WS210META

Manufacturing Management

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Recap of Topic 6 – Inventory Planning

- The major advantage of inventory is that it **decouples** processes by acting as a **buffer**, allowing production to continue even when there is a problem upstream
- The disadvantages of inventory are the **holding costs**, **risks**, and **opportunity costs**
- Inventory planning tries to balance the costs and benefits of holding inventory
- The **Economic Order Quantity (EOQ)** is the order quantity that best balances the costs of placing orders with the cost of holding inventory
- The **Economic Manufacture Quantity (EMQ)** is the manufacturing batch size that best balances the costs of manufacturing with the cost of holding inventory
- In a **Fixed Order Quantity** inventory management system economic order quantity (Q) is ordered whenever inventory drops to reorder level, hence the reorder date varies.
- In a **Replenishments** inventory management system the reorder date is fixed and order quantity varies according to inventory level to fulfil the replenishment level
- **Pareto Analysis and ABC inventory classification** divides inventory into categories of A (5-20% of items incurring 50-70% of expenses), B (30-50% of items, 20-30% of expenses) and C (40-70% of items, 10-20% of expenses)

WS210

Manufacturing Management

Topic 8

Location Planning

Specific Learning Outcomes – Topic 8

- To be able to identify reasons for setting up a new facility or moving geographical location
- To be able to discuss issues determining the choice of geographical location
- To be able to describe and use some simple methods for choosing a new location

Brompton Bikes – New Facility (2015)

