

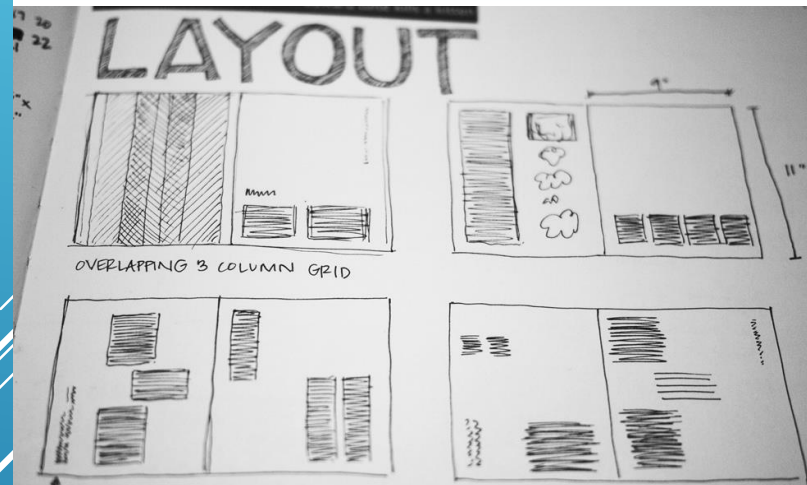
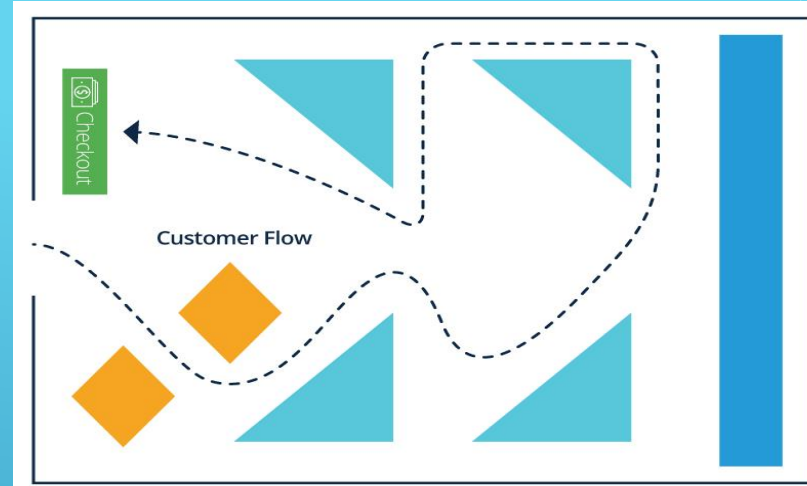
LOCATION, LAYOUT AND FLOW

Chapter 6

Lecturer: Dr. N. Imanipour

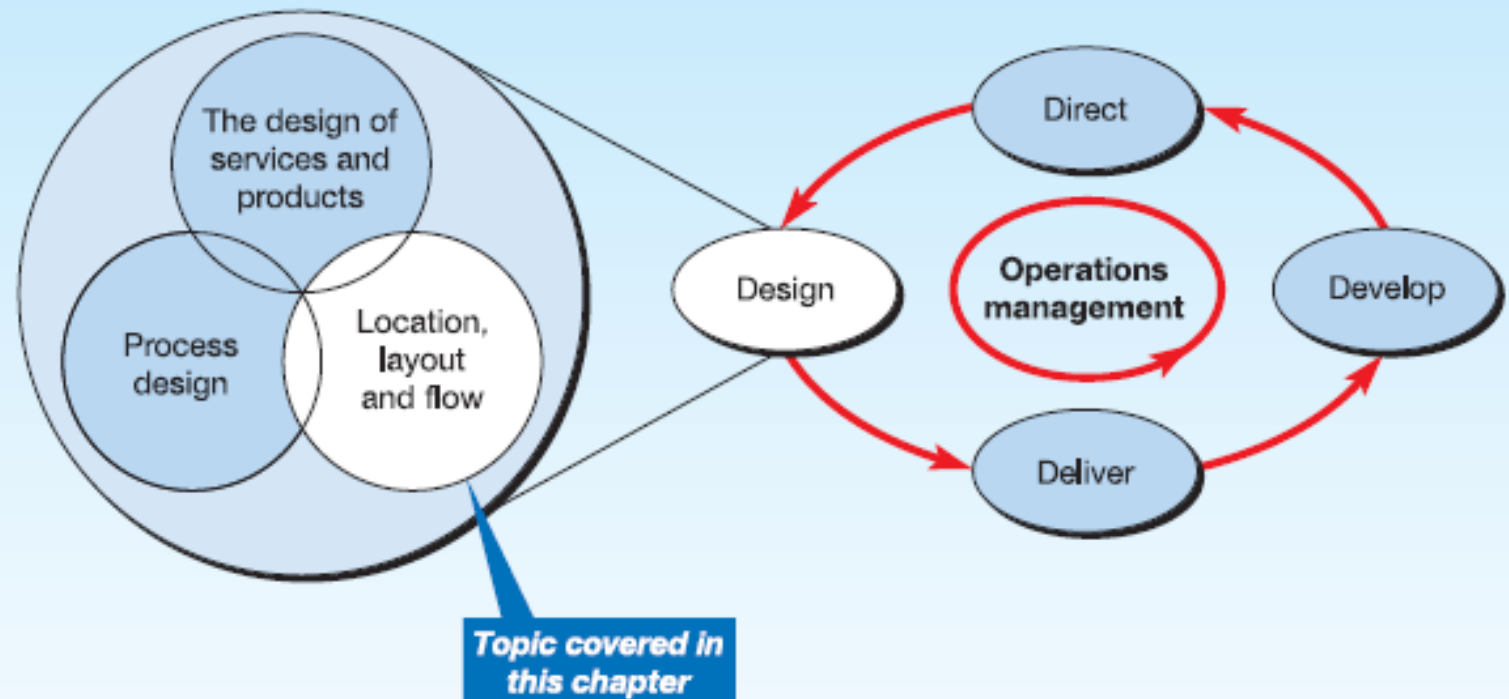
Essentials of
OPERATIONS MANAGEMENT

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Robert Johnston



Key questions

- Where should operations be located?
- What is 'layout' and what are the types used in operations?
- What type of layout should an operation choose?
- How should items be positioned in a workplace?



