

OPERATIONS MANAGEMENT

(Operations is core of business – OM is about change, creativity, value adding & productivity)

Note:

Henry Gantt – devised charts for scheduling
Frank Gilbreth – used time and motion studies
Frederick Taylor – used process analysis
Shewhart – used statistical sampling

Business management centres on Operations Management – without it no other business function is possible.

A. Operations Management is Dynamic

Operations (technical core) produces, works, is in action and has a value- adding effect.

Operation of anything relates to a movement planned campaign, piece of work, project or something that works. Any event, activity/process where inputs are changed/improved/converted/transformed or assembled to a planned, designed or anticipated output = operations. } Note

Operation Management Functions:

- Product/service design
- Demand & capacity planning
- Production system design
- Production planning & control
- Improvement, problem-solving and maintenance

All managers (across the functions) have to find solutions to challenges and hence are in fact all actually operations managers.

Creativity in OM is NB!

Creative ideas impact operations – processes, concepts, product packages, systems, technology, infrastructure, layout, resources and combinations thereof = financial impact on business.

Any part/ process within the transformation process to be considered.
Quality must be maintained.

Technology and innovation are NB

- Designers must design for ease of assembling / operability/quality and cost-effectiveness.
- Technological innovation = idea is converted into a usable technique/ technical application
- Innovation refers to technology that is applied for the first time.
- Technology refer to application of existing knowledge to methods
- Innovation may lead to diversification/elimination of some existing products.
- Rapid prototyping (RP) = technology enables businesses to move to a superior performance curve in terms of faster service & lower costs e.g., industrial robots/ CRM/ SCM/ ERP etc.

*Gives
business
competitive
advantage*

Economic value of the output must be higher than the economic value of the input.

Therefore value added = cost outputs – cost inputs

Productivity, effectiveness and efficiency NB = OM principles: JIT (just-in-time)/ lean production & TQM

Om promotes systematic approach (value analysis) to reduce production cost without decline in quality, value or function.

Principles that promote value & saves time:

- a) Cutting flow/lead time, distance & inventory along the chains of customers
- b) Cutting set-up, changeover, get-ready and start-up lead times
- c) Knowing and teaming up with the next and final customer (customer is the next process)
- d) Entire company to be unified via shared information and dedication towards OM
- e) Reduce number of product/service components and operations/processes and number of suppliers to select few good ones.
- f) Organising resources into multiple chains of customers each focused on a product/service
- g) Investing in cross-training for mastery of multiple skills = utilise human resource potential/creativity
- h) Improve present equipment & human capital before considering new resources
- i) Streamline and simplicity easing the provision of goods/services without error or any process variation
- j) Just-in-time production – decrease cycle intervals and lot size
- k) Cut admin, reporting and controlling causes, not symptoms

B. Operations Management Defined

Operation should be value-adding processes in which inputs are transformed into outputs. Most NB input-transforming resource = human component.

Productivity depends directly on human capabilities to produce effectively/ efficiently.

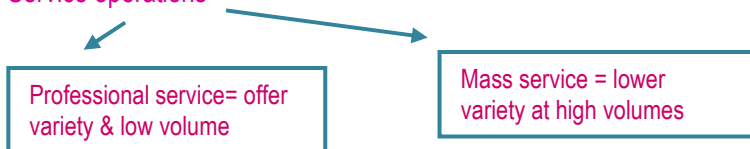
OM deals with planning & control of the inputs, process & outputs of operations.

- Planning & control of transformation systems refers to: macro-processes, micro-processes, productive systems, and process technologies.
- Planning & control of outputs refer to value, goods & services, improvements, new designs, technology, delighted markets, competitive advantages, sustainability etc.
e.g.

Business Type	Inputs	Transformation	Outputs
Bakery	Flour/sugar etc Knowledge/skills/ equipment	Food pre, machine, set-up, mix, mould, bake, pack	Pies, cakes, bread etc

Process design influenced by volume/variety relationship

Service operations



Operations that can yield variety of offerings on large scale will have the edge over competitors

Specific attention must be given to interfaces & need for cross-functional co-ordination.

