Lancaster University
Management School

MSCI 102: Introduction to Operations Management

Operations as a System

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2024-25

Operations as a SYSTEM

- Thinking of Operations as a system essential for our understanding
- Complex whole, where sub-systems interact with each other, modifying their relationships, and producing qualitatively new characteristics and behaviour
- All the time maintaining & reproducing distinct structures & boundaries…of the system and its subsystems
- In this lecture…
- Systems exhibit certain properties…Purpose, Transformation, Adaptation
- With 'objectives', typically Cost, Quality, Speed, Dependability, & Flexibility
- How objectives can be order winning, qualifying, or less important
- How the contribution to higher purpose can be stratified as holding firm back, as good as competition, best in industry or redefining industry expectations

(see Operations performance, p. 38-71 in Slack)

Purpose in the operations system

- Systems (at least ‘living’ ones) exhibit autonomous behaviour
- They don’t simply react to stimuli but seem to pursue goals
- This is especially true of ‘planned systems’, e.g. organisations – rather than biological organisms

Which is the best description of Toyota’s purpose as a *production operation*?

A.To maximise shareholder worth over the medium term

B.To produce vehicles with high quality, and high dependability, at low cost

C.To embody values of loyalty, service and collective endeavour

D.To make environmentally friendly cars

Interaction of sub-components

Operations		Marketing	Implications
Supply	>	Demand	Waste of resources
Supply	<	Demand	Opportunity loss
Supply	=	Demand	Ideal

Purpose in the operations system

- Operations have some obvious ‘objectives’
- Typically
  1. Cost
  2. Quality
  3. Speed
  4. Dependability
  5. Flexibility
  6. (Sustainability)

(see Triple Bottom Line, p. 41 in Slack)

Five performance objectives

- **Cost:**

- Everyday low prices

- Example: Aldi

Quality

1. Top Quality

Example: Rolex

2. Consistent Quality

Example: McDonald's

Five performance objectives

Speed/Time:

1. On-time delivery

Example: DHL Express

2. Development Speed

Quickly introducing new service or product

Example: Zara

Flexibility:

1. **Customization**

Example: Bentley Car

2. Variety

Example: Amazon

3. Volume flexibility

Example: UBER

Five performance objectives

Dependability:

1. Durable products

Example: Apple

2. Reliable car

Example: Toyota

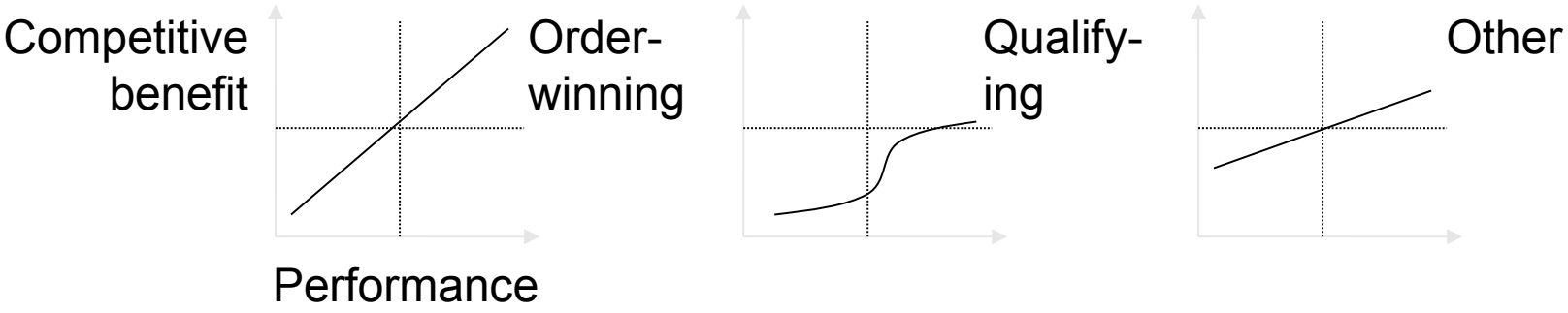
Purpose in the operations system

- Although context determines practical meaning of the objective…
  - Quality in NHS: speed of treatment, error, amenity
  - Quality in Ford: defects, reliability, aesthetics
  - Quality in education: ???
- Context also determines relative importance…
  - Order-winning *vs.* qualifying *vs.* other factors

