

MANUFACTURING MANAGEMENT

ARRANGEMENT OF FACILITIES



What is

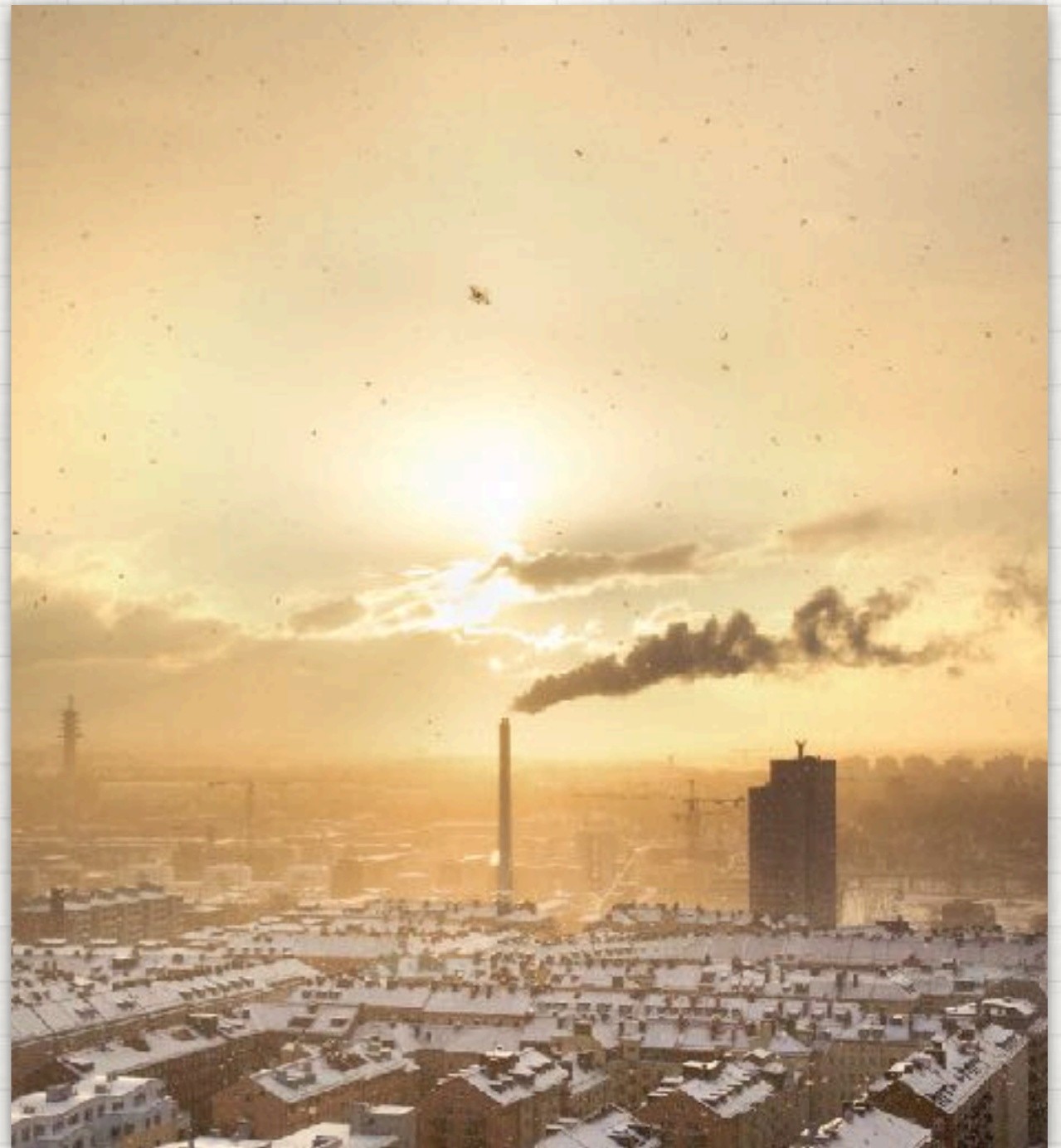
**manufacturing
management?**

The set of interrelated management activities, which are involved in manufacturing certain products, is called as **manufacturing management**

The facilities location problem is an important strategic level decision-making for an organisation

THE NEED FOR SELECTING A SUITABLE LOCATION ARISES BECAUSE OF THREE SITUATIONS.