Brompton Bicycle Official Factory Opening with HRH Duke of Edinburgh

https://youtu.be/ve7lmTun1D0?si=vWyXLFfmkr7CwKaa

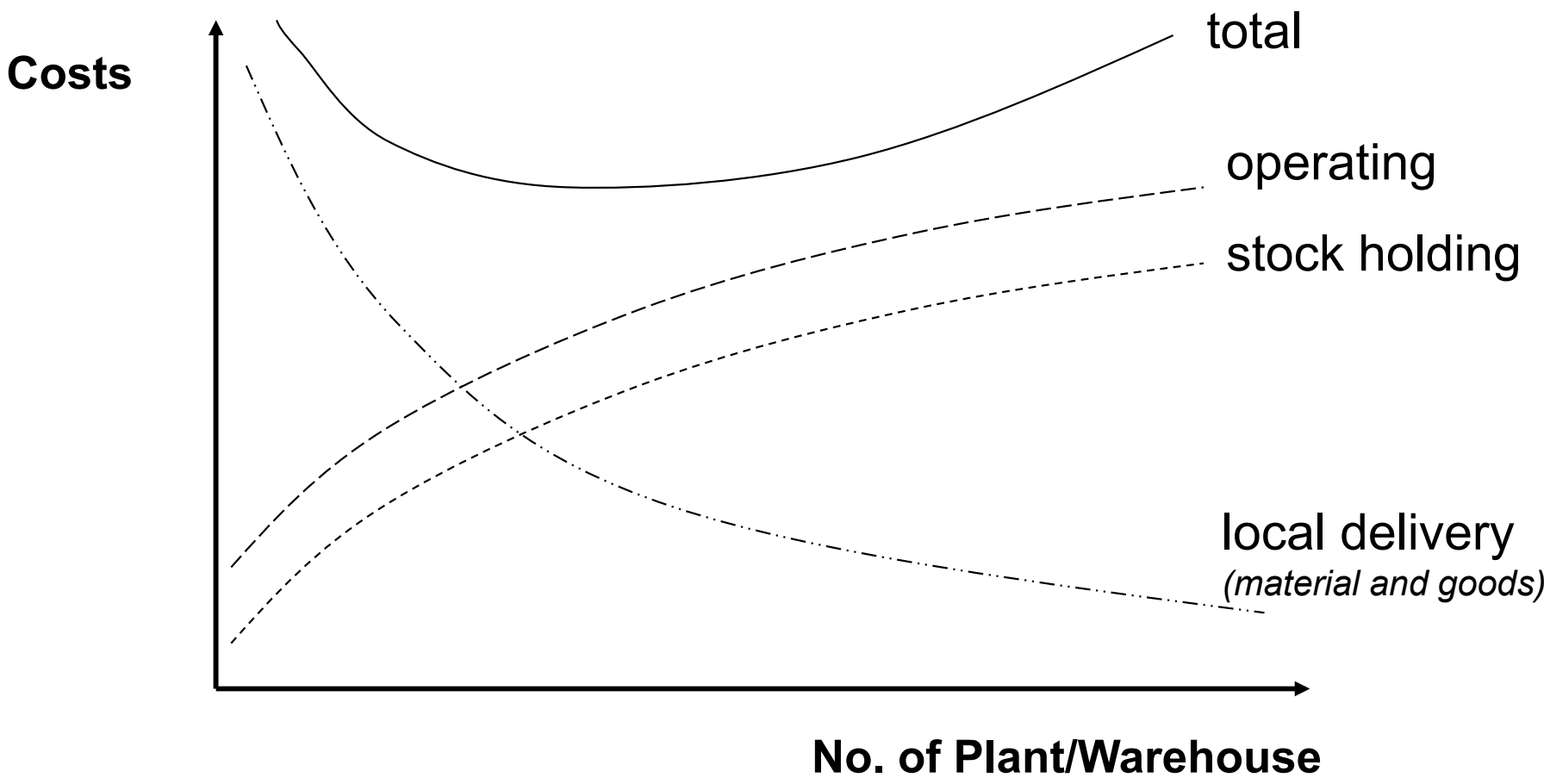
Location Planning

Find the best geographical location for an organisation’s activities.

Why a New Location?

- New plant
- New branch for existing plant
- Relocation of existing plant

Costs vs. Number of Plants/Warehouse



What Would You Consider When Choosing a Factory Location?

- Market
- Suppliers
- Personnel
- Transportation
- Local conditions and other factors

Location Planning Issues - 1

- **Nearness to Market**
  - Customers location
  - Service level provided
  - Economies of scale
  - Transportation Costs
- **Nearness to Raw Material**
  - Supplier location
  - Service level Required
  - Transportation Costs
- **Personnel**
  - Skills available
  - Labour costs
  - Quality of life (schools, parks, residential areas)
  - Trade union

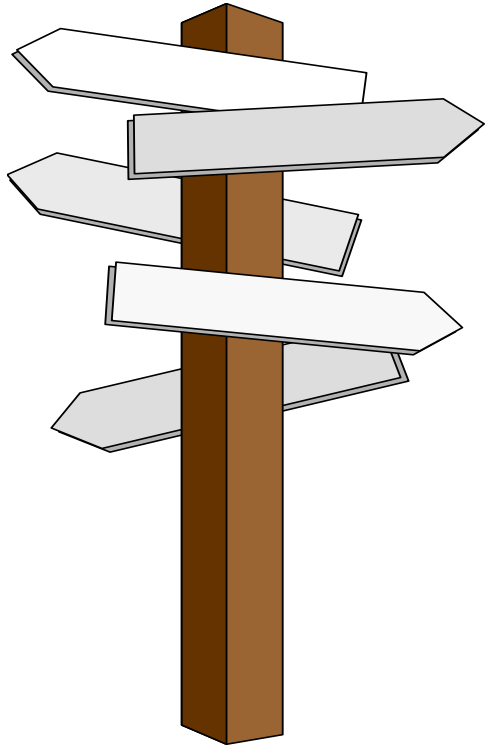
Location Planning Issues - 2

- **Transportation**
  - Proximity to good highways
  - Access to major airports
  - Location on an ocean port
- **Local Conditions**
  - Cost of land
  - Power and water supplies
  - Waste and drainage
  - Pollution control
  - Taxes and tariffs, incentives
- **Other factors**
  - Climate
  - Community administration and attitude
  - Nearness to existing facilities
  - Space for expansion

Location Planning

Typical methods/models used for location planning :-

- Scoring Model (Preference Matrix)
- Break-even Analysis
- Load-distance Model
- Centre of Gravity



Preference Matrix

- select factors and weight them
- score alternatives against factors
- total scores to indicate “best” alternative

		Locations			
FACTORS	**Max Points**	A	B	C	D
Nearness to raw material	200	150	100	150	50
Nearness to market	200	150	150	50	50
Labour supply	200	100	100	150	200
Transportation	100	100	50	50	50
Power and water supply	50	50	25	25	25
Waste disposal	100	100	50	50	50
Land and building costs	50	50	25	25	50
Taxes and laws	100	100	75	100	100
SCORE	1000	800	575	600	575