Purpose in the operations system

- Order winners: gaining/increasing customers
- Order qualifiers: in order to remain competitive
- Less important factors: less/no impact on customer choice

Slack *et al* p.80



- See the comparison of retail/corporate banking (Slack *et al* p.83)

Purpose in the operations system

‘Order winning’ operational factors are those that will directly and significantly contribute to winning business

These provide competitive advantage

What would be the order-winning factor for a low-cost airline?

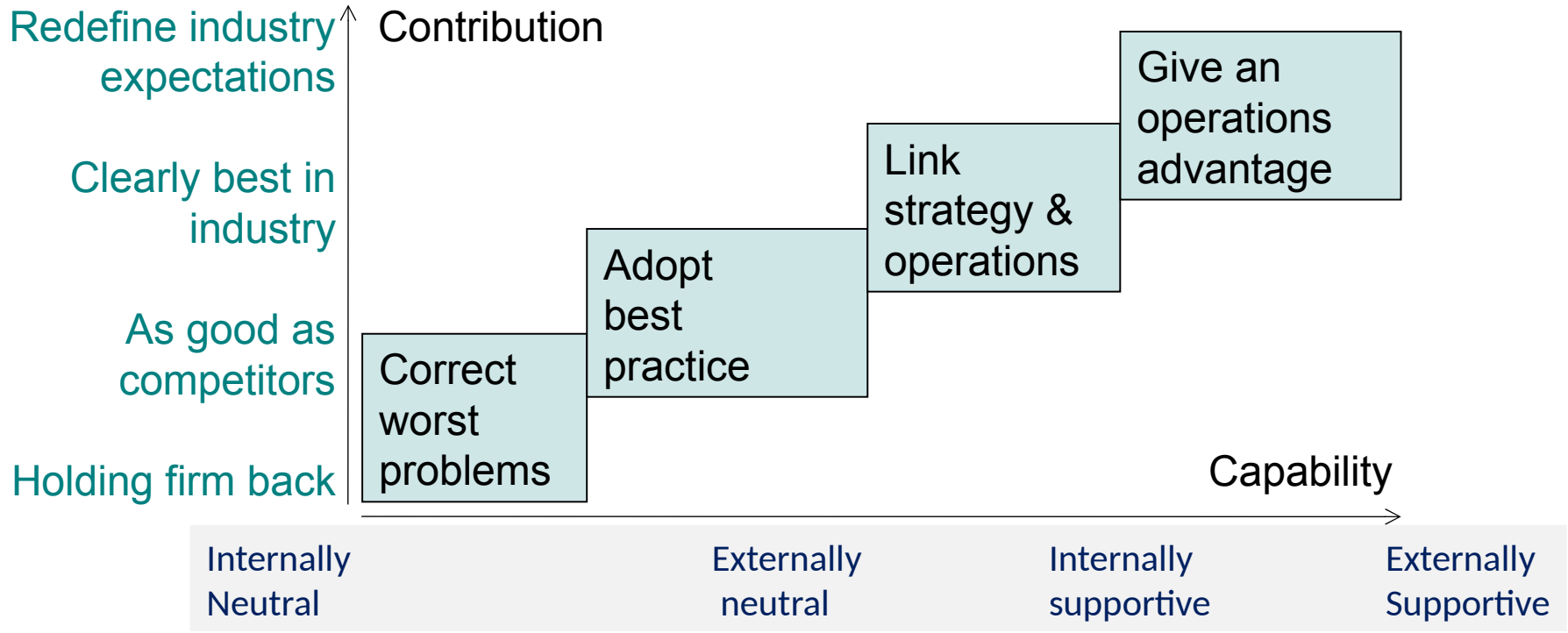
A. Flight schedule (number of flights, time of departure arrival etc.)
B. Likelihood of delays/cancellations
C. Total cost of air travel (including airline fee)
D. Ancillary services (luggage allowance, lounge access etc.)
E. Services on board (choice of meals etc.)