- When starting a new organisation, *i.e.*, location choice for the first time.
- In case of existing organisation
- In case of Global Location



IN CASE OF NEW ORGANISATIONS

- Identification of region
- Choice of a site within a region
- Dimensional analysis





IN CASE OF LOCATION CHOICE FOR EXISTING ORGANISATION

- Plant manufacturing distinct products.
- Manufacturing plant supplying to specific market area.
- Plant divided on the basis of the process or stages in manufacturing
- Plants emphasizing flexibility.

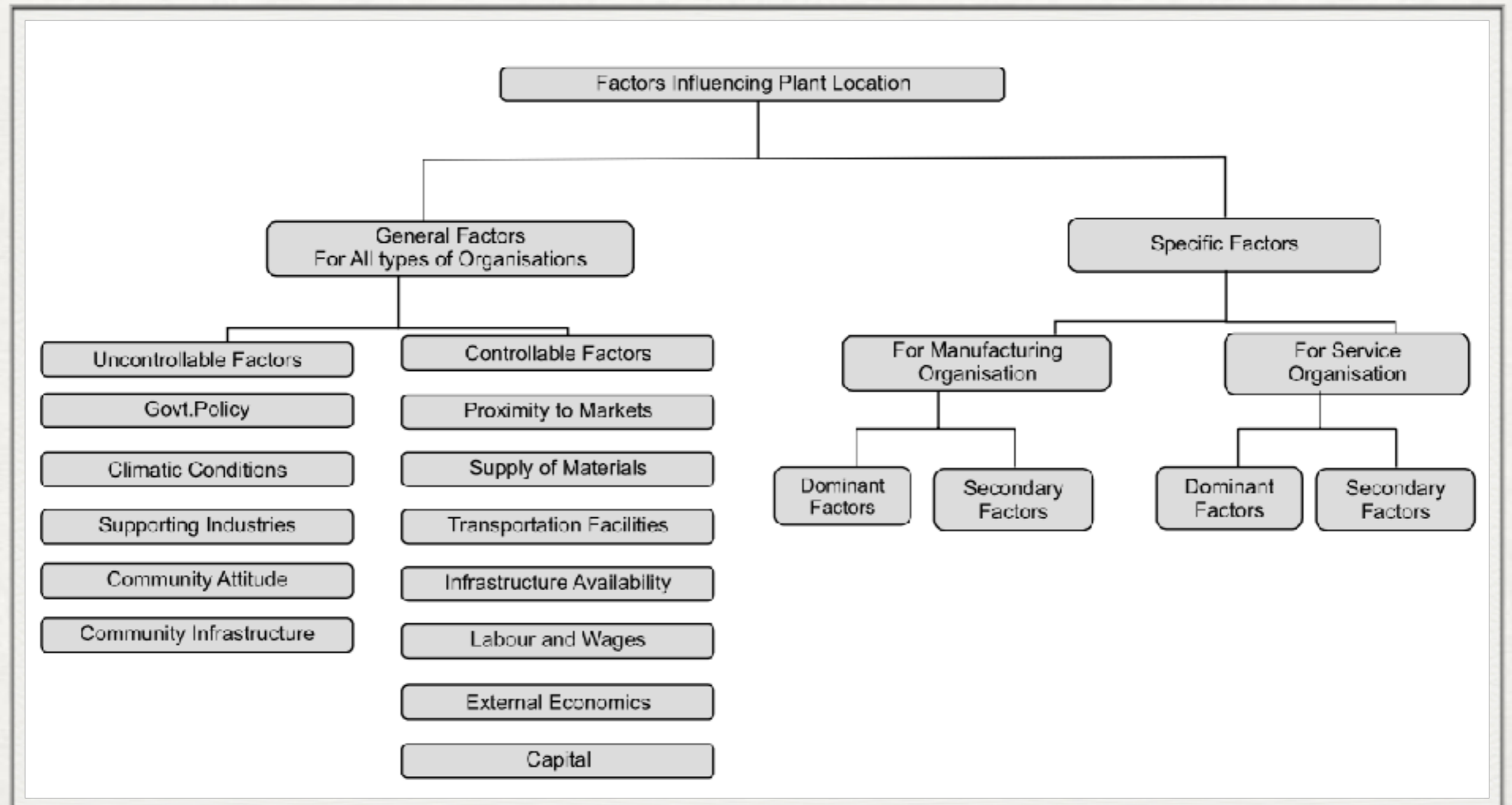




IN CASE OF GLOBAL LOCATION

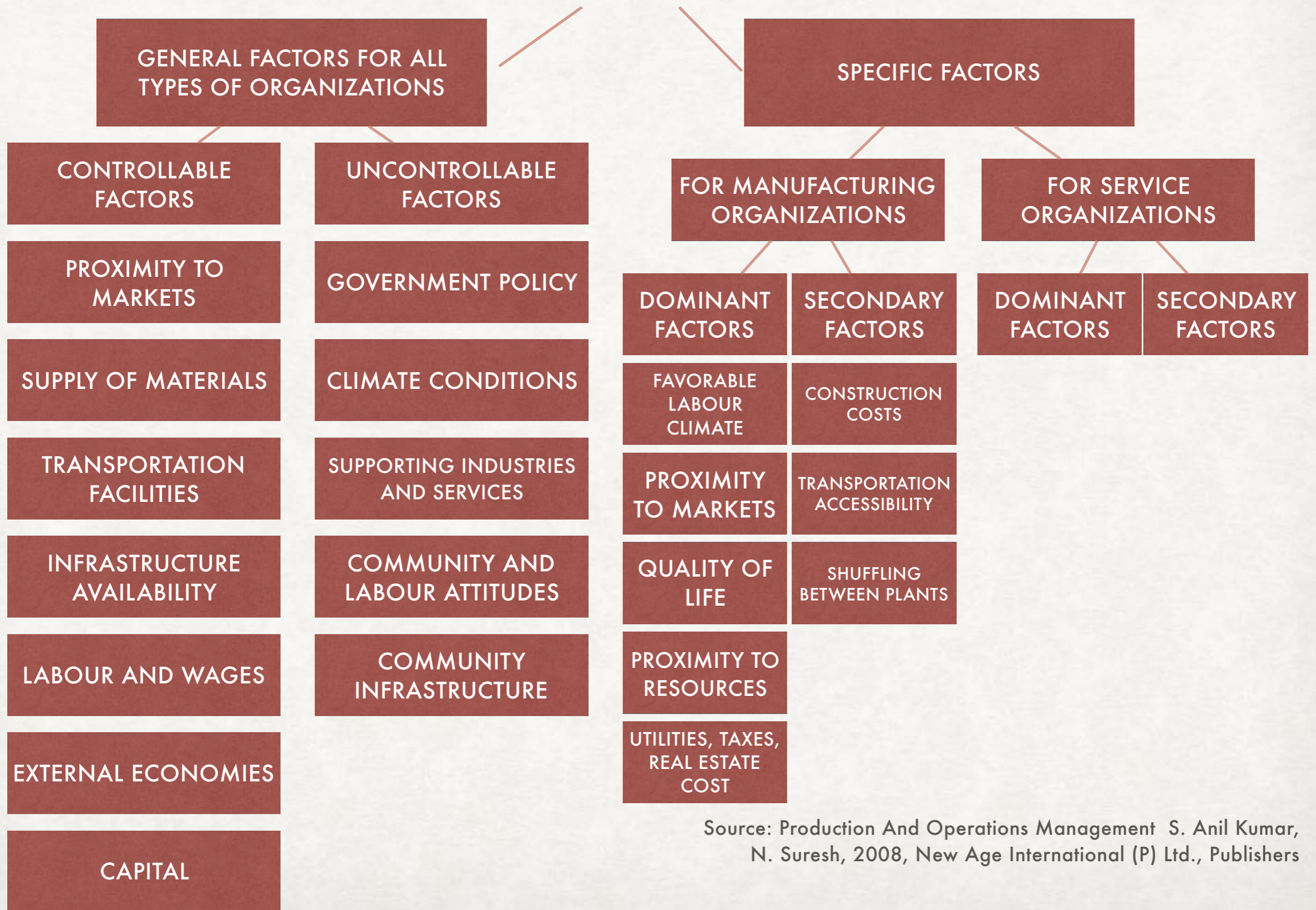
- Tangible Reasons
 - reaching the customers
- Intangible Reasons
 - customer related reasons
 - organisational learning related reasons
 - other strategic reasons





