

Supply Chain Management

CB2201 – Operations Management

Lecture 10

Executive summary

The goal of today's lecture is to answer the following questions:

1. What business activities should you perform in-house, and which should you obtain from suppliers?
2. What is the right supply chain design for your product?

Outline

1. *Sourcing and supply management*

A. *Insourcing vs outsourcing*

B. *Supply chain risk*

2. *The right supply chain for your product*

A. *Physically efficient vs market-responsive*

B. *Mass customization*



Assembled by Foxconn in China

Why doesn't Apple assemble iPhones? 🤔

“Jack of all trades and master of none”

“Jack of all trades, master of none” is a figure of speech used in reference to a person who has dabbled in many skills, rather than gaining expertise by focusing on one.



Apple performs certain activities in-house

A company's **core competencies** are the combination of multiple resources and skills that distinguish a firm in the marketplace

Apple's core competencies

- Integration of hardware and software design
- Chip design
- Delivering a superior retail experience



Apple relies on numerous suppliers

	The iSight 8MP camera has the all the markings of this Japanese company.
 	Both Japanese companies supply the identical retina displays of the 5s and 5c iPhones, overtaking LG of Korea as the leading supplier.
 	These Taiwanese companies supply components that go into NXP's fingerprint sensor assembly.
	Taiwanese company is a major supplier of RF module manufacturers Avago and RF Micro Devices.
	Japanese company that is a major Apple supplier of inductor coils
	This Japanese company is Apple's primary supplier of flash memory
	Primary iPhone assembler was also tapped to supply the main chassis for iPhone 5s.
	Singapore-based Hi-P, together with Green Point – Taiwan-based subsidiary of US company Jabil – supply the plastic chassis for the iPhone 5c.

Questions that a firm needs to answer...

1. Should we perform this activity by ourselves, or rely on a supplier?
2. How should we mitigate our supply chain risks?
3. What type of relationship should we have with our suppliers?

Outline

1. Sourcing and supply management
 - A. *Insourcing vs outsourcing*
 - B. Supply chain risk
2. The right supply chain for your product
 - A. Physically efficient vs market-responsive
 - B. Mass customization

Do it yourself, or rely on others?

- **Insourcing** is performing a business activity in-house
- **Outsourcing** is relying on an external supplier
 - *Example* Owning a car (insourcing) vs hailing a taxi/Uber (outsourcing)
- The **make or buy decision** considers insourcing or outsourcing the production of parts and components
- **Offshoring** is moving work from one country to another
 - *Example* Dell customer service center in India to serve American clients

The pros and cons of outsourcing

- + Can be cheaper due to the supplier's economies of scale
- + Requires less capital investment
- + Flexibility to scale capacity up or down
- It is risky to depend on a supplier for a key product/service
- Reduction in control and ability to differentiate product/service



The factors that drive outsourcing

A company is more likely to outsource a business activity if:

- It is not consistent with the company's current business focus
- It is not exclusive to the company
- The company does not have expertise in that area
- Other companies can perform that activity better

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Important supplier: don't let me down

There is a risk that your supplier will let your company down



Example: Nokia, Ericsson and Philips

- Nokia and Ericsson were two of the largest cell phone manufacturers in the year 2000
- Key component: radio frequency chips made at a Philips semiconductor factory in Albuquerque
- Then lightning struck...