Purpose in the operations system

- Operations underpin business strategy (i.e. contribute to a higher purpose)
- e.g. If the order-winning factor for a low-cost airline is total cost of travel, then its business strategy *should require:*
  - minimising turnaround time
  - maximising crew flexibility
  - simplifying maintenance
  - using low landing fee/low service fee airports
  - direct e-ticket sales
  - hedging on fuel, and so on….

Purpose in the operations system

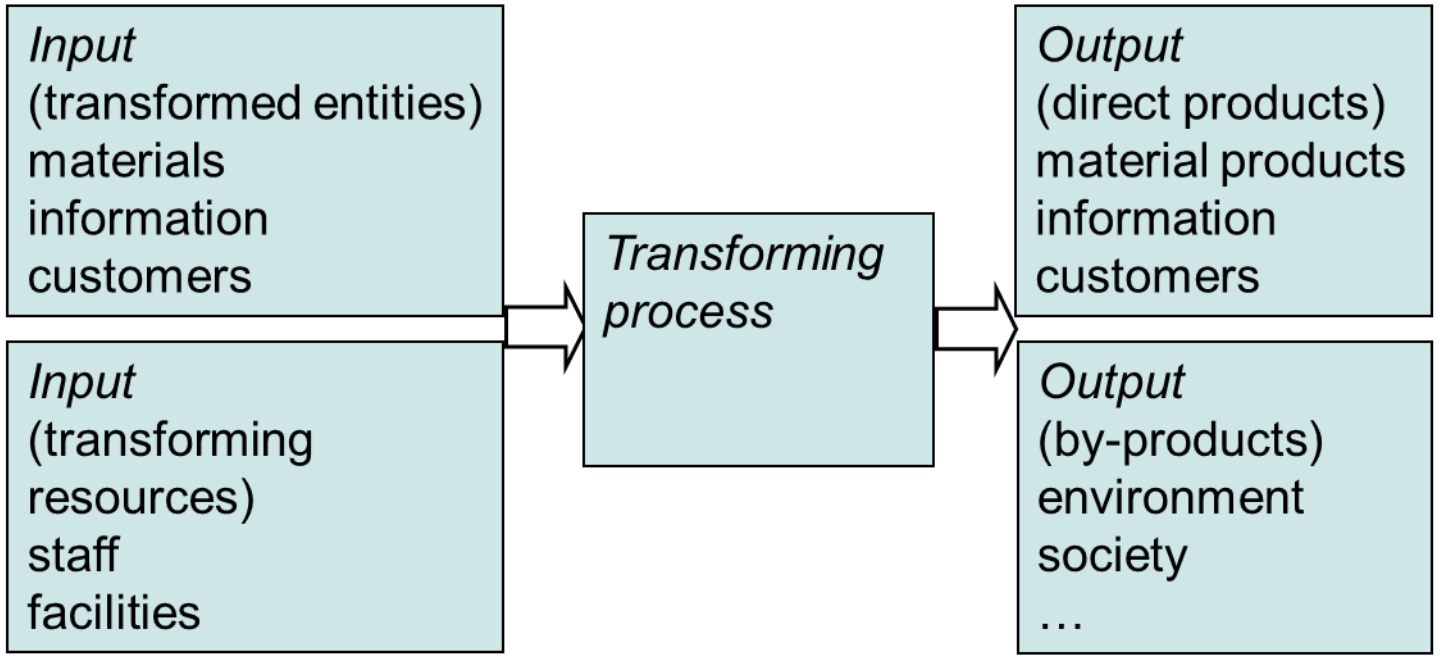
- This contribution to higher purpose can be stratified



