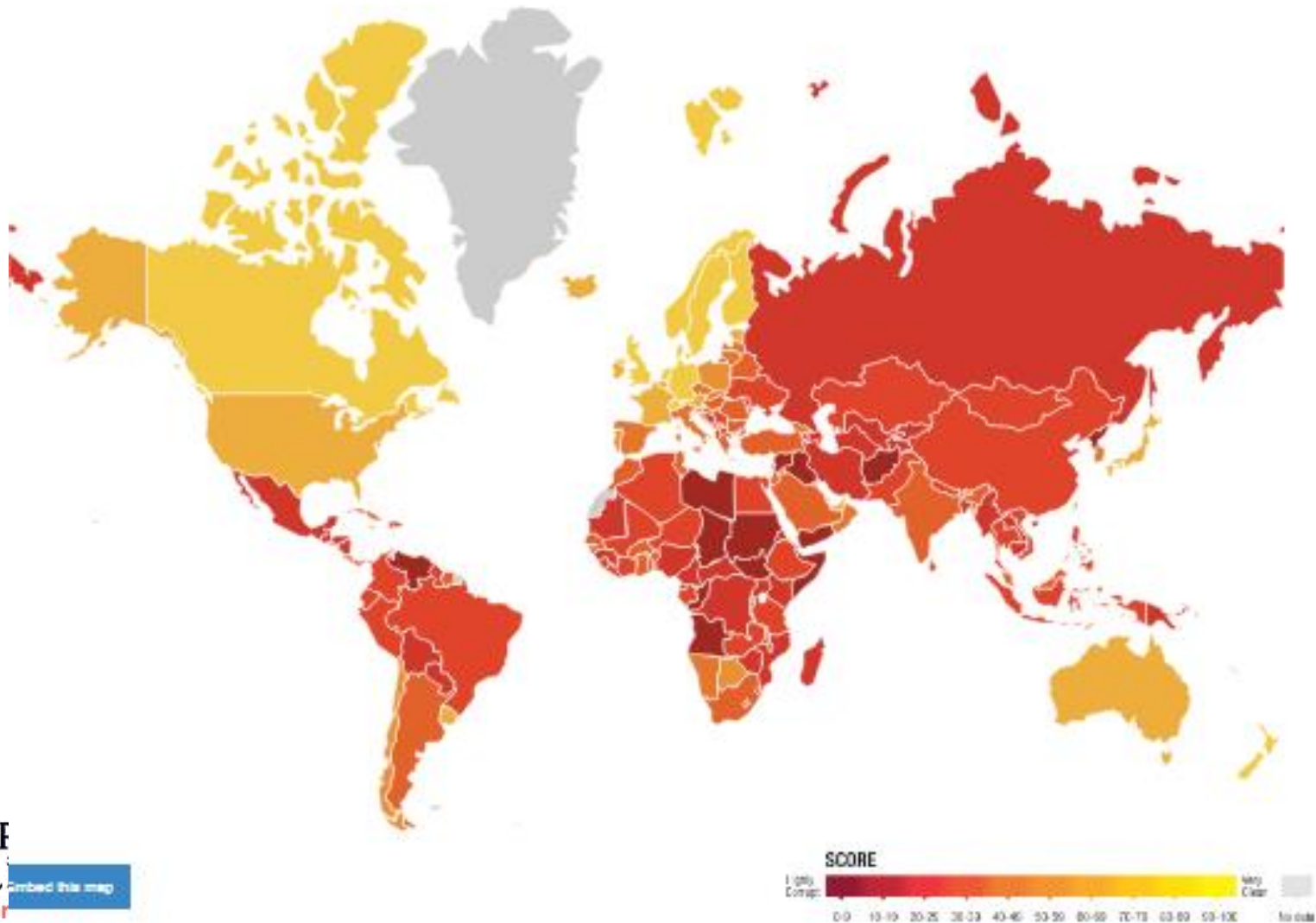
# Factors that affect location decisions

- ☑ Political risk, values, and culture
  - ☑ National, state, local governments attitudes toward private and intellectual property, pollution
  - ☑ Worker attitudes towards turnover, unions, absenteeism
  - ☑ Globally cultures have different attitudes towards punctuality, legal, and ethical issues



# Ranking corruption

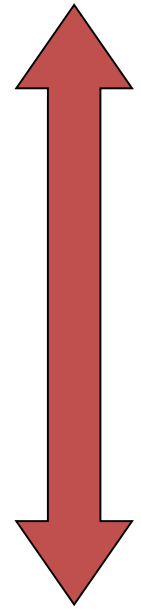
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# Ranking corruption