Example: Nokia, Ericsson and Philips

Nokia

Let's investigate the situation

Lock up alternative sources of chips

Nokia gained significant market share

Ericsson

Relax... Let the delay take its course

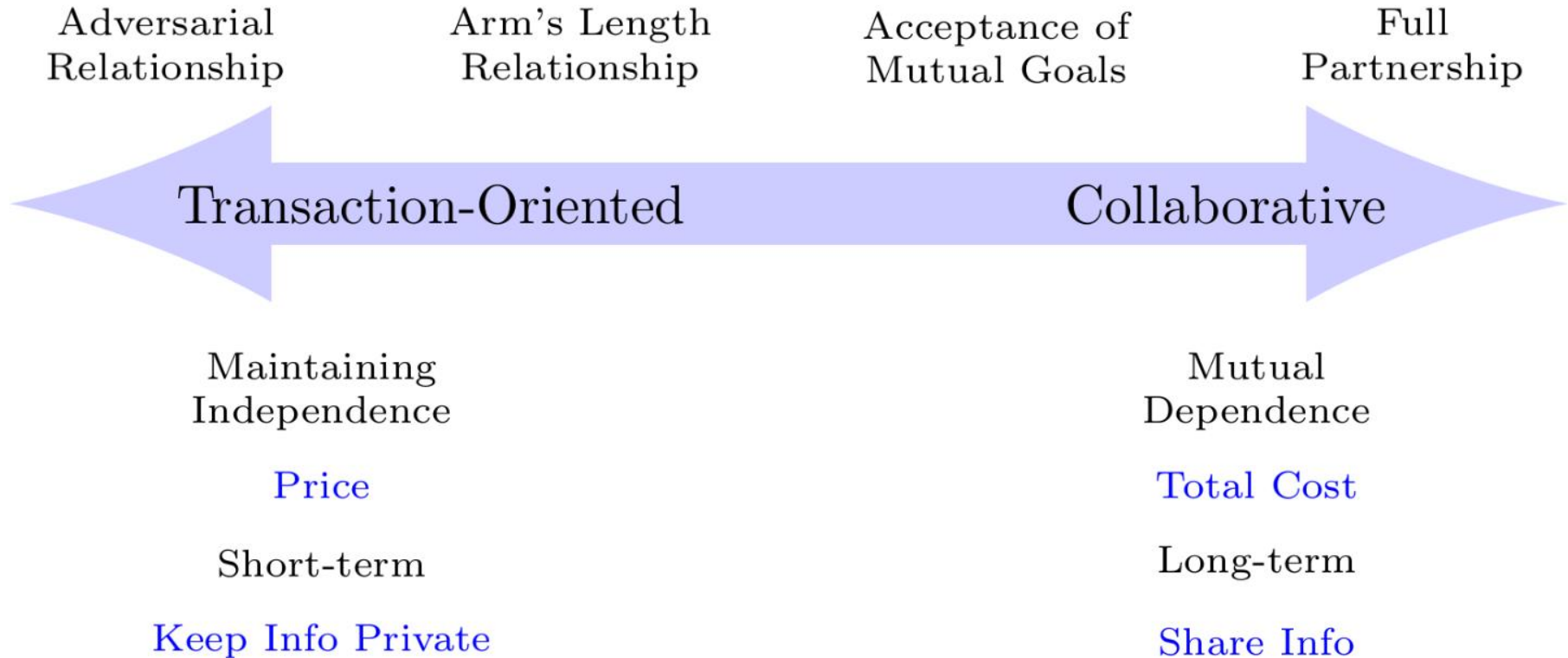
Philips is our one and only supplier

Ericsson lost USD 1.7 billion

Forced to merge with Sony



The spectrum of supplier relationships



Example: Tesla

- Tesla manufactures electric cars
- Should Tesla have a strong relationship with its battery supplier?
- Should Tesla have a strong relationship with its stationery supplier?



Example: US automakers vs Japanese automakers

Quotes from employees of automaker suppliers:

- The US automakers set cost-reduction targets. To realize those targets, they'll do anything. They've unleashed a reign of terror, and it just gets worse every year.
- Toyota helped us dramatically improve our production system. We started by making one component, and as we improved, Toyota rewarded us with orders for more components. Toyota is our best customer.



Address risks by building supply chain resilience

Supply chain resilience is the capability to resist and recover from supply chain disruptions

Ways to increase supply chain resilience:

- Holding higher inventory levels of critical materials
- Build a strategic partnership with your key suppliers
- Keep regular communication with and close monitoring of key suppliers
- Using more than one supplier for critical materials
- Requiring key suppliers to have geographically dispersed operations

Example: Emirates and Airbus

- Emirates invested heavily in the A380 (owns > 100, renovations to the airport)
- Due to poor sales of the A380, Airbus threatened to terminate the A380 program if Emirates did not order more aircraft
- *Result* Emirates agreed to buy 36 more A380s (list price: US\$16B)



Example: Panasonic and Tesla

Panasonic Corporation and Tesla Motors, Inc. have signed an agreement that lays out their cooperation on the construction of a large-scale battery manufacturing plant in the United States, known as the Gigafactory.