Source: Production And Operations Management S. Anil Kumar, N. Suresh, 2008, New Age International (P) Ltd., Publishers

FACTORS INFLUENCING PLANT LOCATION



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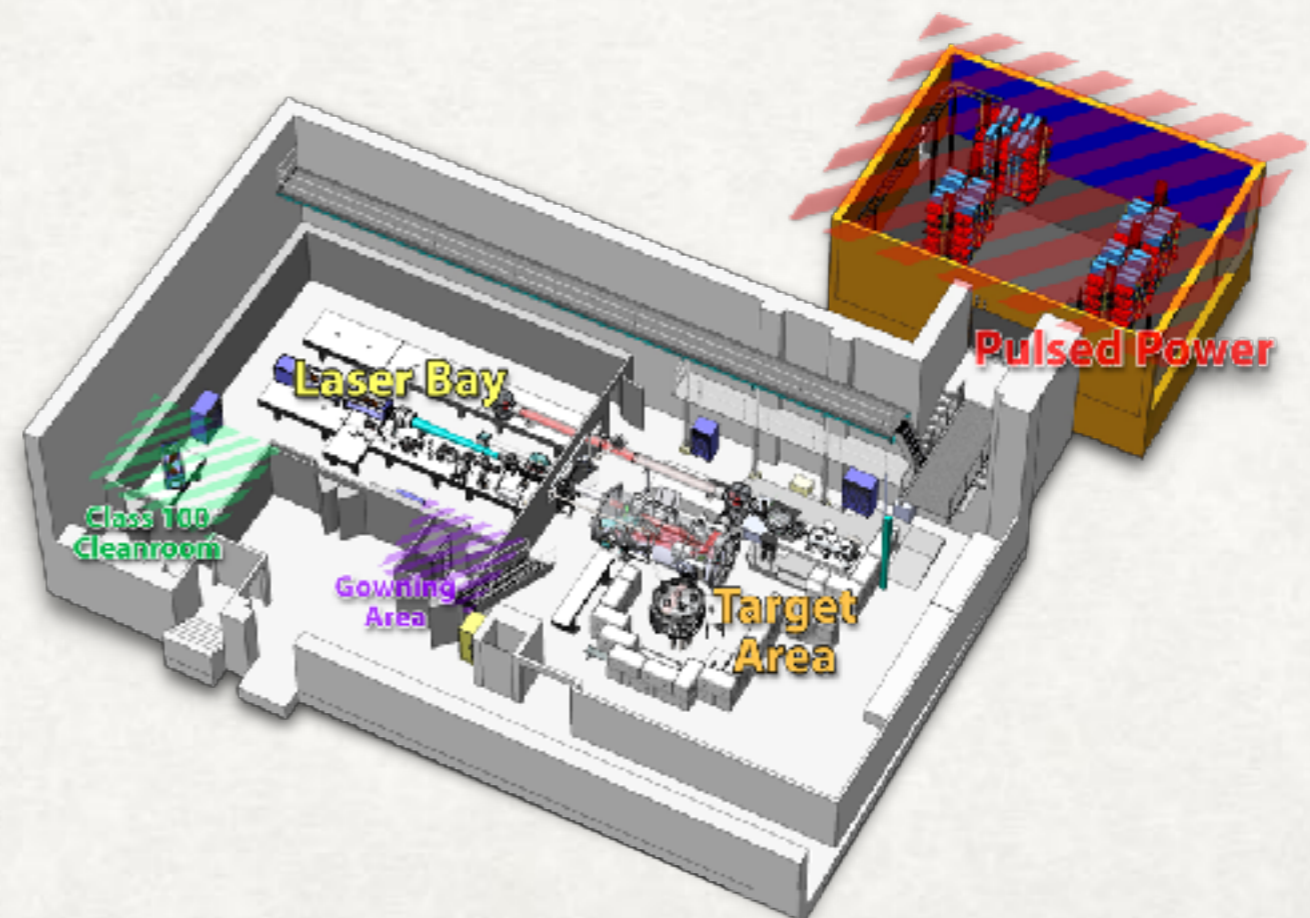
LOCATION THEORIES

- Alfred Weber (1868–1958), with the publication of *Theory of the Location of Industries* in 1909, put forth the first developed general theory of industrial location. His model took into account several spatial factors for finding the optimal location and minimal cost for manufacturing plants.