(Hayes *et al* 2005 – see Slack *et al* p.75)

Transformation in the operations system

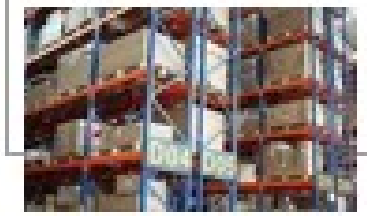
- Systems transform their environments



Transformation in the operations system

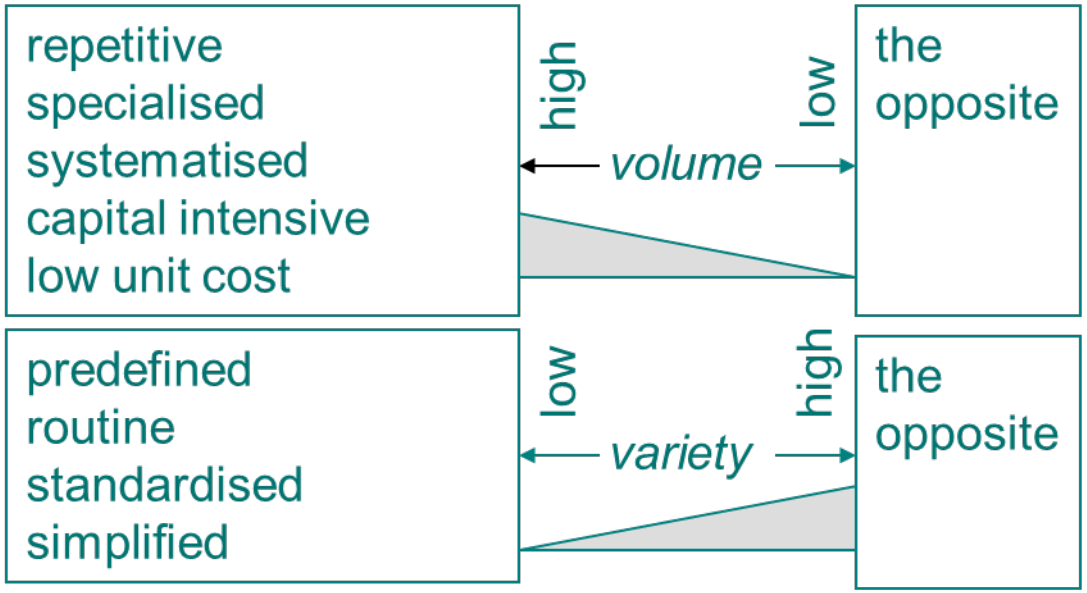
- Organisations appear to transform quite different entities
- *Materials processors*: manufacturing, mining, energy
- *Information processors*: accountancy, media, research
- *Customer processors*: hotels, hospitals, education, transport
- But situation becoming more complex
- …e.g. manufacturers as services
- …emphasises importance of deep understanding of transformation

Transformation in the operations system

System	Primary inputs	Resources	Primary transformation	Desired outputs
automobile plant 	steel, engine parts, other materials	facilities, and workers	manufacturing and assembling	cars with high quality 
Warehouse 	goods	storage tools, workers	Packaging, distribution	instant delivery 

