

## Chapter 2 Process Strategy and Analysis

- Product/Service Design
- Process Structures
- Process Strategy Decisions
- Process Analysis and Improvement

### Product/Service Design 點子哪裡來？

#### Research and Development R&D

- Basic Research
- Applied Research
- Development



#### Reverse Engineering 逆向工程 服務業缺乏專利保護

Dismantling and inspecting a competitor's product to learn and to discover possible improvements.

#### Original Design Manufacturer ODM 設計代工

Strategy → **Product Design** → Process Design

## Product Standardization 單一標準規格

Advantages:

- Fewer parts to deal with in inventory and manufacturing
- Quality is more consistent
- Opportunities for long production runs and automation

Disadvantages

- ▣ Decreased variety results in less consumer appeal

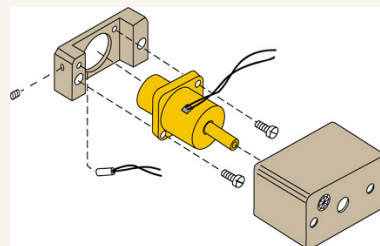


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## Value Analysis/Value Engineering

Examination of the function of parts and materials to reduce costs of order qualifiers and order winners

- Is the item necessary?
- Could another material be used instead?
- Can specifications be less stringent?
- Can two or more parts be combined?
- Can packaging be improved to save cost?



採購運用VA以降低採購成本  
研發運用VE以降低製造成本

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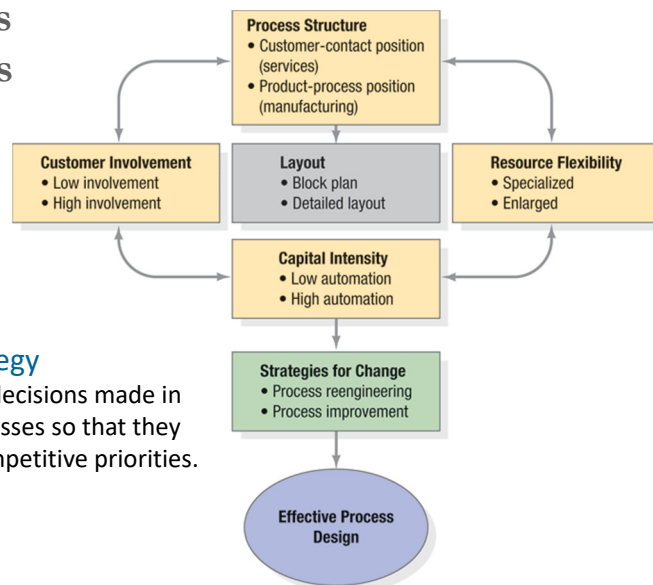
**Design For Assembly:** A form of standardization in which component parts are grouped into modules that are easily replaced or interchanged. 以模組化設計來解決客製化與成本的衝突



**Delayed differentiation postponement**  
 暫停於製造或服務的最後階段·依照客戶偏好完成



## I. Process Decisions



**Process Strategy**  
 The pattern of decisions made in managing processes so that they will achieve competitive priorities.

## 便當店服務流程規劃



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## Process Structure in Services

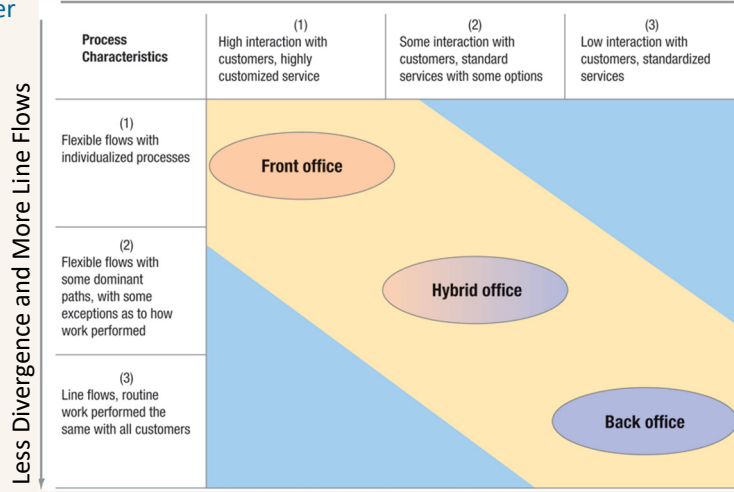
DIMENSIONS OF CUSTOMER CONTACT IN SERVICE PROCESSES		
Dimension	High Contact	Low Contact
Physical presence	Present	Absent
What is processed	People	Possessions or information
Contact intensity	Active, visible	Passive, out of sight
Personal attention	Personal	Impersonal
Method of delivery	Face-to-face	Regular mail or e-mail