Tesla will prepare, provide and manage the land, buildings and utilities. Panasonic will manufacture and supply cylindrical lithium-ion cells and invest in the associated equipment, machinery, and other manufacturing tools...



Outline

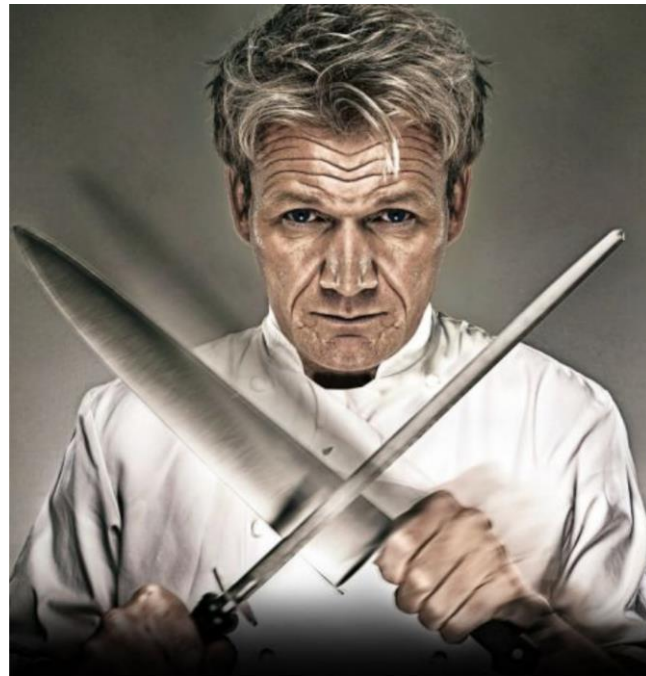
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Your career: jack of all trades or a master of one?



Domestic helper

Decent at cooking, cleaning, childcare, etc



Gordon Ramsay

World-class chef, swears a lot

Key Takeaway

You can't be best at everything...

But you don't need to be

Be excellent at something useful

Life is about tradeoffs

Which is the “best” car?