OM's different processes characteristics:

- 1) Market segment & product range determine the different items that are produced by the operation.
(greater the variety made by same operation, the greater the flexibility, cost & ability to provide non-standardised products/services)
- 2) Process velocity = ratio of total throughput time for a product n terms of the value added time.
(value-added time = work is actually being done to complete the product or deliver the service)
- 3) Number of items produced by operation over given period determines process type.
(greater the volume of type of product produced the greater the benefits through standardisation & repeatability of the process)

- 4) A particular demand pattern for the output of the operation may be: highly variable, irregular, non-routine and unpredictable – implication of this is the possibility of a sudden and dramatic change in operations capacity required to supply products/services
(e.g. hotel resorts must be able to deal with variation in demand levels)
- 5) Always attempt to reduce or eliminate lead time elements in a process – set-up time, queue time, idle time, inspection time, transportation time etc

Process flowcharting:

Process re-engineering = rethinking and **radical redesign** of business processes to achieve dramatic improvements in critical contemporary measures of performance, such as cost, quality, service and speed.

Process flowcharting = technique used to analyse, describe and display any process clearly/accurately and concisely.

Shows cross-functional interaction and teamwork in business process.

Question all steps, eliminate unnecessary/ combine/ rearrange/ simply activities = effective results & reduce waste.

OM Objectives:

- Quality
- Low lead times and inventory reductions
- Dependability
- Speed/ flexibility
- Productivity and efficiency
- Low cost & affordability
- Change whatever in operation is causing one performance objective to deteriorate as the other improves – trade-off



Note: a business can be 'productive' regardless if that production output didn't justify the input – sustainable profitability is impossible without productivity i.e.

Output value after being exposed to a uniquely design transformation process, must be higher than the value of the separate pieces of available inputs (resources)

Macro Productivity

= all individual businesses

➔ Context of a nation's entire production (GDP)
= country/economy as a whole & the governance of productivity growth

Value of the total output of a country ÷ by its total population

Micro Productivity:

Individual business's operations

Focus on how well operations perform in terms of value/ effectiveness, efficiency, utilisation impact & quality.

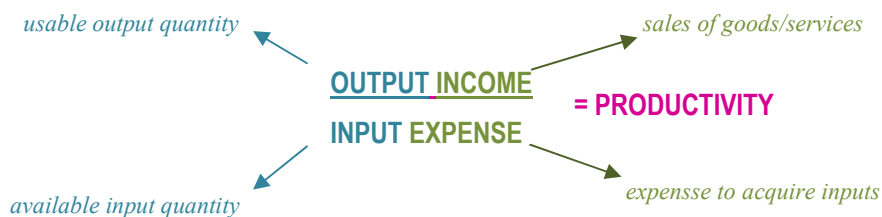
1st measure = ability to achieve production

2nd measure = $\frac{\text{output}}{\text{input}}$

i.e. productivity = $\frac{\text{value output}}{\text{value input}}$

Productivity is not only efficiency but quality of inputs, resource utilisation & effectiveness.

Qualitative improvements in inputs create sustainability, durability and stability & cause output to increase without additional capital or HR inputs.



Effectiveness = how good the output of the transformation process is in relation to market needs = value + quality definition

Value added productivity measurement:

Concept is NB – gives whole picture of labour costs + how operation creates and distributes wealth. Income Statement & Balance Sheet used as sources of data for measuring productivity.