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# Service Process Structuring

Customer Contact Matrix

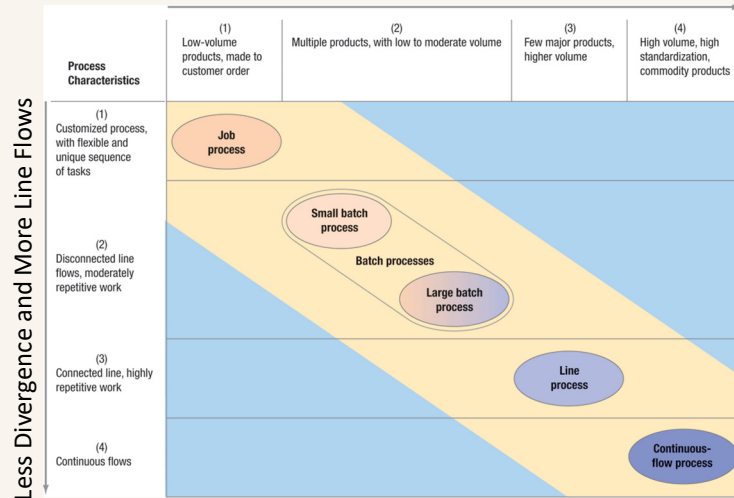
Less Contact and Customization



# Process Structure in Manufacturing

Product Process Matrix

Less Customization and More Volume



## Manufacturing Process Structuring

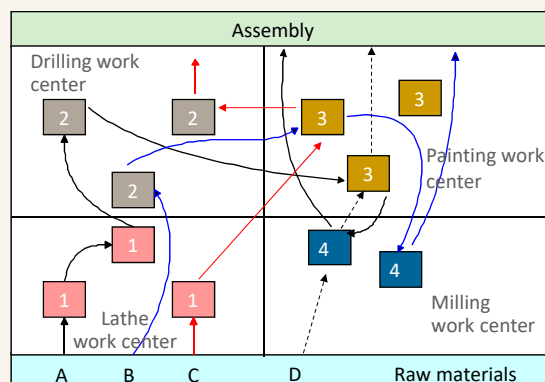
- Continuous flow process  
自動化連續製程：石化、飲料、網路連線
- Flow line, Assembly line (line process)  
大量組裝的流水線生產：汽車、家電、IC封裝
- Batch process  
批量生產：精密儀器、旅遊團、店家烘培
- Job shop (job process)  
零工生產，多樣少量：鐵工廠、百貨公司
- Project  
專案生產，one-of-a-kind：大型建築、電影製作



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## Job Shop

產品多樣少量，製造步驟因規格而異，沒有主要的順序，產品根據各自的製造需求到各站接受處理。



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## Batch Process

volume, variety, quantity  
Movie, Bakery



Setup/Changeover  
設備或人員從事不同類型  
工作所需的準備時間

## Continuous Flow

Standardized production and rigid flows



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Flow Line (repetitive): 規格相似產品依照既定順序與速度逐步完成組裝



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## Process Choice Affects Activity/Function

	Job Shop	Batch	Flow Line	Continuous	Project
Equipment	general	general	special	special	
Labor Skills	high	moderate	low	low	
Fixed Costs	low	moderate	high	high	very high
Variable Costs	high	moderate	low	very low	very high
Cost per unit	high	moderate	low	very low	very high
Scheduling	complex	complex	routine	routine	complex

自動洗車 vs. 專業汽車美容  
學校自助餐 vs. 快餐便當店

迴轉壽司 vs. 料理壽司  
婚紗攝影



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## Production and Inventory Strategies

	Make-to-Stock (Push)	Make-to-Order (Pull)
<b>Production mode</b>	事先生產以滿足預期的未來需求	客戶下單後，依照客戶要求生產(customization)
<b>Process characteristic</b>	標準化規格、大量生產 Line or continuous flow	規格多樣少量 Job or batch process
<b>Advantage</b>	快速交貨 可以庫存因應需求起伏	降低庫存壓力 顧客滿意度高、利潤高
<b>Challenge</b>	需求預測、庫存控管	準時交貨、保持品質穩定

