









# MSO – Manufacturing and Services Operations

Master in Industrial Management, Operations and Sustainability

ISEG, Lisbon School of Economics and Management,
Universidade de Lisboa

pamarques@iseg.ulisboa.pt



#### **Course content:**

- 1. Introduction to Manufacturing and Service Operations
- 2. Design of products, services and processes
- 3. Managing capacity and demand in manufacturing and services
- 4. Manufacturing and service inventory management
- 5. Managing supply chain relationships
- 6. Continuous improvement of services, products and processes
- 7. Technology in services and manufacturing

































Teacher: Pedro Alexandre De Albuquerque Marques

pamarques@iseg.ulisboa.pt

Office hours: Thursday from 5h30 p.m to 6h30 (by appointment)































#### **Course assessement**

The evaluation of the curricular unit QM consists of a final exam and a group work:

A) Final exam

The final exam covers all the topics and a minimum grade of 8.5 out of 20 values is required.

Continuous evaluation:

B) Group work (mandatory): Presentation of a scientific article

The final grade is given by:

Final grade = 0.6\*A + 0.4\*B

In the case of the special exam and grade improvements the final grade will be equal to that of the final exam.



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#### **Important dates**

**September 25** – Each group must send by e-mail a word document including the name, student number, e-mail, and Photo.

October 9 – Each group must send by e-mail the reference of the scientific article

**November 17** – Each group must send by e-mail the work group presentation.

Weeks (November 20, and November 27) – Presentation of the group work (15-20 minutes).





























This course provides students with theoretical and practical knowledge regarding operations management as it applies to a variety of businesses and organizations. It comprises a set of topics covering the use of principles and tools to perform operations strategy, design, planning, control, and improvement related activities. The course is practice-oriented and requires active student's involvement in class activities such as resolution of case studies problem sets and preparation of a work group.





























# 1. Introduction to Manufacturing and Service Operations































#### **Agenda**

- Operations management
- Operations performance
- Operations strategy































# Operations management lifecycle (4D's model)

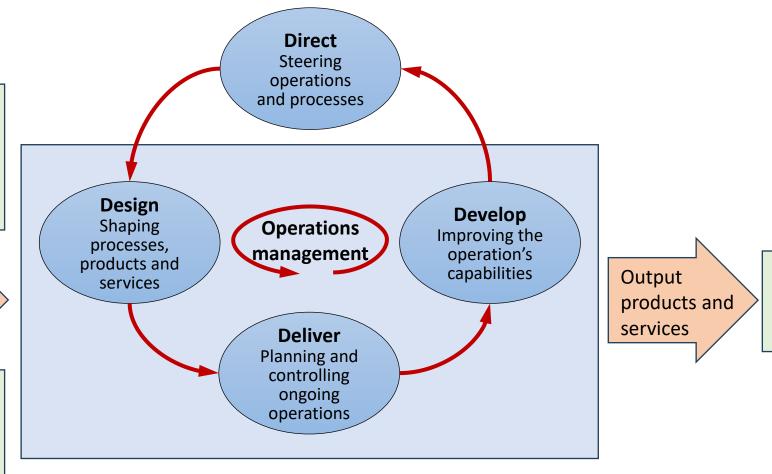
#### **Transformed** resources:

- Materials
- Information
- Customers

Input resources

**Transforming** resources:

- Staff



Value-added for customers

- **Facilities**























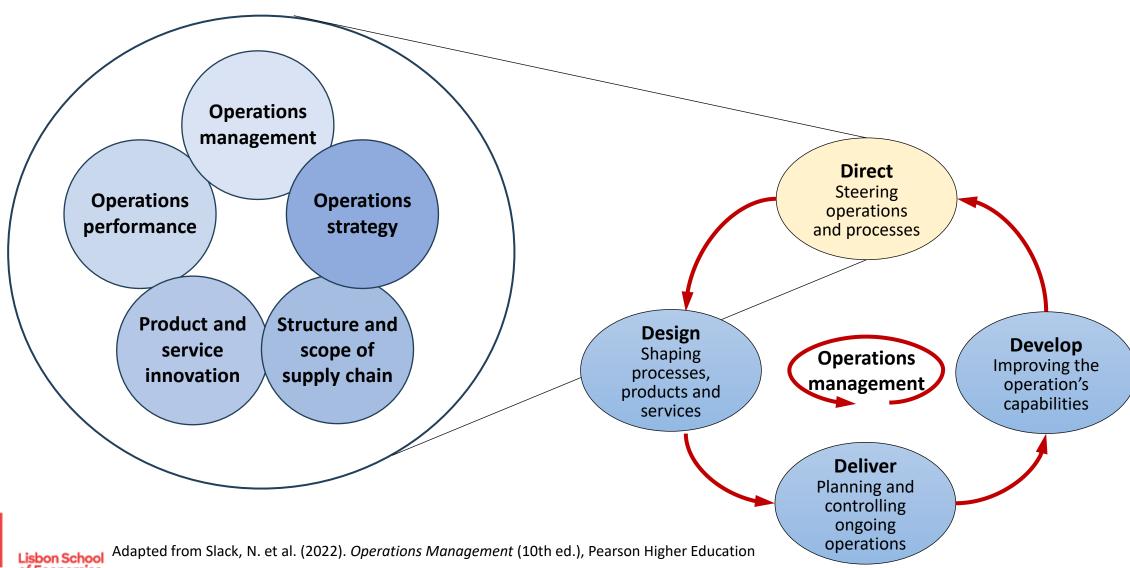








# Operations management lifecycle (4D's model)





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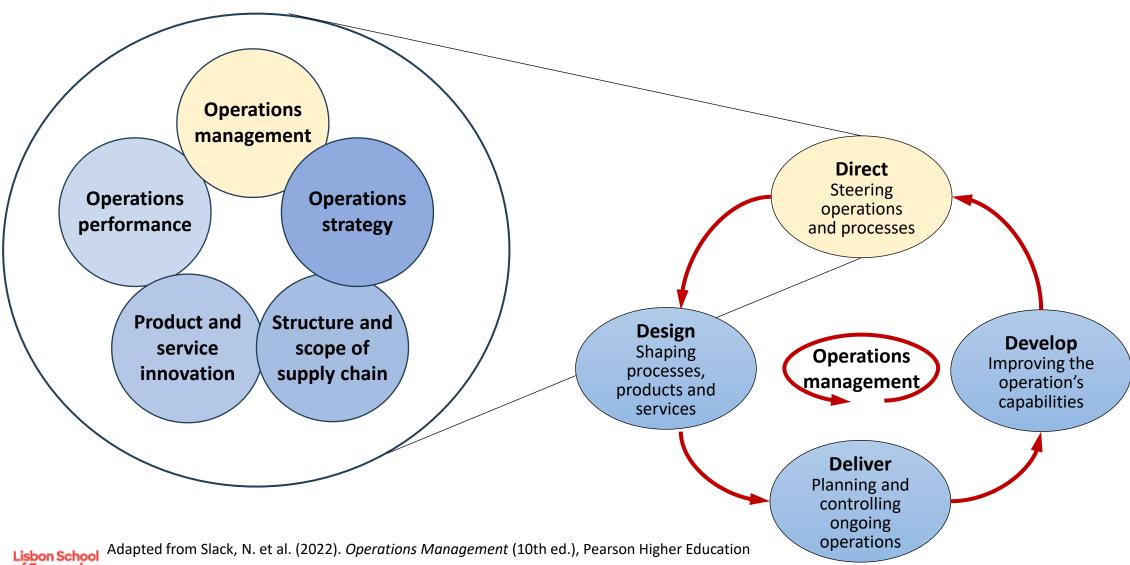








# Operations management lifecycle (4D's model)





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#### What is "Operations Management"?

Operations management involves **overseeing the resources** used to **produce and provide goods and services**.

All organizations possess an **operations function** since they all produce some form of service or product.

