Break-Even Analysis

F = fixed cost

c = variable cost per unit sold

p = price charged per unit sold

Q = quantity produced AND sold

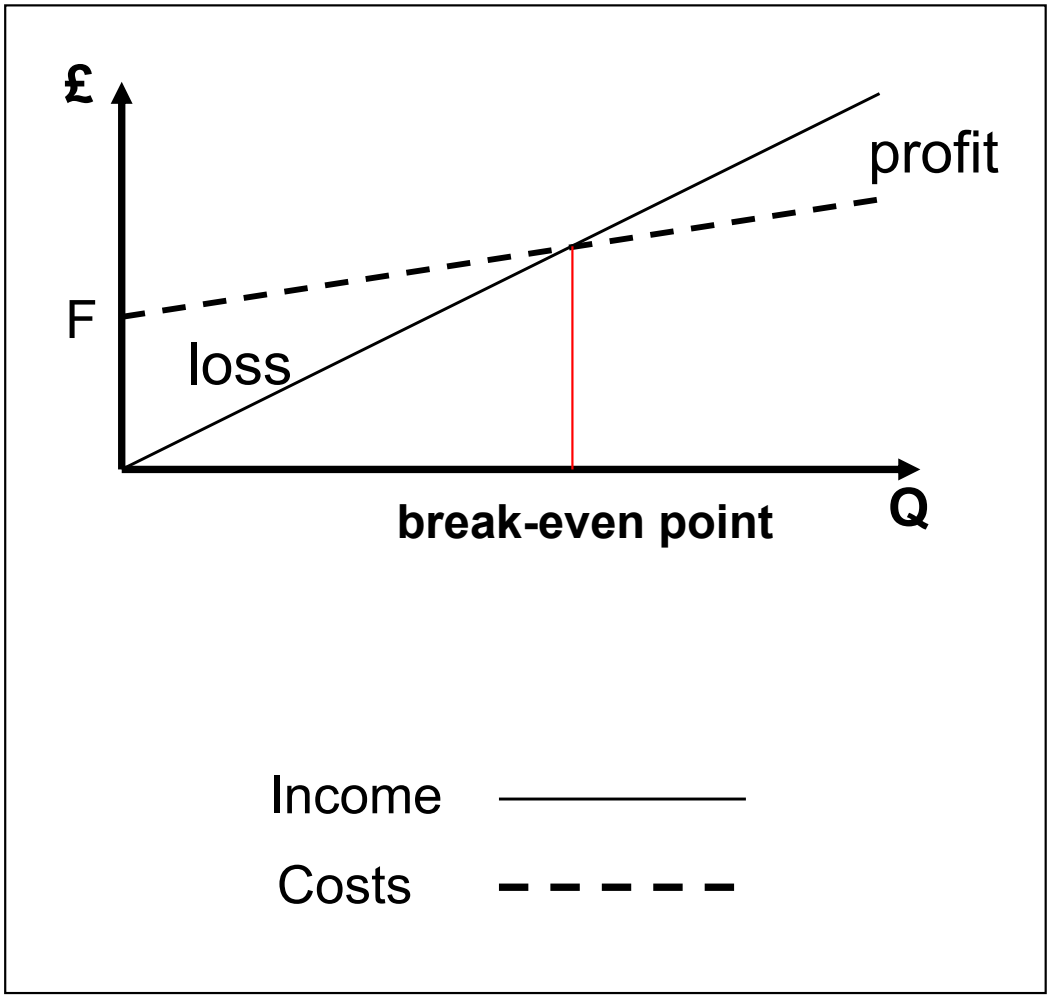
Income = $Q * p$

Costs = $F + (Qc)$

Profit = $Q(p - c) - F$

Loss = $F - Q(p - c)$

Break-even point = $F/(p - c)$



Break-Even Analysis –An Example

Fixed cost for setting up a plant at location A is £ 5000K, at B is £9000K

Variable cost per unit sold at location A is £3.25, and B is £4.25

Price charged per unit is set at £3.75 for Location A, and £5.25 Location B

Forecasted sales for first 2 years at Location A is 11,000K, and location B is 8,000K

Use ‘Break Even Analysis’ to consider which location is more viable after the first 2 years:

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Using 'Break Even Analysis' to consider which location is more viable after the first 2 years:-

At Location A ; F = 5000K, c= 3.25, p = 3.75

And therefore Break Even Quantity = F/(p - c) = 5000K/(3.75-3.25) = 10,000K

Sales after two years = 11,000K – so site has broken even

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At Location B ; F = 9000K, c= 4.25, p = 5.25
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Sales after two years = 8,000K – so site has not broken even

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THEREFORE SITE A IS MORE VIABLE AFTER TWO YEARS

Load-Distance Model

1) Find distances between proposed location and customers/suppliers.
2) Multiply estimated load by distance.
3) Sum results of 2) and compare options.

Does this remind you of anything?