Lamborghini



Tesla Model S



Toyota Odyssey

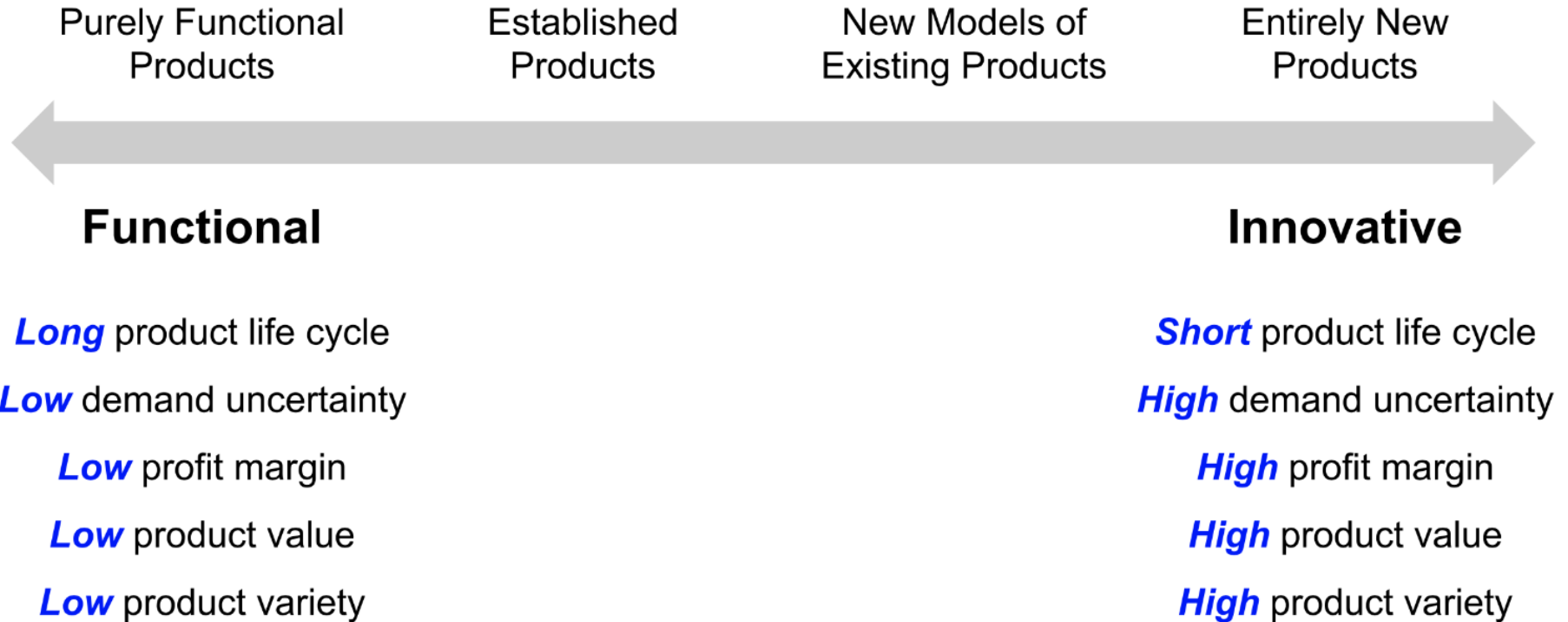


Key Takeaway

There is no “best” car for all purposes

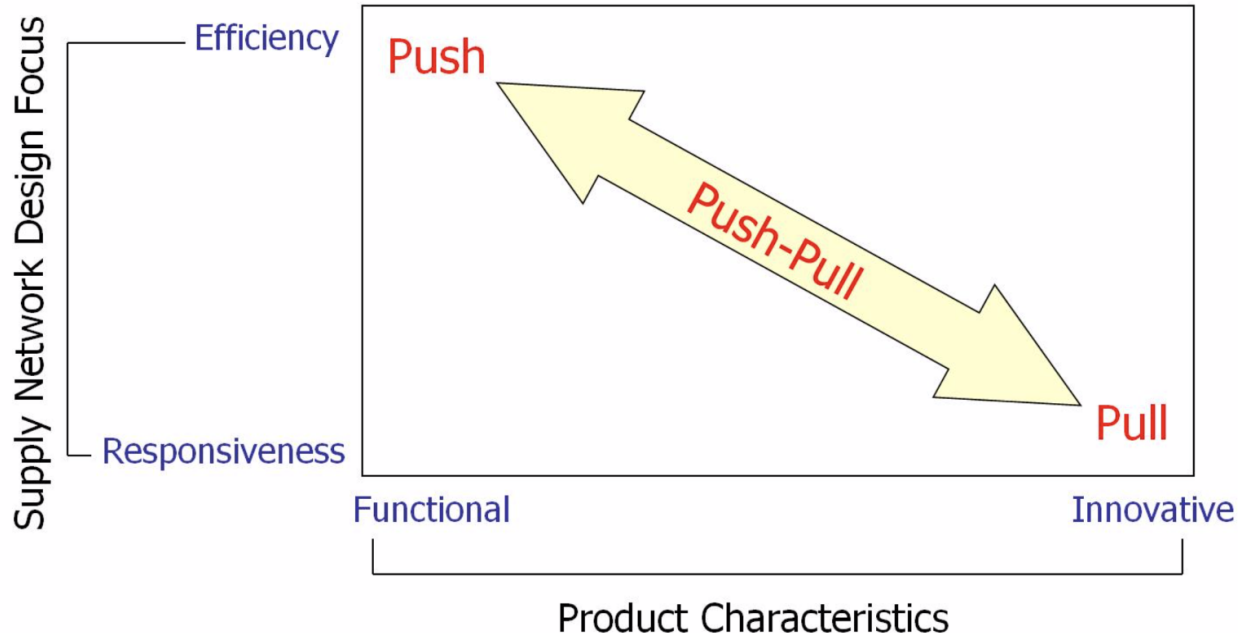
Find a suitable car for your situation

Is your product functional or innovative?