How to increase or improve productivity: Keep output same drop input / increase output but drop input
Keep input same but increase output etc

External components of productivity improvement = factors beyond the control of management (physical or natural) e.g. market & legislation	Internal soft components of productivity improvement = factors which are difficult to change e.g. human resource, training, culture, organisation	Internal hard components of productivity improvement = factors that are easy to change e.g. methods, machines, equipments, process technologies (resource outputs) of the process.	Work study =management tool – study method & work measurement used investigation of all aspects of human labour and aimed to improve increasing efficiency / productivity by means of systematic research = measurement techniques <ul style="list-style-type: none">• <i>Step 1:Method study:</i> Investigates current procedure to develop simpler/cheaper method to increase efficiency and reduce costs• <i>Step 2: Work measurement:</i> Apply techniques to determine time scope of worker to complete task.
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C. Operations Strategy and Operations Design

Business strategy and operations strategy:

(actions /decisions committing business to moving in certain direction)

OM drives corporate business strategy – puts strategy into practice.

Operations strategy = total pattern of decisions and actions that formulate the role, objectives and activities of each part of the operation so that they contribute to and support the organisation's business strategy.

OM strategy triad that's affected by OM

- 1) Customers
- 2) Competitors
- 3) Internal capability (resources, innovation, products, process technologies)

Remember want: quality, speed, dependability, reliability, low costs, flexibility, service, respect and predictability. OM manager will use SWOT analysis and current well-established strategies.

Kaplan & Norton balanced scorecard aid in overall picture: links performance measures that give comprehensive overview of business:

- 1) The market: how do customers see us? Is their view our view?
- 2) The internal customer: what must we excel at? Safety, health and the environment?
- 3) The value-adding perspective: can we keep on improving, innovating and creating value?
- 4) The financial perspective: how do shareholders see us?



Operations design

÷ 2 lean or agile supply

Lean supply = customers demanding costs

- Low product variety & long life cycles
- Lower profit margins than agile supply
- Market is more predictable
- Stock demand is stable

Agile supply = customers demanding availability

- High product variety & short life cycle
- Higher profit margins than lean supply
- Market is more volatile
- Stock demand immediate and volatile

Productive systems designed for particular aggregate demand that determines system's dimensions, nature, scope & scale

TYPE	Continuous or repetitive operations systems	Job/batch operations system	Project operations systems
WHAT	High volume low variety = highly mechanised plant e.g motorcar plant	e.g. clothing manufacturers/ plastic injection moulding	= fixed position layout, temporary, o clear flowlines unique function need – low volume = 1 item e.g space shuttle
PRODUCT TYPE	Standardised	Diversified	Unique
PRODUCT FLOW	Standardised	According to requirements of particular product	Virtually none
MATERIALS HANDLING	Materials flow determinable, systemised and often automated	Handling depends on the product, therefore highly variable and expensive	Special equipment often necessary; high cost
RAW MATERIALS INVENTORY	High turnover	Low turnover	Variable because of production time
PRODUCTION COST COMPONENTS	Small quantities	Large quantities	Single product
LABOUR REQUIREMENTS	Relatively high fixed costs; low variable costs per unit	Relatively low fixed cost; high variable cost per unit	Relatively high fixed costs; high variable costs
PRODUCT TYPE	Highly specialised routine tasks at a specific rate	Highly skilled artisans working without supervision and with moderate adaptability	High degree of adaptability to various tasks commissioned

(process type dictates layout)

Relationship between operation system type & layout

Note: high variety output= low volume
Output is determined by feasibility & importance of degree of regular flow

- Projects & large jobs = fixed positions layout
- Jobs & batch processes = process layout (layout according to similar processes)
- Large batches & small continuous process = cell layout
- Mass processes or pure continuous repetitive processes = product layout (layout according to product)

X4 configurations: machinery placed to cut process time:

- 1) Plant for fixed assembly points Raw materials on one spot & production is brought to raw materials
- 2) Horizontal grouping (process/functional layout) Similar machines grouped together in own sections (woodmills)
- 3) Vertical layout (product layout/flow grouping) machines placed in straight line & machine capacity are attuned news paper printers
- 4) Combination

D. Operations Planning and Control

E. Operations Improvement

F. Operations & Other Business Functions