#	COUNTRY	REGION	2018	2017	2016	2015
1	Denmark	Western Europe & European Union	88	88	90	91
2	New Zealand	Asia Pacific	87	89	90	91
3	Finland	Western Europe & European Union	85	85	89	90
3	Singapore	Asia Pacific	85	84	84	85
5	Sweden	Western Europe & European Union	85	84	88	89
6	Switzerland	Western Europe & European Union	85	85	86	86
7	Norway	Western Europe & European Union	84	85	85	88
8	Netherlands	Western Europe & European Union	82	82	83	84
9	Canada	Americas	81	82	82	83
9	Luxembourg	Western Europe & European Union	81	82	81	85
11	Germany	Western Europe & European Union	80	81	81	81
165	Angola	Sub-Saharan Africa	19	19	18	15
165	Chad	Sub-Saharan Africa	19	20	20	22
165	Congo	Sub-Saharan Africa	19	21	20	23
168	Iraq	Middle East & North Africa	18	18	17	16
168	Venezuela	Americas	18	18	17	17
170	Burundi	Sub-Saharan Africa	17	22	20	21
170	Libya	Middle East & North Africa	17	17	14	16
172	Afghanistan	Asia Pacific	16	15	15	11
172	Equatorial Guinea	Sub-Saharan Africa	16	17	N/A	N/A
172	Guinea Bissau	Sub-Saharan Africa	16	17	16	17
172	Sudan	Sub-Saharan Africa	16	16	14	12
176	Korea, North	Asia Pacific	14	17	12	8
176	Yemen	Middle East & North Africa	14	16	14	18
178	South Sudan	Sub-Saharan Africa	13	12	11	15
178	Syria	Middle East & North Africa	13	14	13	18
180	Somalia	Sub-Saharan Africa	10	9	10	8

**Least  
Corrupt**



**Most  
Corrupt**

# Factors that affect location decisions

- ☑ Proximity to markets
  - ☑ Very important to services
  - ☑ JIT systems or high transportation costs may make it important to manufacturers
  
- ☑ Proximity to suppliers
  - ☑ Perishable goods, high transportation costs, bulky products

# Factors that affect location decisions

- ☑ Proximity to competitors
  - ☑ Called clustering
  - ☑ Often driven by resources such as natural, information, capital, talent
  - ☑ Found in both manufacturing and service industries

# Clustering of companies

Industry	Locations	Reason for clustering
Wine making	Napa Valley (US) Bordeaux region (France)	Natural resources of land and climate
Software firms	Silicon Valley, Boston, Bangalore (India)	Talent resources of bright graduates in scientific/technical areas, venture capitalists nearby
Race car builders	Huntington/Northampton region (England)	Critical mass of talent and information

# Factor-rating method

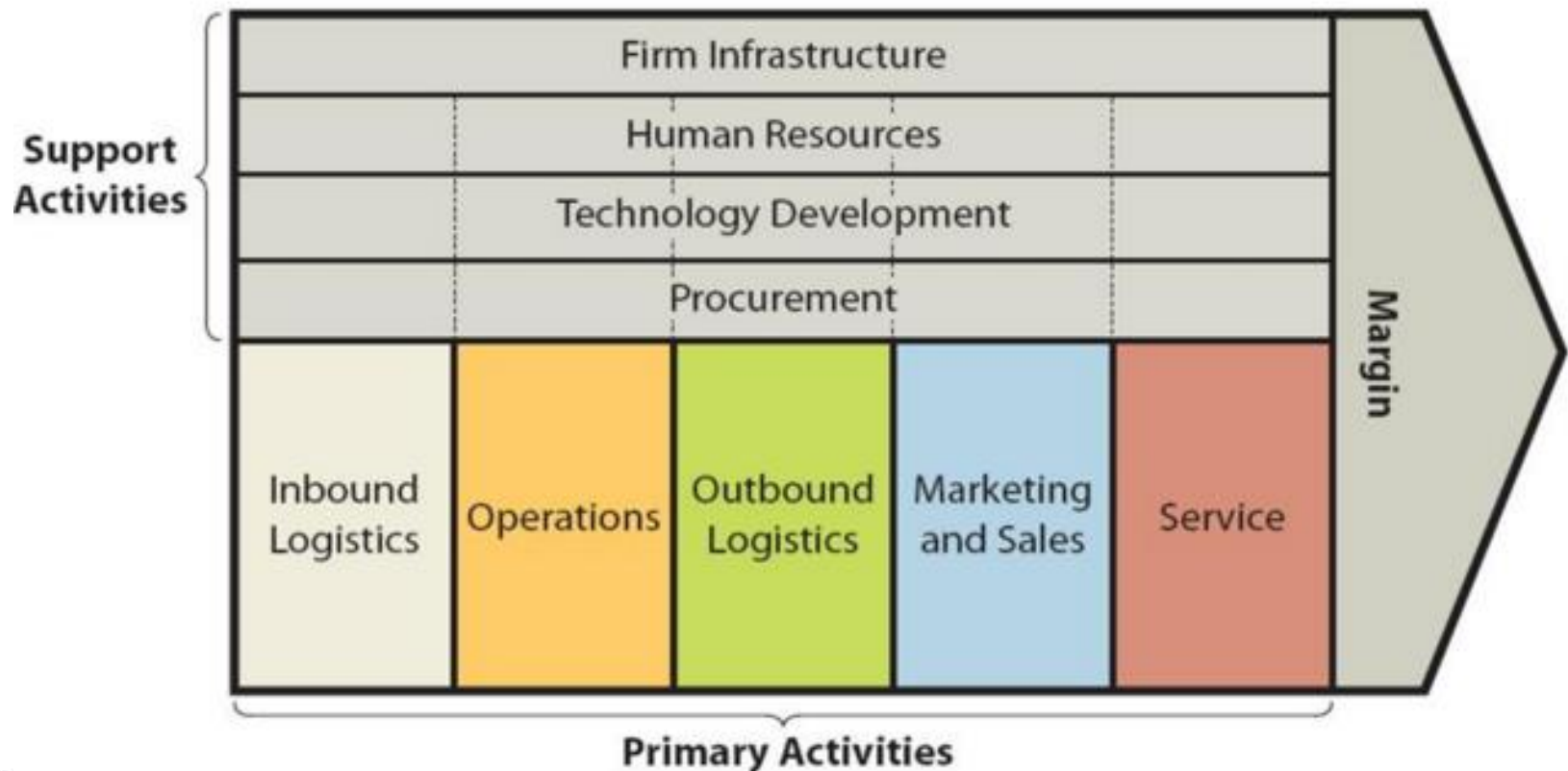
- ✓ Popular because a wide variety of factors can be included in the analysis.
- ✓ Six steps in the method:
  1. Develop a list of relevant factors called critical success factors
  2. Assign a weight to each factor
  3. Develop a scale for each factor
  4. Score each location for each factor
  5. Multiply score by weights for each factor for each location
  6. Recommend the location with highest point score