Transformation in the operations system

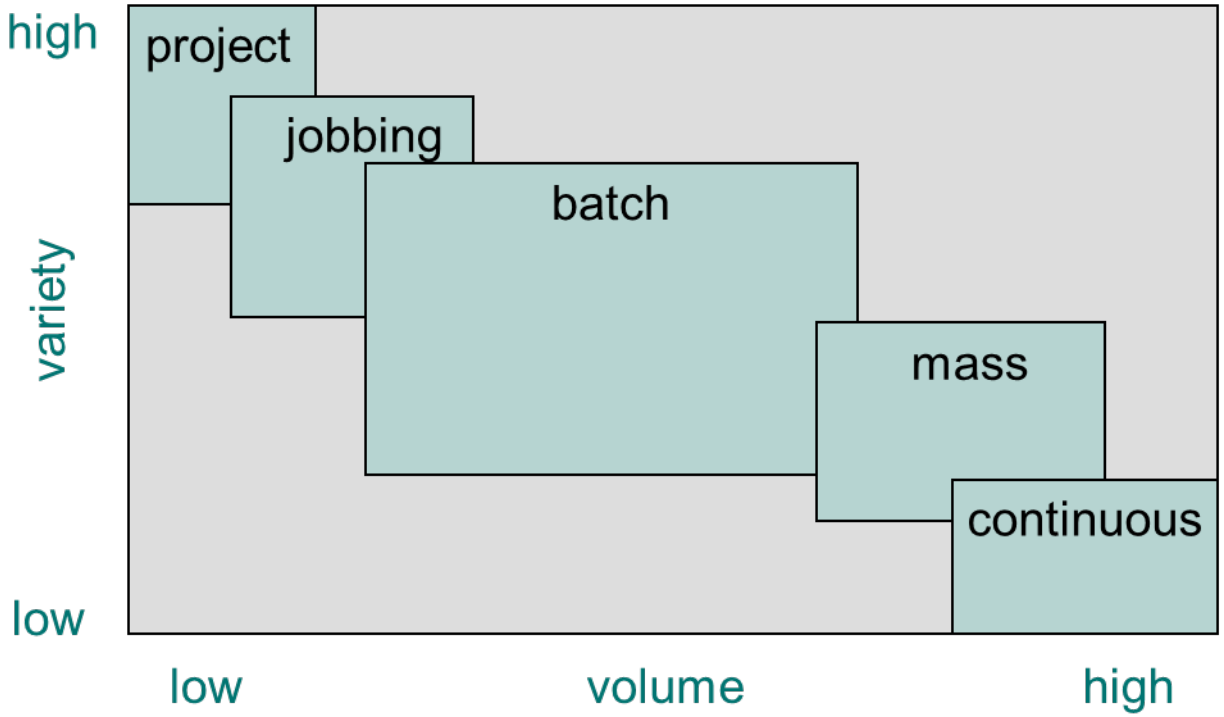
- Transformation also characterised by volume & variety*



(*text also refers to variation and visibility)

Transformation in the operations system

- Volume and variety define basic types of (manufacturing) operation:



Transformation in the operations system

Manufacture of professional sports equipment e.g. a racing bike for a professional team is likely to be a:

A.Project operation

B.Jobbing operation

C.Batch operation

D.Mass operation

E.Continuous operation

Transformation in the operations system

"The hospital has 42 surgeons who perform 6 000 heart operations each year… 'It's a numbers game' said Dr Shetty, who has performed 15 000 operations. 'Surgeons are technicians. The more practice they get the more specialized they become and the better the results… The hospital's charges for open-heart surgery are, on average, a tenth of the cost of the cheapest procedures in the USA."*

Surgery traditionally is a professional service. So is this

A. A proof that the volume-variety relationship is false
B. An identification of a low variety process (relatively) within a larger high variety process
C. A venture that's doomed to failure because it ignores the volume-variety relationship?

(*https://www.thetimes.co.uk/article/britain-can-learn-from-indias-assembly-line-heart-operations-says-doctor-50ws3pf8l8w)