The right supply chain for your product

- A **physically efficient** supply chain is suitable for **functional** products
- A **market-responsive** supply chain is suitable for **innovative** products



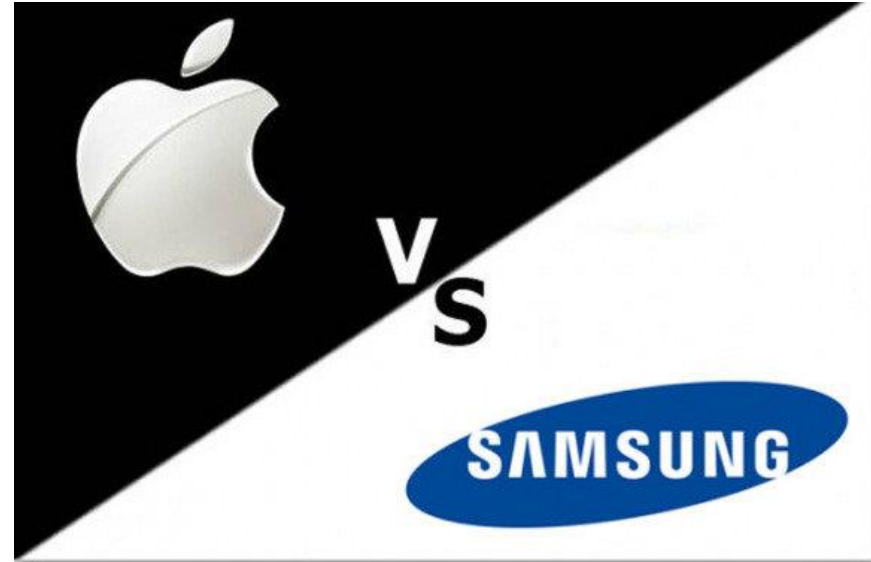
SKU proliferation causes problems for firms

SKU = stock keeping unit

In 2018:

- Apple released the iPhone XR, XS and XS Max
- Samsung released the Galaxy Note 9, Galaxy S9/S9+, A6 (India), J6, J8, J7, J3, J4, Galaxy S Lite Luxury (China), A9 Star and possibly more?

Which company will have more stockouts and/or higher inventory levels?



Delayed differentiation can mitigate SKU proliferation

Principle Making a **generic** product that is later **differentiated** into a specific end-product based on customers' needs

Problem Paint company offers 200 shades in 5 sizes = 1000 SKUs

Solution

- Store the components: white paint base with 3 basic color dyes
- Use a machine to perform mixing at the retail store

The push-pull boundary

In a **push** inventory control system, products are produced or inventory is ordered based on a **demand forecast**

In a **pull** inventory control system, products are produced or inventory is ordered based on **actual orders from customers**

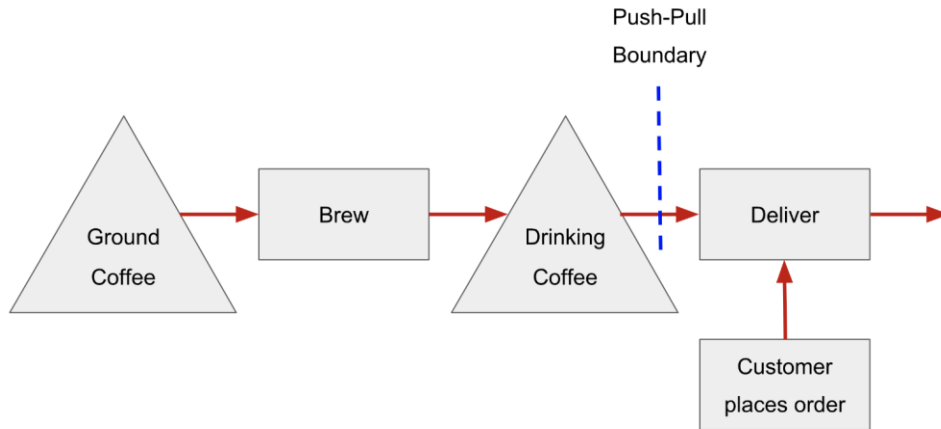
The **push-pull boundary** refers to the point where the supply chain where switches from push to pull