► Reason for location decision :

Changes in demand

Changes in supply



The objectives of the location decision

The aim of the location decision is to achieve an appropriate balance between three related objectives:

- the spatially variable costs of the operation (spatially variable means that something changes with geographical location);
- the service the operation is able to provide to its customers;
- the revenue potential of the operation.

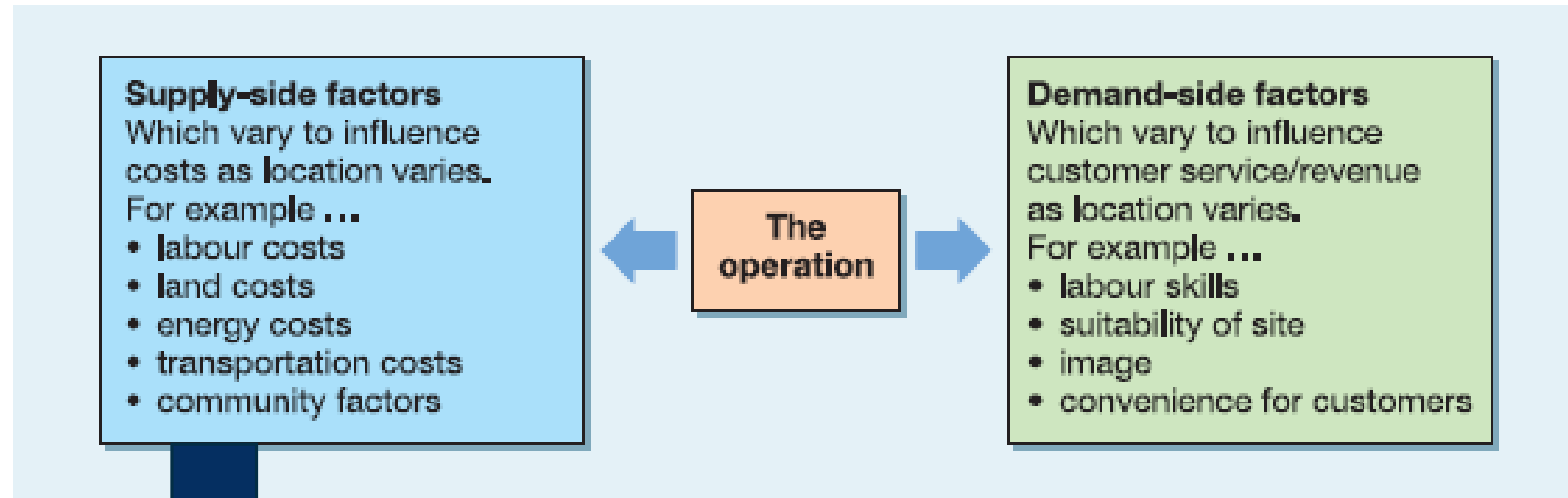
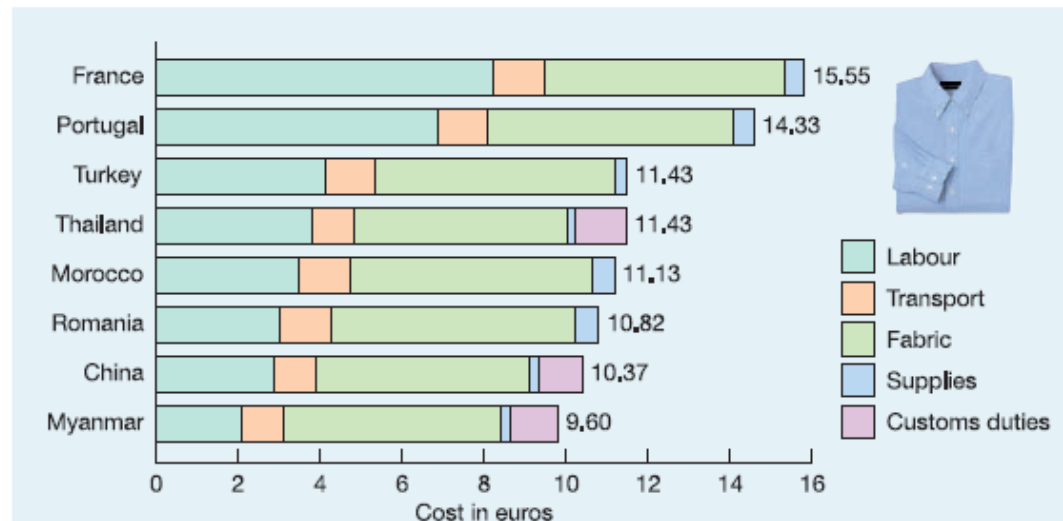
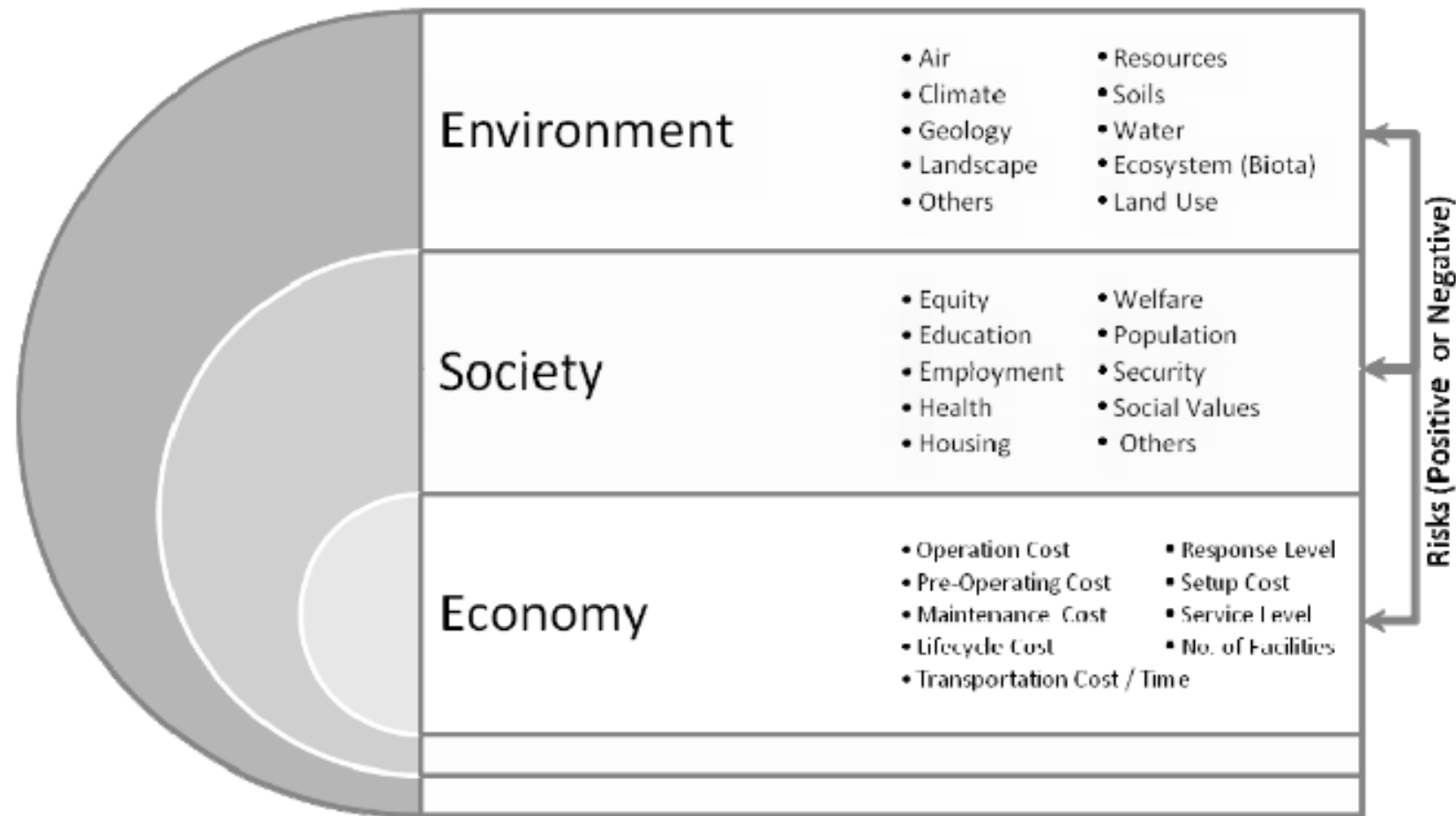