Adaptation in the operations system

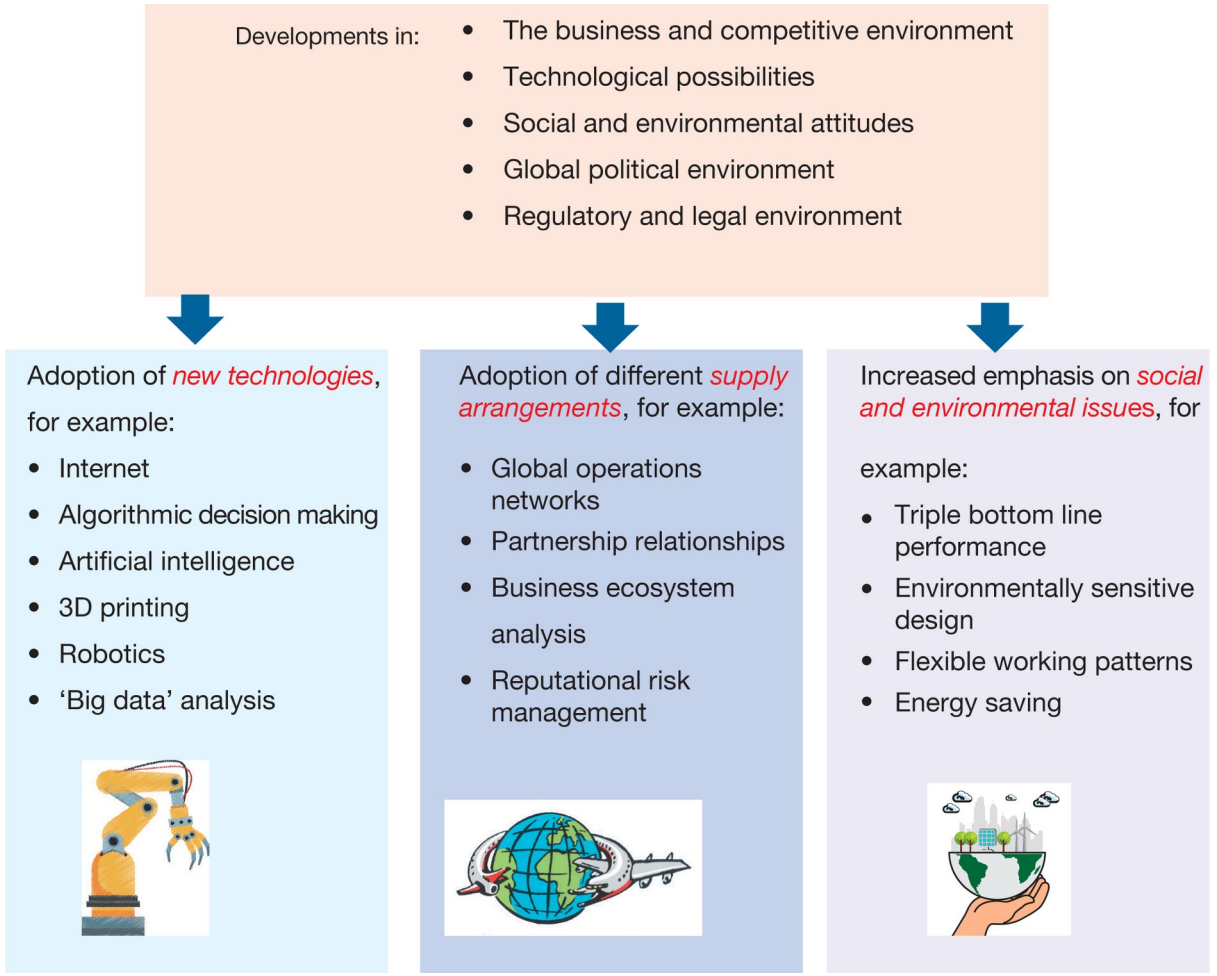


Figure 1.4

Adaptation in the operations system

- Adaptation sometimes debilitating, eg:
- Adapting to local deficiency allows it to persist
- (eg use of ‘buffer’ inventory in car plants)
- Adaptation that is too rapid: ‘thrashing’
- (eg frequent change of layout in retail)
- Adaption that produces over-specialisation…

For example, a firm produces specially adapted vehicles for a security organization. Which of the following is essentially an *over-adaptation*?

A. It specialises in the production of a vehicle that no-one wants

B. It specialises in the needs of a dominant customer

C. It specialises in the use of a production process that few competitors have the capability to use

Seminar: Ops as a System

- Please work on next week's seminar material, seminar case/questions will be uploaded 24 hours before the first seminar.

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Thank you.