THE POINT FOR LOCATING AN INDUSTRY THAT MINIMIZES COSTS OF TRANSPORTATION AND LABOUR REQUIRES ANALYSIS OF THREE FACTORS:

- The point of optimal transportation based on the costs of distance to the 'material index'—the ratio of weight to intermediate products (raw materials) to finished product
- The labour distortion, in which more favourable sources of lower cost of labour may justify greater transport distances
- Agglomeration and degglomeration



IDENTIFYING THE IDEAL LOCATION

MODELS:

- Factor rating method
- Weighted factor rating method
- Load-distance method
- Centre of gravity method
- Break even analysis



FACTOR RATING METHOD

sl. no.	Location factor	Factor rating	Rating	
			location 1	location 2
1	facility utilization	8	3	5
2	total patient km per month	5	4	3
3	average time per emergency trip	6	4	5
4	land and construction costs	3	1	2
5	employee preference	5	5	3

SOLUTION

sl. no.	Location factor	Factor rating (1)	Location 1		Location 2	
			Rating (2)	Total = (1)*(2)	Rating (3)	Total = (1)*(3)
1	facility utilization	8	3	24	5	40
2	total patient km per month	5	4	20	3	15
3	average time per emergency trip	6	4	24	5	30
4	land and construction costs	3	1	3	2	6
5	employee preference	5	5	25	3	15
			Total	96	Total	106

WEIGHTED FACTOR RATING METHOD

sl. no.	Location factor	Weight	Scores	
			location 1	location 2
1	facility utilization	25	3	5
2	total patient km per month	25	4	3
3	average time per emergency trip	25	3	3
4	land and construction costs	15	1	2
5	employee preference	10	5	3

WEIGHTED FACTOR RATING METHOD

Solution

$$\begin{aligned}\text{Weighed score location 1} &= 25 \times 3 + 25 \times 4 + 25 \times 3 + 15 \times 1 + 10 \times 5 \\ &= 75 + 100 + 75 + 15 + 50 = 315\end{aligned}$$

$$\begin{aligned}\text{Weighed score location 2} &= 25 \times 5 + 25 \times 3 + 25 \times 3 + 15 \times 2 + 10 \times 3 \\ &= 125 + 75 + 75 + 30 + 30 = 335\end{aligned}$$

LOCATION ECONOMICS

From the following data select the most advantageous location for setting a plant for making transistor radios

		Site X (uzs)	Site Y (uzs)	Site Z (uzs)
i	total initial investment	200,000	200,000	200,000
ii	total expected sales	250,000	300,000	250,000
iii	distribution expenses	40,000	40,000	75,000
iv	raw material expenses	70,000	80,000	90,000
v	power and water supply expenses	40,000	30,000	20,000
vi	wages and salaries	20,000	25,000	20,000
vii	other expenses	25,000	40,000	30,000
viii	community attitude	Indifferent	Wants business	Indifferent
ix	employee housing facilities	poor	excellent	Good

WEIGHTED FACTOR RATING METHOD

Solution

$$\text{Rate of return (RoR), \%} = \frac{\text{Total sales} - \text{Total expenses}}{\text{Total investment}} \times 100$$

PLANT LAYOUT

OBJECTIVES

- Streamline the flow of materials through the plant.
- Facilitate the manufacturing process
- Maintain high turnover of in-process inventory
- Minimise materials handling and cost
- Effective utilisation of men, equipment and space
- Make effective utilisation of cubic space.
- Flexibility of manufacturing operations and arrangements
- Provide for employee convenience, safety and comfort
- Minimize investment in equipment.
- Minimize overall production time
- Maintain flexibility of arrangement and operation
- Facilitate the organizational structure.

PRINCIPLES

- Integration
- Minimum distance
- Cubic space utilization
- Flow
- Maximum flexibility
- Safety
- Minimum handling

CLASSIFICATION OF LAYOUT

- Process layout
- Product layout
- Combination layout
- Fixed position layout
- Group layout



PROCESS LAYOUT

ADVANTAGES

- In process layout machines are better utilized and fewer machines are required
- Flexibility of equipment and personnel is possible in process layout
- Lower investment on account of comparatively less number of machines and lower cost of general purpose machines.
- Higher utilisation of production facilities.