Figure 6.2 Supply-side and demand-side factors in location decisions

- local tax rates
- government financial and planning assistance
- political stability, and local attitudes to 'inward investment'
- language
- availability of support services
- history of labour relations and behaviour
- environmental restrictions and waste disposal.



Sustainable Facility Location



Economy – Environment – Society inter-relationship

What is layout?

The layout of a process or an operation means how its transformed resources are positioned relative to each other and how its various tasks are allocated to its transforming resources as they progress through the operation or process.

The layout decision is relatively infrequently but important .

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What makes a good layout?

- *Inherent safety.* All processes which might constitute a danger to either staff or customers should not be accessible to the unauthorized.
- *Length of flow.* The flow of materials, information or customers should be appropriate for the operation. This usually means minimizing the distance travelled by transformed resources. However, this is not always the case (in a supermarket, for example).
- *Clarity of flow.* All flow of customers and materials should be well signposted, clear and evident to staff and customers alike.
- *Staff conditions.* Staff should be located away from noisy or unpleasant parts of the operation.
- *Management coordination.* Supervision and communication should be assisted by the location of staff and communication devices.
- *Accessibility.* All machines and facilities should be accessible for proper cleaning and maintenance.
- *Use of space.* All layouts should use space appropriately. This usually means minimizing the space used, but sometimes can mean achieving an impression of spacious luxury, as in the entrance lobby of a high-class hotel.
- *Long-term flexibility.* Layouts need to be changed periodically. A good layout will have been devised with the possible future needs of the operation in mind.

The basic layout types

Basic layout type

Fixed-position layout

Functional layout

Cell layout

Line layout

Most practical layouts are derived from only four basic layout types. These are:

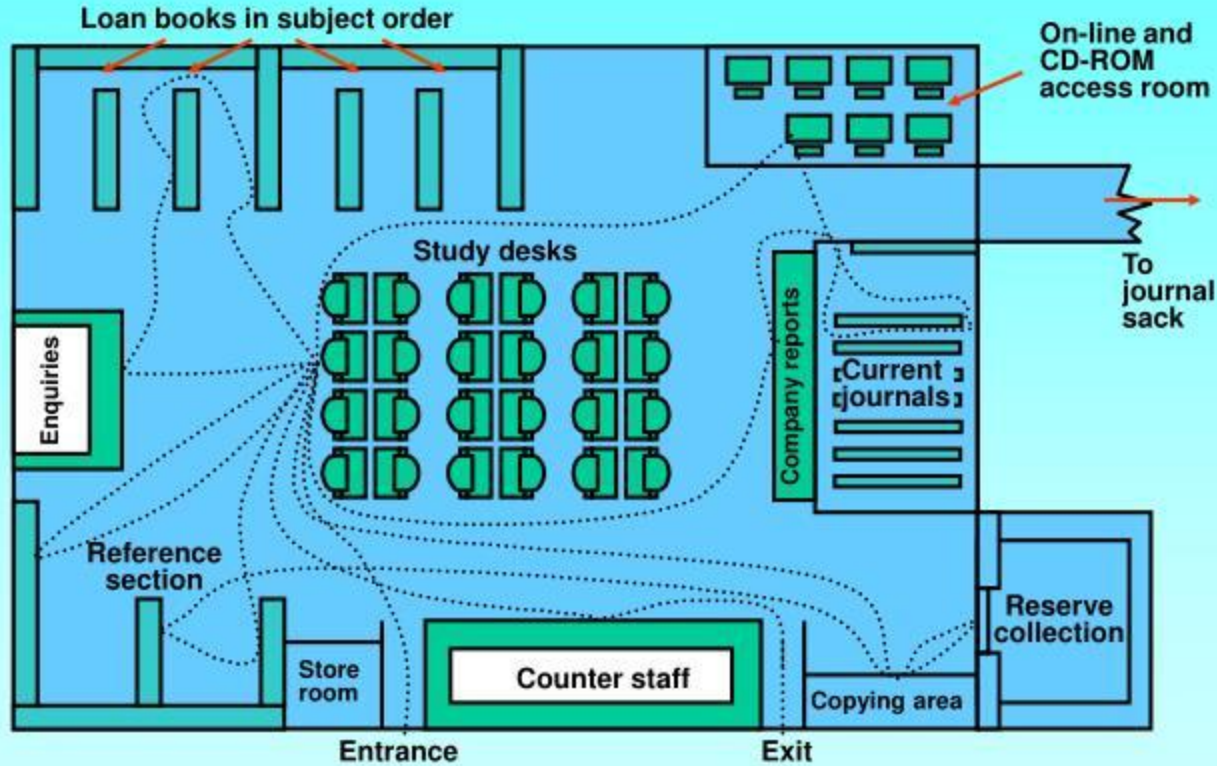
- fixed-position layout
- functional layout
- cell layout
- line layout (also called product layout)

Table 6.1 The relationship between process types and basic layout types

<i>Manufacturing process types</i>	<i>Basic layout types</i>	<i>Service process types</i>
Project processes	Fixed-position layout	Professional services
Jobbing processes		
Batch processes	Functional layout	Service shops
Mass processes	Cell layout	Mass services
Continuous processes	Line layout	

7.6

An example of a process layout in a library showing the path of just one customer



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Operations Management, 4E: Chapter 7

surgery

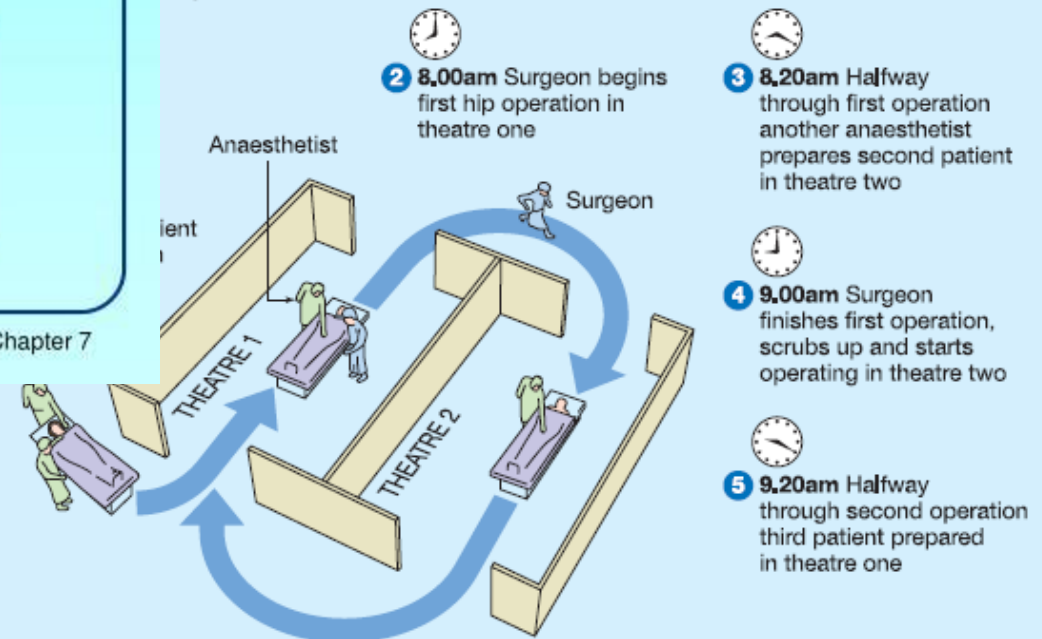
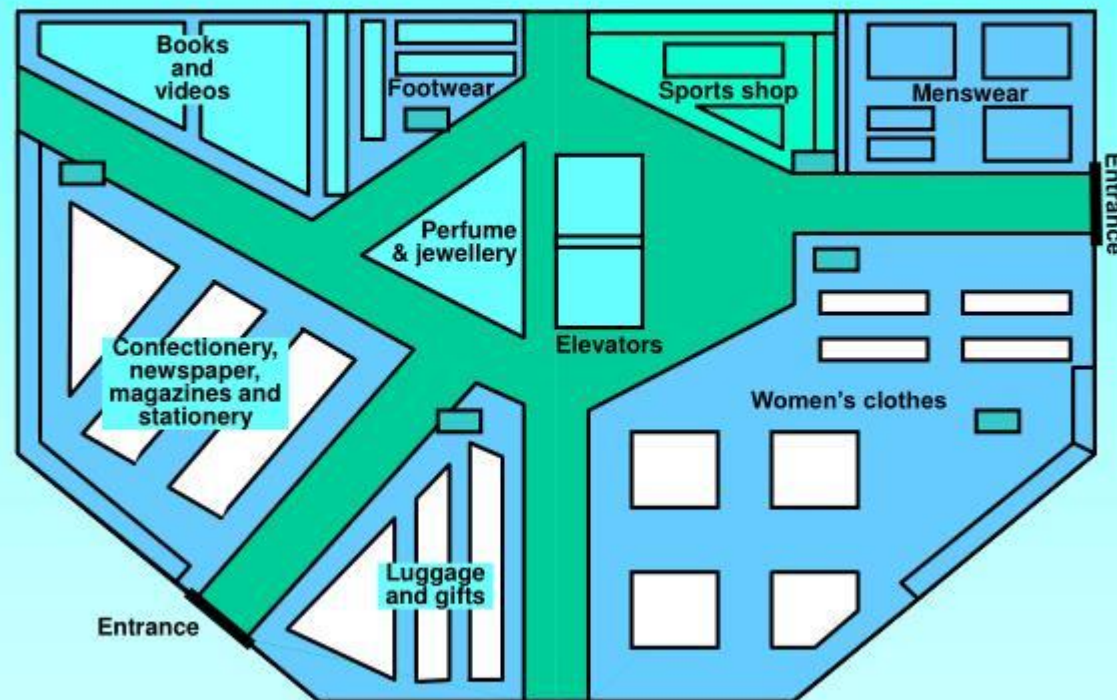