# Factor-rating example

<b>Critical Success Factor</b>	<b>Weight</b>	<b>Scores (out of 100)</b>		<b>Weighted Scores</b>	
		<b>France</b>	<b>Denmark</b>	<b>France</b>	<b>Denmark</b>
<b>Labor availability and attitude</b>	.25	70	60	$(.25)(70) = 17.5$	$(.25)(60) = 15.0$
<b>People-to-car ratio</b>	.05	50	60	$(.05)(50) = 2.5$	$(.05)(60) = 3.0$
<b>Per capita income</b>	.10	85	80	$(.10)(85) = 8.5$	$(.10)(80) = 8.0$
<b>Tax structure</b>	.39	75	70	$(.39)(75) = 29.3$	$(.39)(70) = 27.3$
<b>Education and health</b>	.21	60	70	$(.21)(60) = 12.6$	$(.21)(70) = 14.7$
<b>Totals</b>	<u>1.00</u>			<u>70.4</u>	<u>68.0</u>

## INTERNATIONAL DECISIONS: LOCATING PRODUCTION

Location and the value chain : different countries offer advantages along the value chain





## INTERNATIONAL DECISIONS: LOCATING PRODUCTION

Location and value chain: comparative advantages along the value chain for knitted apparel

	Raw cotton	Spun cotton yarn	Knitted fabric	Knitted apparel
US	+0.68	+0.85	+0.03	-0.89
Germany	-1.00	-0.18	+0.30	-0.18
Korea	-1.00	-0.28	+0.94	-0.34
China	-0.99	-0.54	+0.70	+0.97
Bangladesh	-0.98	-0.95	-0.96	+0.98

**Note:** A country's revealed comparative advantage in particular product is measured as  $(\text{exports} - \text{imports}) / (\text{exports} + \text{imports})$ . The scale ranges from -1 to +1.

**Source:** International Trade Commission.

## INTERNATIONAL DECISIONS: LOCATING PRODUCTION

- Decisions are not only taken on a cost-basis.
- For some technologically advanced products, location of sophisticated know-how is also determinant of location:
  - Design of chips in some parts of China and Taiwan
  - IT industry in India
- Also, cost of coordination of dispersed value chain activities should be taken into account.
- For example, Inditex (Zara) favours production near its headquarters in Spain, Portugal and Morocco: their competitive advantage lies in speed and delivery, not cost advantages.

# INTERNATIONAL DECISIONS: LOCATING PRODUCTION

## IT IS IMPORTANT TO MODEL ALL THE ELEMENTS OF BOTH LCC SAVINGS AND ADDITIONAL COSTS

Modeled Economics for a Typical Industrial Product Sourced from an LCC