LIMITATIONS

- Backtracking and long movements may occur in the handling of materials thus, reducing material handling efficiency
- Material handling cannot be mechanised which adds to cost
- Process time is prolonged which reduce the inventory turnover and increases the in-process inventory

FIXED POSITION LAYOUT

ADVANTAGES

- Helps in job enlargement and upgrades the skills of the operators
- The workers identify themselves with a product in which they take interest and pride in doing the job
- Greater flexibility with this type of layout



GROUP LAYOUT

ADVANTAGES

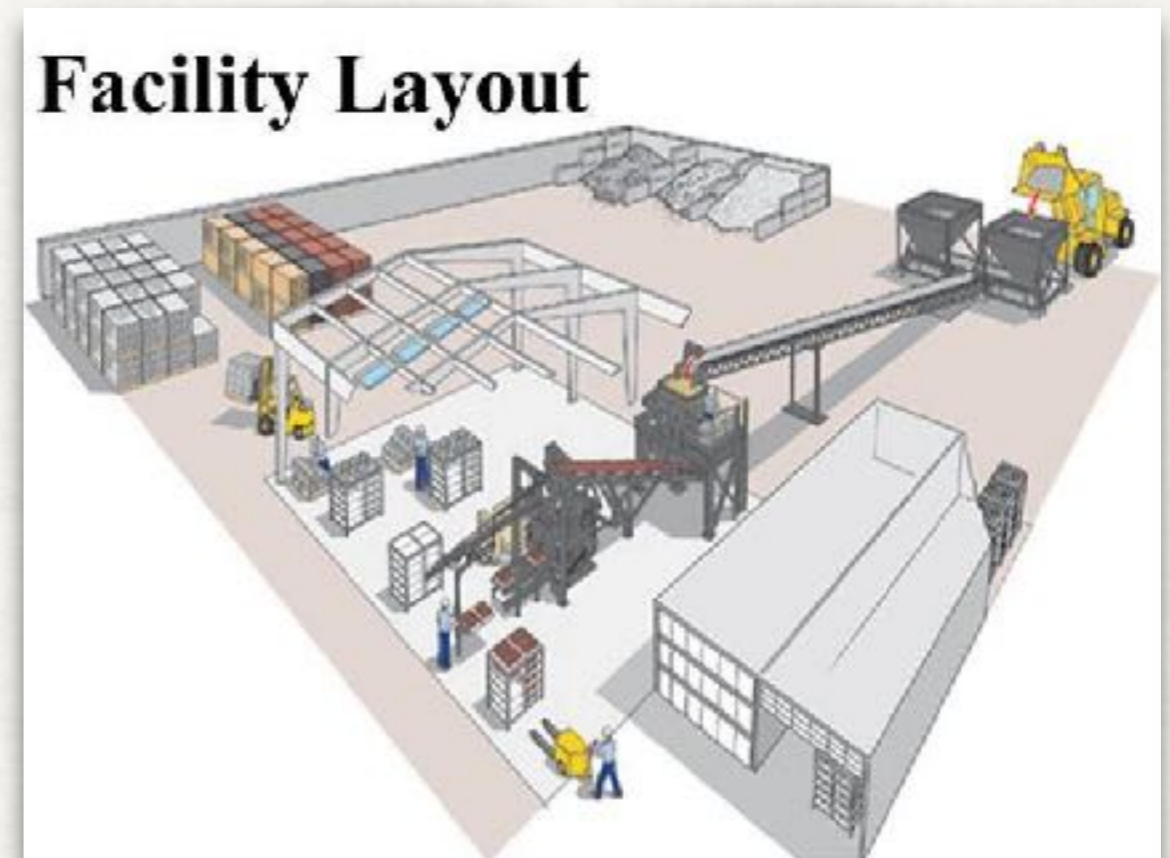
- Component standardization and rationalization
- Reliability of estimates
- Effective machine operation and productivity
- Customer service

LIMITATIONS

- Not feasible for all situations

ORGANISATION OF PHYSICAL FACILITIES

- Factory building
- Lighting
- Climatic conditions
- Ventilation
- Work related welfare facilities





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THE END

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