Figure 6.4 Assembly line surgery

7.8

The ground floor plan of a department store showing the sports goods shop-within-a-shop retail 'cell'



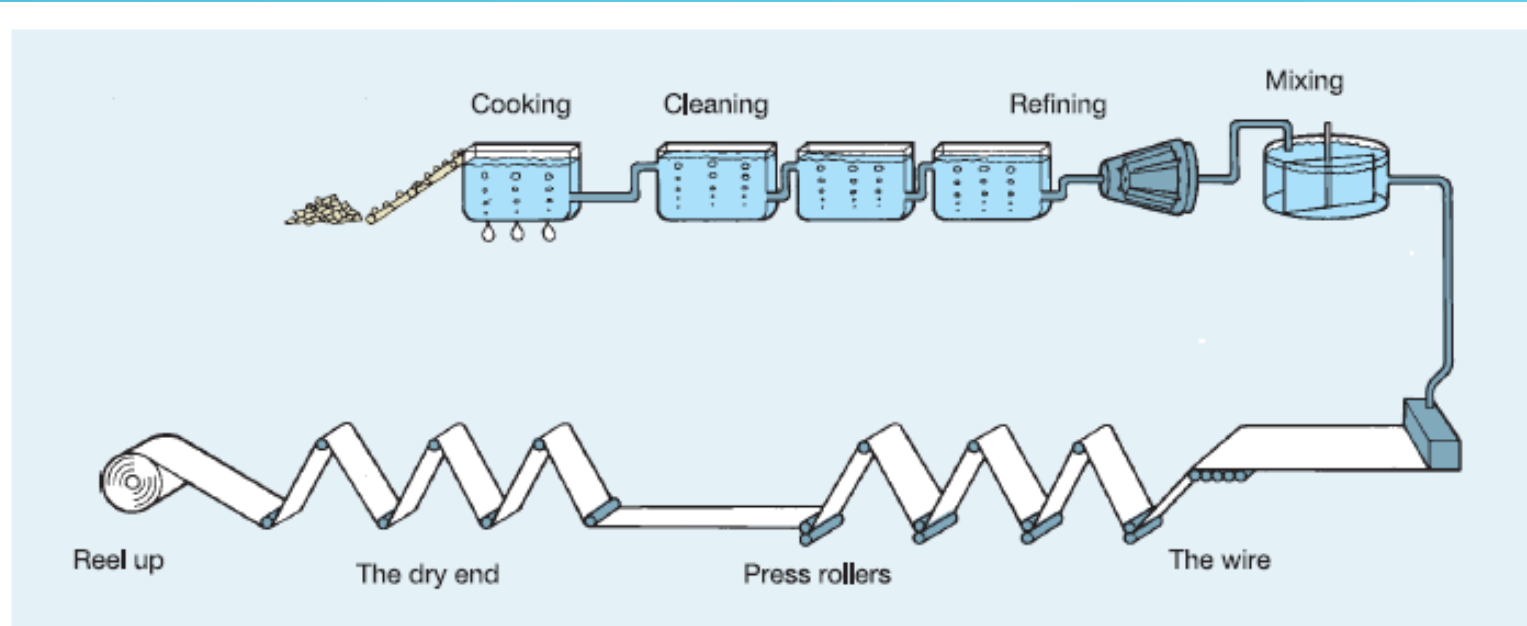
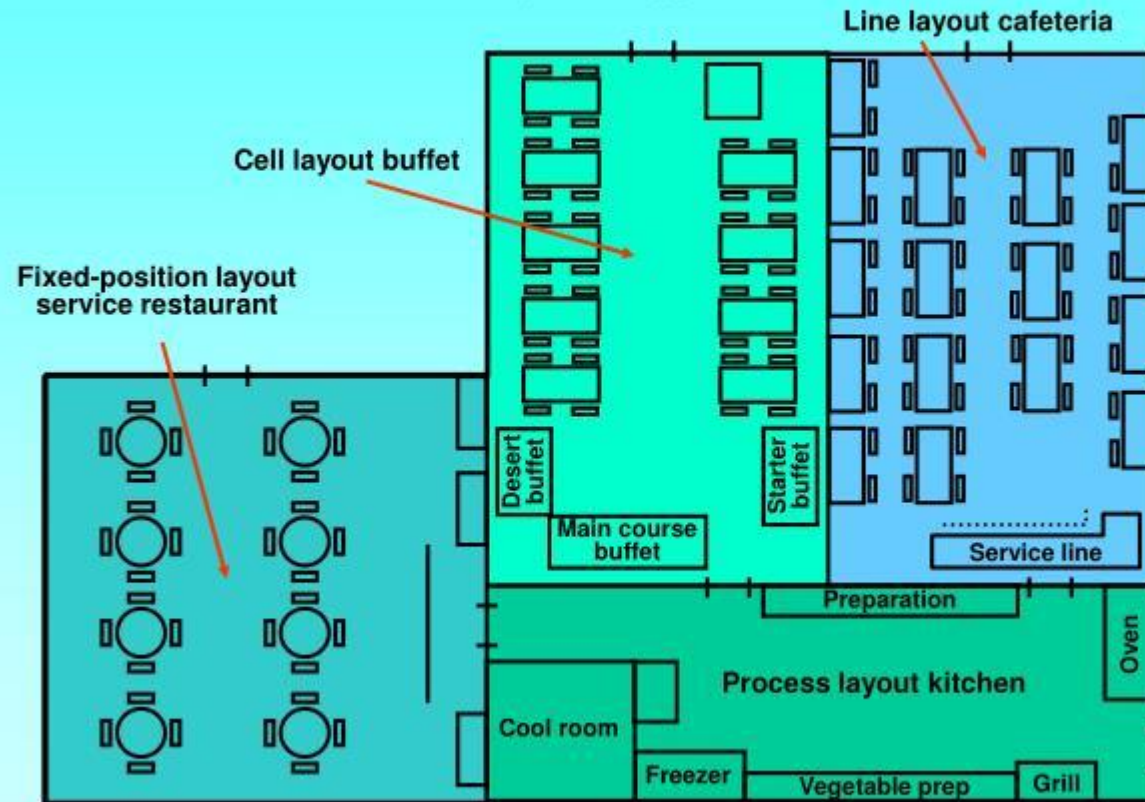