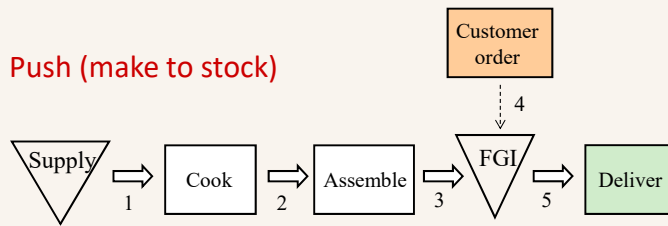
Design to Order, Built to Order, Configure to Order, Assemble to Order

**Mass Production vs. Mass Customization**

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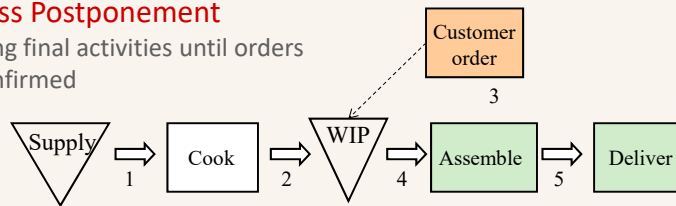


### Push (make to stock)



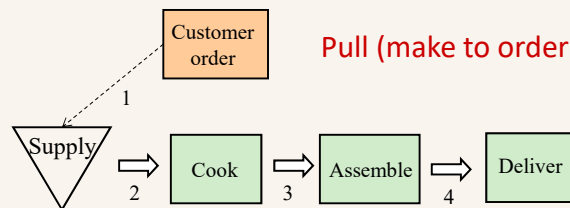
### Process Postponement

Delaying final activities until orders are confirmed

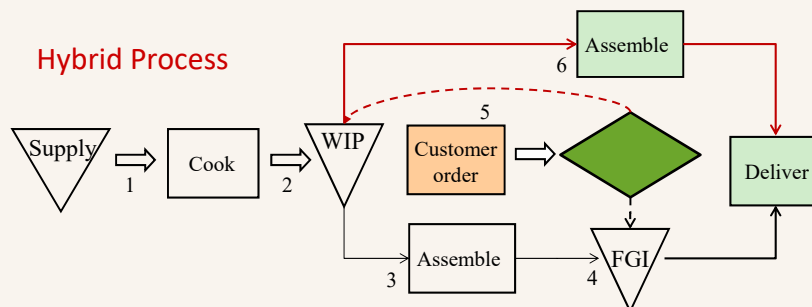


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### Pull (make to order)



### Hybrid Process



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## II. Process Strategy Decisions

- **Customer Involvement:** extent of customer participation
- **Resource Flexibility:** account for process (task) divergence and diverse process flows.
- **Capital Intensity:** cost of equipment relative to cost of labor

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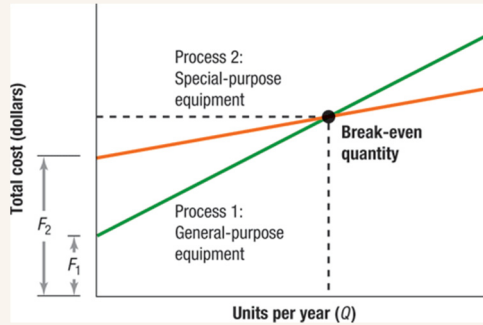
## Customer Involvement (service)

- |   |   |
|---|---|
| <ul style="list-style-type: none"><li>● <b>Possible Advantages</b><ul style="list-style-type: none"><li>■ Increased net value to the customer</li><li>■ Better quality, faster delivery, greater flexibility, and lower cost</li><li>■ Reduction in product, shipping, and inventory costs</li><li>■ Coordination across the supply chain</li></ul></li></ul> | <ul style="list-style-type: none"><li>● <b>Possible Disadvantages</b><ul style="list-style-type: none"><li>■ Can be disruptive</li><li>■ Managing timing and volume can be challenging</li><li>■ Quality measurement can be difficult</li><li>■ Requires interpersonal skills</li><li>■ Multiple locations may be necessary</li></ul></li></ul> |
|---|---|