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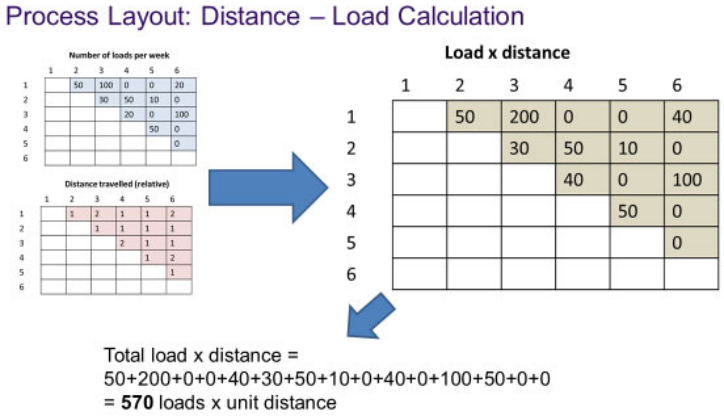

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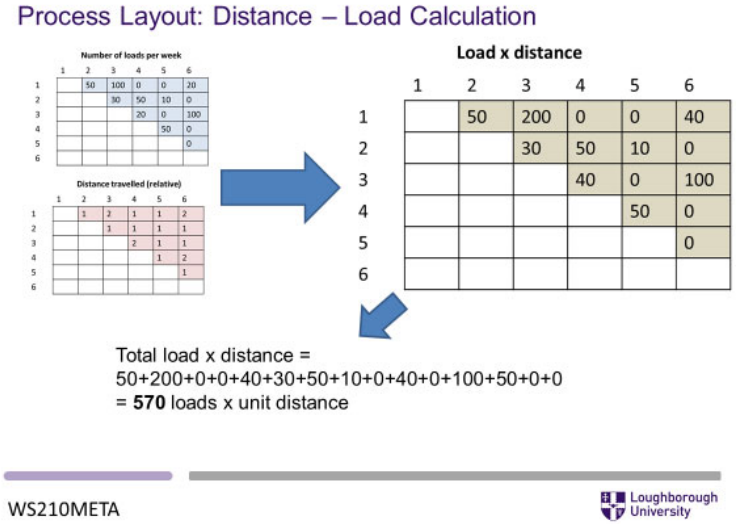

Topic 4 Process Layout Technique!

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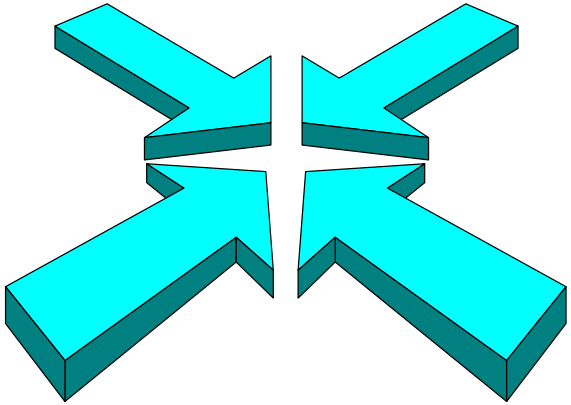
Centre of Gravity - 1

1) Calculate load x distance scores assuming (0,0) to be the location
2) Sum x-scores and y-scores separately
3) Divide results of 2) by total load to give x,y coordinates of the centre of gravity



Centre of Gravity - 2

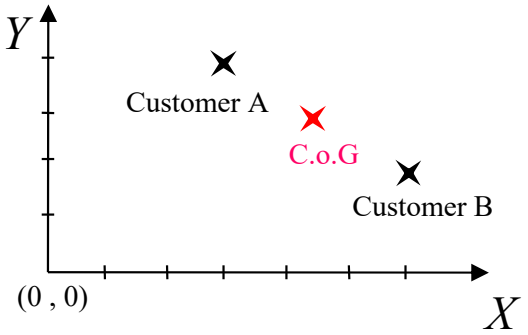
Select an Origin (0 , 0) , and based on this origin :-

Let

Location of Customer A = (X_1 , Y_1), with Load L1

Location of Customer B = (X_2 , Y_2), with Load L2

Then Centre of Gravity for A & B is calculated as follows :-



$$X_{AB} = \frac{(X_1 * L_1) + (X_1 * L_2)}{L_1 + L_2}$$

$$Y_{AB} = \frac{(Y_1 * L_1) + (Y_2 * L_2)}{L_1 + L_2}$$

And Centre of Gravity for A & B is **(X_{AB} , Y_{AB})**

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