Figure 6.7 The sequence of processes in paper-making; each process will be laid out in the same sequence

7.11

A restaurant complex with all four basic layout types



Selecting a layout type

Table 6.2 The advantages and disadvantages of the basic layout types

	<i>Advantages</i>	<i>Disadvantages</i>
Fixed-position	Very high mix and product flexibility Product or customer not moved or disturbed High variety of tasks for staff	Very high unit costs Scheduling of space and activities can be difficult Can mean much movement of plant and staff
Functional	High mix and product flexibility Relatively robust in the case of disruptions Relatively easy supervision of equipment or plant	Low facilities utilization Can have very high work-in-progress or customer queuing Complex flow can be difficult to control
Cell	Can give a good compromise between cost and flexibility for relatively high-variety operations Fast throughput Group work can result in good motivation	Can be costly to rearrange existing layout Can need more plant and equipment Can give lower plant utilization
Line	Low unit costs for high volume Gives opportunities for specialization of equipment Materials or customer movement is convenient	Can have low mix flexibility Not very robust if there is disruption Work can be very repetitive

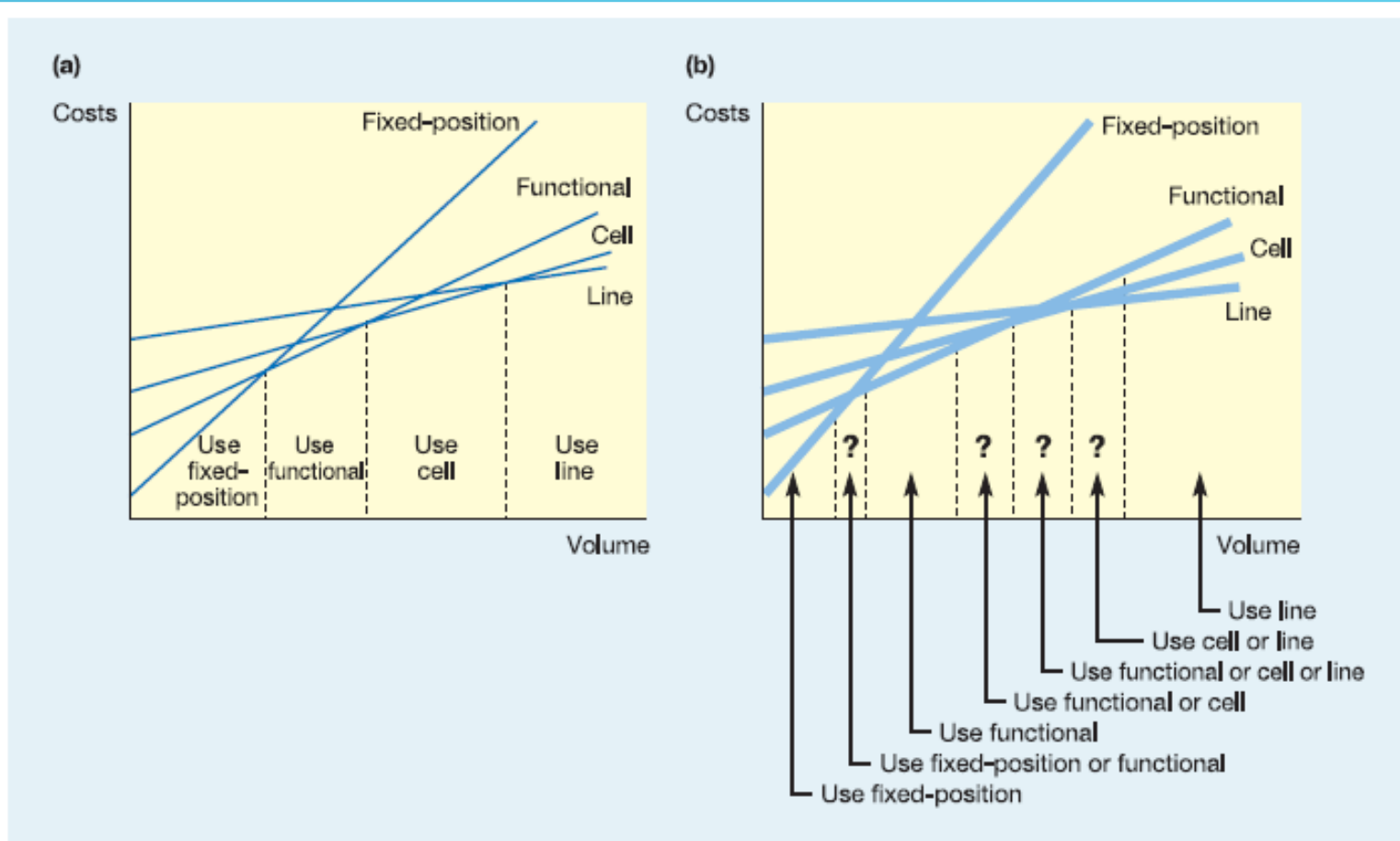


Figure 6.10 (a) The basic layout types have different fixed- and variable-cost characteristics which seem to determine which one to use. (b) In practice the uncertainty about the exact fixed and variable costs of each layout means the decision can rarely be made on cost alone

➤ How should items be positioned in a workplace?