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## Resource Flexibility

- Flexible Workforce
  - multiple skills (training and cost)
  - volume flexibility (part-time)
- Equipment
  - General-purpose vs. Special-purpose



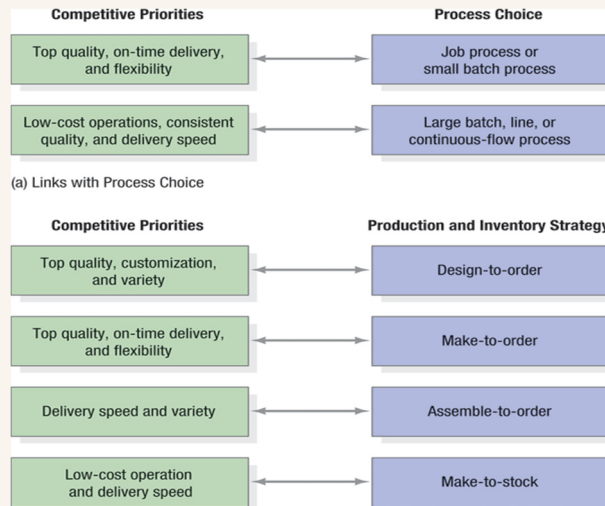
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## Capital Intensity

- Automating Manufacturing Processes
  - Good for large demands, stable product designs, and long product lifecycles
  - Large initial investment cost and relative inflexibility
- Automating Service Processes
  - Cost reduction and consistent quality.
  - Technology in the future will surely make possible even a greater degree of customization and variety

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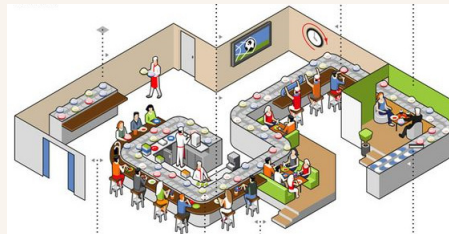
## Decision Patterns for Manufacturing Processes



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## III. Strategies for Changes

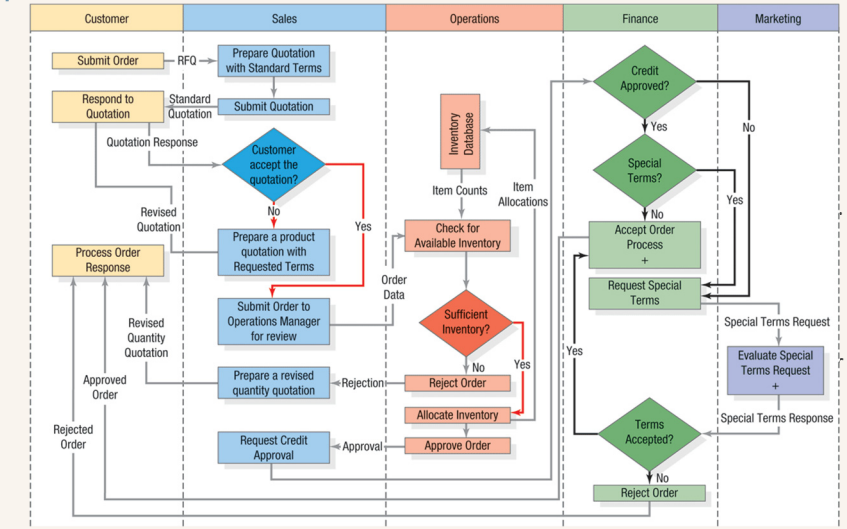
- **Process Reengineering:** The fundamental rethinking and radical redesign of processes to improve performance dramatically in terms of cost, quality, service, and speed



- **Process Analysis:** documentation & detailed understanding of how work is performed and how it can be redesigned.
  - Flowcharts, Work Measurement, Process Charts