Example: Starbucks

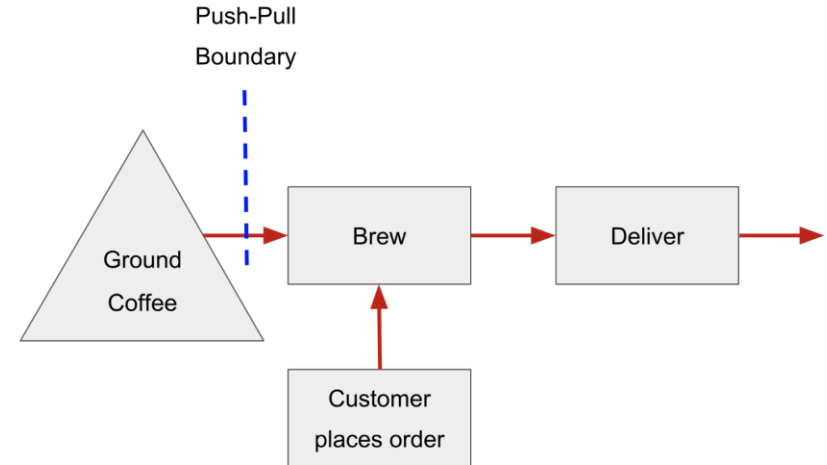
Push-pull boundary closer to customers
⇒ Shorter lead time and more waste

- Caffeine-free coffee (“decaf”) will be made-to-order only after noon
- It is wasteful to brew decaf regardless of demand
- This will add about four minutes to the wait time

Before Noon

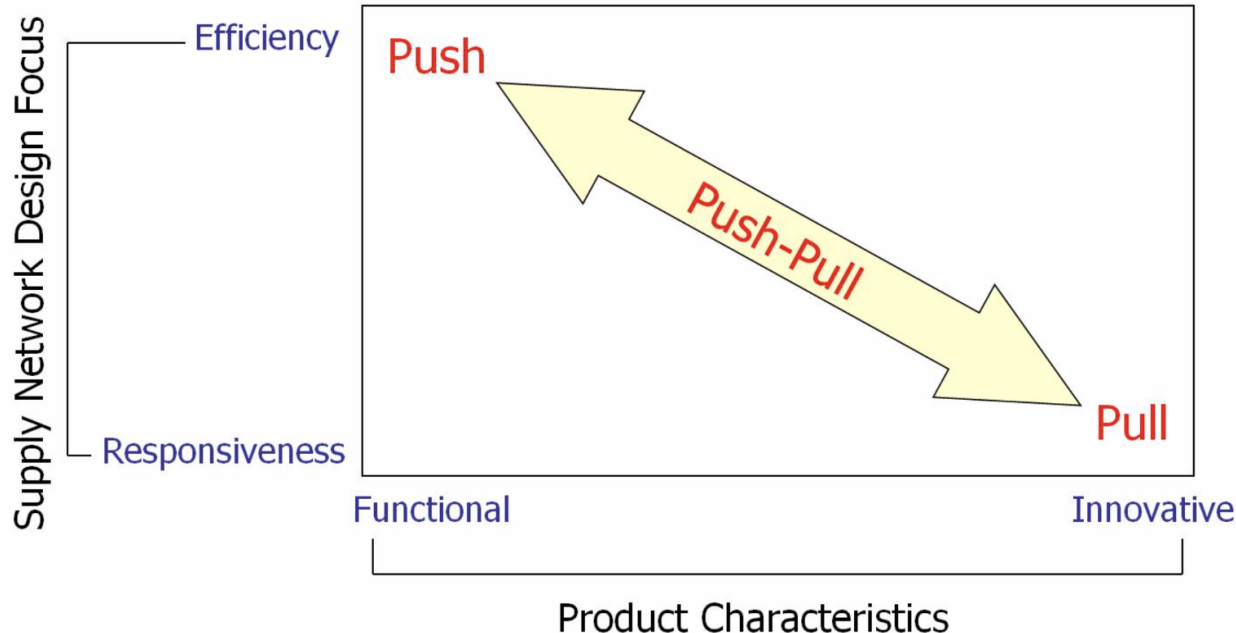


After Noon



The push-pull boundary

- The push-pull boundary determines the supply chain's efficiency and responsiveness
- Closer to customers \Rightarrow shorter lead times and more wasted inventory