Usually workplace design involves positioning equipment to minimize effort, minimize the risk of injury, and maximize quality of work.

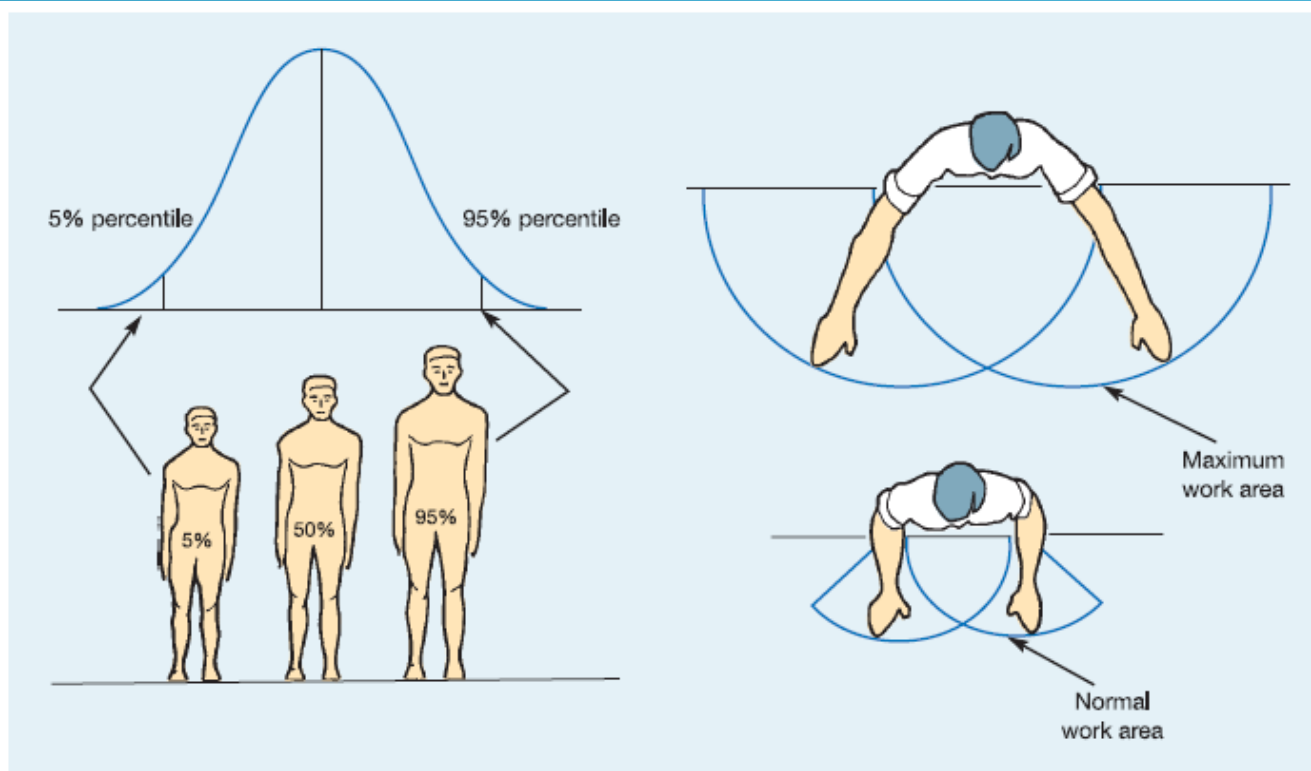


Figure 6.11 The use of anthropometric data in job design

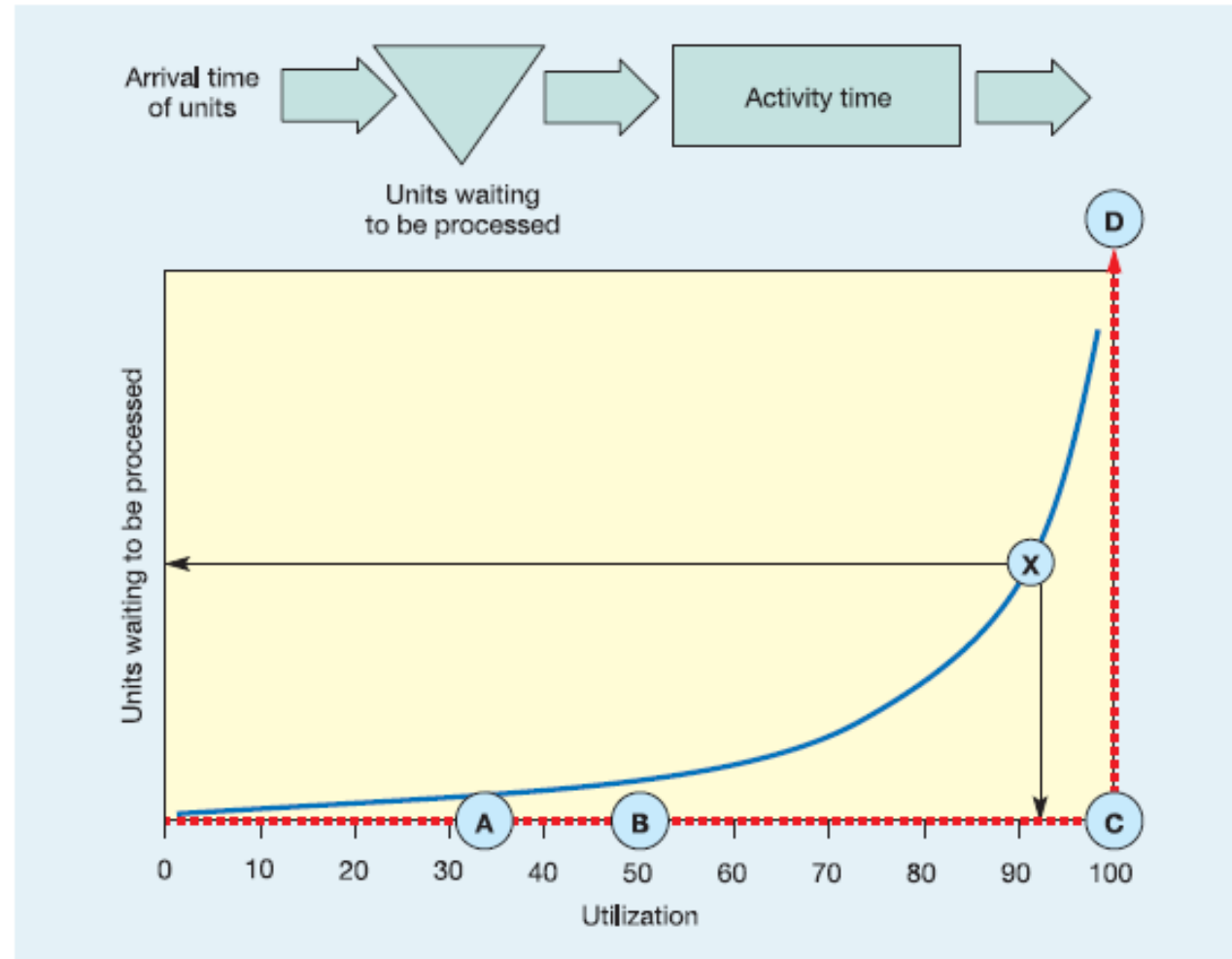
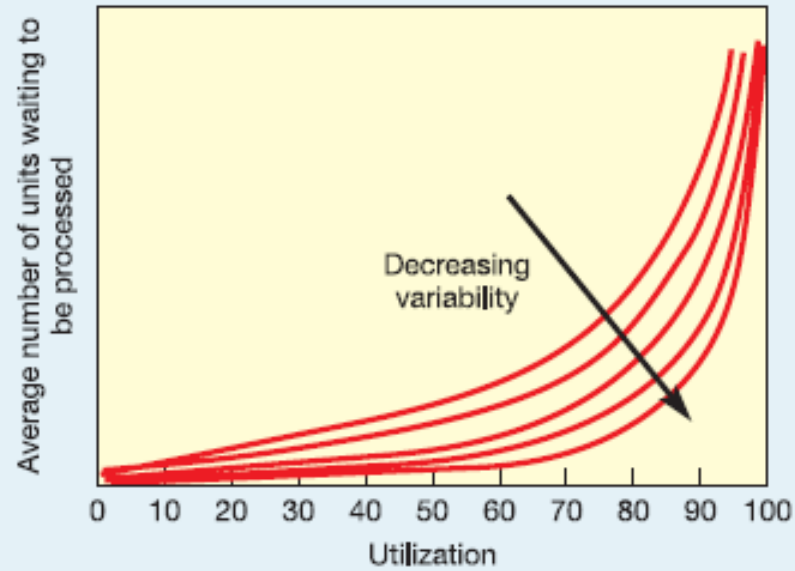
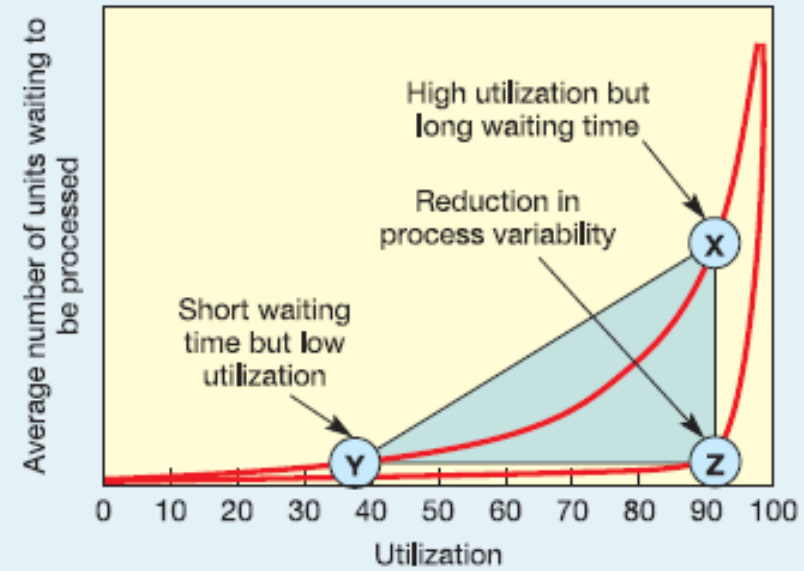


Figure 5.10 The relationship between process utilization and number of units waiting to be processed for constant, and variable, arrival and process times



(a) Decreasing variability allows higher utilization without long waiting times



(b) Managing process capacity and/or variability

Figure 5.11 The relationship between process utilization and number of units waiting to be processed for variable arrival and activity times

Task allocation- division of labor

Advantages of division of labor	Disadvantages of highly divided jobs
It promote faster learning Automation becomes easier Reduced non productive works	Monotony Physical injury Low flexibility Poor robustness

Job commitment –behavioral approach to job design

- Job rotation
 - Job enlargement
 - Job enrichment
 - Empowerment
 - Team working
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7.13

Layout selection steps