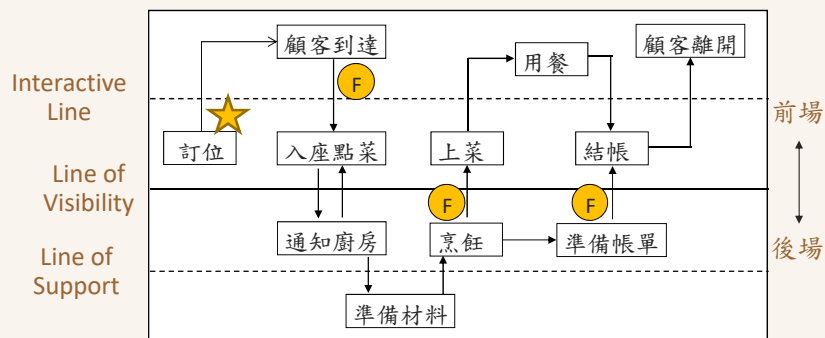
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## Swim Lane Flowchart (for low contact service)



## Service Blueprint

A special flowchart of a service process that shows which steps have high customer contact.



service encounter  $\Rightarrow$  moments of truth fail-safing = pokayokes

## Work Measurement

- Process documentation would not be complete without estimates of the average time each step in the process would take. 食譜
- Time estimates are needed not just for process improvement efforts, but for capacity planning, constraint management, performance appraisal, and scheduling.
- Time Study: A analyst use a stopwatch to record the time spent on each element for several repetitions. The analyst assigns a **performance rating** for each element to make adjust for normal effort.



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## Stopwatch Time Study

	Obs 1	Obs 2	Obs 3	Obs 4	Average Time	Performance Rating Factor	Normal Time
Element 1	2.60	2.34	3.12	2.86	<b>2.730</b>	100%	<b><u>2.730</u></b>
Element 2	4.94	4.78	5.10	4.68	<b>4.875</b>	110%	<b><u>5.363</u></b>
Element 3	2.18	1.98	2.13	2.25	<b>2.135</b>	90%	<b><u>1.922</u></b>

$$\bar{T}_1 \times RF_1 = NT_1 \quad (NT_1 + NT_2 + NT_3) \times (1 + \text{allowance}) = ST$$

The **allowance** is expressed as a percent of the total normal time.

Total Normal time = 10.015

Standard Time = 10.015 (1+0.18) = 11.82

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## Process Charts

- **Flowchart** – traces the flow of information, customers, equipment, or materials through various steps of a process
- **Process Charts** – documenting all the activities performed by a person or group, at a workstation, with a customer, or working with certain materials
  - Activities are typically organized into five categories
    - Operation, ●
    - Transportation, ➡
    - Inspection, ■
    - Delay, ◐
    - Storage, ▼

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## Process Chart for Emergency Room

Step No.	Time (min)	Distance (ft)	●	➡	■	◐	▼	Step Description
1	0.50	15.0						Enter emergency room, approach patient window
2	10.00							Sit down and fill out patient history
3	0.75	40.0						Nurse escorts patient to ER triage room
4	3.00							Nurse inspects injury
5	0.75	40.0						Return to waiting room
6	1.00							Wait for available bed
7	1.00	60.0						Go to ER bed
8	4.00							Wait for doctor
9	5.00							Doctor inspects injury and questions patient
10	2.00	200.0						Nurse takes patient to radiology
11	3.00							Technician x-rays patient
12	2.00	200.0						Return to bed in ER
13	3.00							Wait for doctor to return
14	2.00							Doctor provides diagnosis and advice
15	1.00	60.0						Return to emergency entrance area
16	4.00							Check out
17	2.00	180.0						Walk to pharmacy
18	4.00							Pick up prescription
19	1.00	20.0						Leave the building

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## Process Charts

Summary				
Activity		Number of Steps	Time (min)	Distance (ft)
Operation	●	5	23.00	
Transport	➔	9	11.00	815
Inspect	■	2	8.00	
Delay	▷	3	8.00	
Store	▼	—	—	

### For customer service...

$$\text{Annual labor cost (service cost)} = \left( \frac{\text{Time to perform the process in hours}}{\text{the process in hours}} \right) \times \left( \frac{\text{Variable costs}}{\text{per hour}} \right) \times \left( \frac{\text{Number of times process performed each year}}{\text{performed each year}} \right)$$

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## Redesigning & Managing Process Improvements

### Questioning and Brainstorming

1. *What* is being done?
2. *When* is it being done?
3. *Who* is doing it?
4. *Where* is it being done?
5. *How* is it being done?
6. *How well* does it do on the various metrics of importance?



### Benchmarking

- A systematic procedure that measures a firm's processes, services, and products against those of industry leaders

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