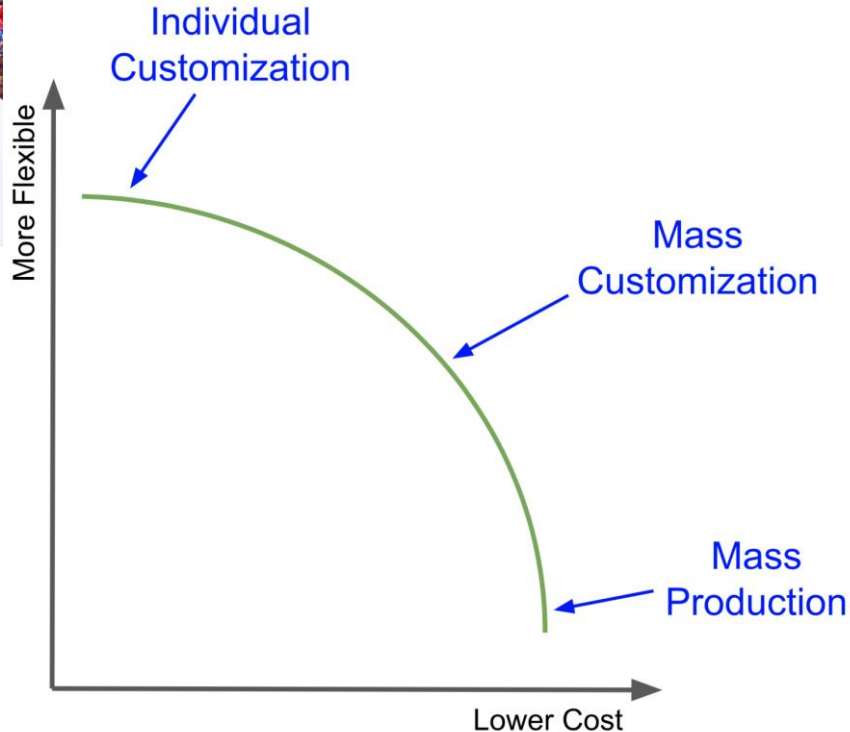


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Mass customization is a hybrid production strategy

Mass customization offers some level of flexibility at a reasonable price



Example: BMW Individual

Link to video: [BMW Individual. The expression of personality.](#)

What does BMW Individual offer to car buyers?

LINES

EXTERIOR


INTERIOR

PACKAGES

OPTIONS



ACCESSORIES

SUMMARY





EXTERIOR:



360°





INTERIOR:

360°







MY EXTERIOR



MY INTERIOR






ORDER NOW >

My 528i Sedan

2.0 liter BMW TwinPower Turbo inline 4-cylinder
Rear-wheel drive

[See all standard features](#)

BASE MSRP	\$50,200
Luxury Line	\$2,000
 Mediterranean Blue metallic	\$550
 Venetian Beige/Black Dakota Leather w/exclusive stitching	\$0
 Dark Red Sycamore Wood trim	\$1,080
Cold Weather Package	\$950
Lighting Package	\$1,900
Premium Package	\$2,600
Luxury Seating Package	\$2,400
ACC Stop & Go + Active Driving Assistant	\$1,900
Destination & Handling:	\$995

Total MSRP as Built \$64,575

GET A QUOTE >

ESTIMATE A PAYMENT >

Share This Build < Have a Build ID? GO

Example: National Bicycle (1980s)

National Bicycle manufactures bicycles in Japan

- Commuter bikes for regular people (functional products)
- Sports bikes for the affluent (innovative products)

Problems

1. National Bicycle faced stiff competition from Taiwanese and Korean manufacturers
2. Difficult to predict which models and **color patterns** would be popular



Example: National Bicycle (1980s)

National Bicycle adopted a **mass customization** strategy

- Installed fitting machines at retailers to measure customers for height and weight (similar to buying a tailored suit)
- Customers could choose from: 14 bike models, 18 sizes, 70 color patterns and various components
- Met a proposed 2-week delivery lead time 99.99% of the time

Result From 1987 (program launch) to 1991, increased market share of sports bicycle market from 5% to 29%

Example: National Bicycle

National Bicycle adopted an **assembly postponement** strategy

They moved the push-pull boundary further away from customers

- **High variability** in the demand for the > 2 million possible distinct configurations of finished bicycles
- **Low variability** in the demand for uncut tubes and components
(The 3rd law of forecasting: aggregate forecasts are more accurate)

Result Reduced unsold inventory and markdowns

Key takeaways

1. Focus on your valuable capabilities and outsource other activities
2. Manage your supplier relationships and supply chain risk
3. Understand where your product falls on the functional-innovative spectrum
4. To better match supply to demand, a firm can use mass customization, which is a type of delayed differentiation

United Colors of Benetton

United Colors of Benetton produces sweaters in bold, bright,



Two key operations:

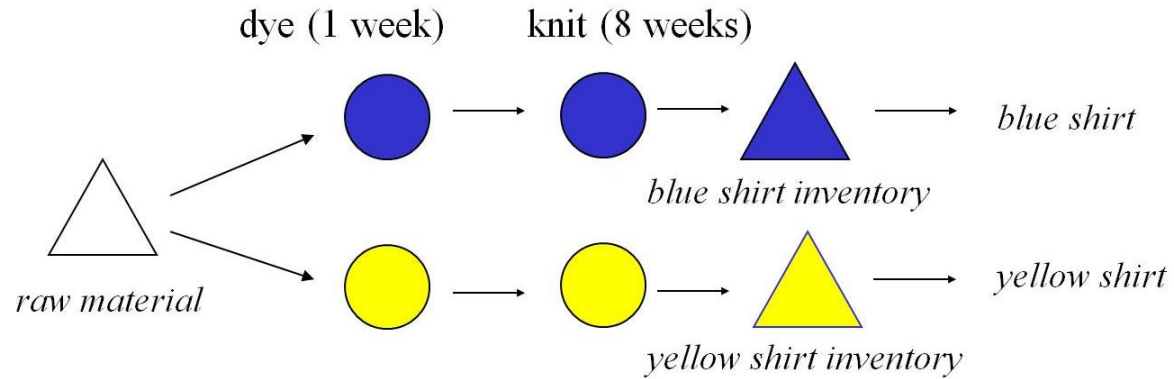
Knitting



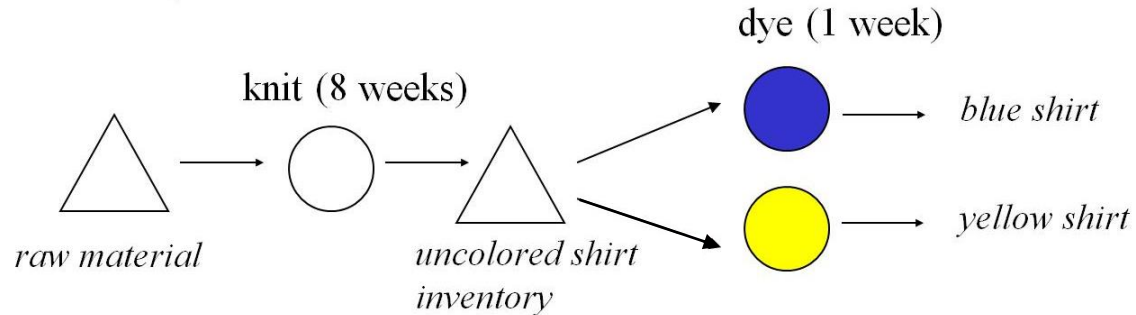
Dyeing



Old process



New process



Manufacturing postponement



Old manufacturing process

- Yarns dyed into various colors (1 week)
- Yarns knitted into finished garments (8 weeks)
- *Result* Significant unsold inventory which had to be marked down

New manufacturing process

- Yarns knitted into finished garments (8 weeks)
- Yarns dyed into various colors (1 week)
- *Result* Reduction in unsold inventory

See also this lecture's in-class exercise