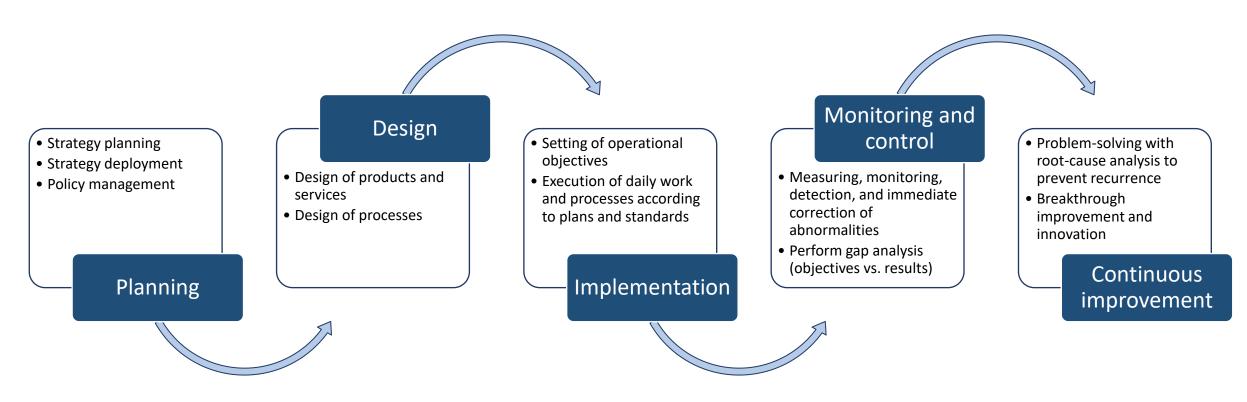








#### Operations Management process



































### **Operations Management elements**







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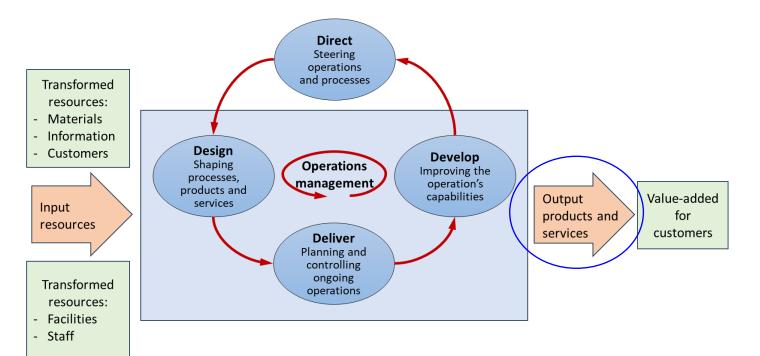








#### **Products and services**



According to the International Organization for Standardization (ISO):

**Product** is an output that is the result of a process that does not include activities that are performed at the interface between the supplier (provider) and the customer.

**Service** is the result of a process that includes at least one activity that is carried out at the interface between the supplier (provider) and the customer..



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#### Products and services









#### Pure products

Intangibility
Some significant tangible elements

Heterogeneity

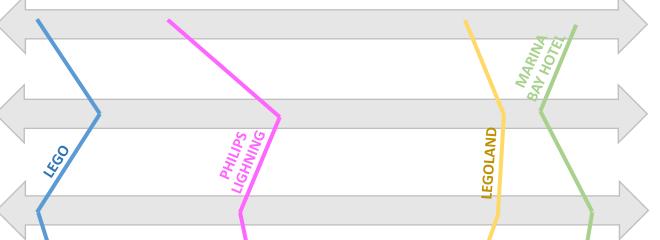
Largely standardized

Inseparability

Production and consumption can be separated

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**Perishability**Storage possible



#### **Pure services**

Intangibility

No tangible elements

Heterogeneity

Not at all standardized

Inseparability

Production and consumption totally simultaneous

Perishability

No storage possible





























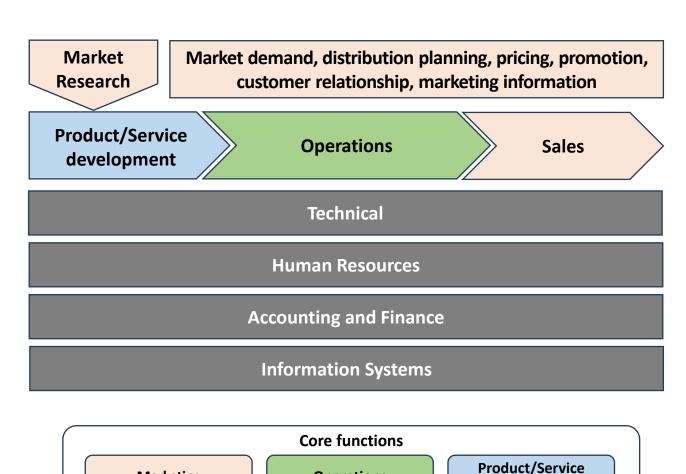




#### Operations Management function

The operations function is central to the organization because **it creates and** delivers services and products, which is its reason for existing.

Regardless of scale, every organization must manage operations efficiently and effectively to ensure successful delivery of products and services.





















Marketing







**Operations** 

**Suport functions** 





development





#### Operations Management function

#### Operations management uses...

Resources to People **Technology Knowledge** Information **Partners** etc.

**Appropriately Effectively Efficiently** Creatively Reliably **Accurately** etc.

Create **Produce Assemble** Sell Move Cure Diagnose Shape **Fabricate** etc.

**Outputs Services Products** Ideas **Solutions** Knowledge etc. Nature of the that **Fulfill** Meet Satisfy **Exceed Delight** etc.

**Defined** Current **Potential Perceived Emerging** Real etc.

Market Customer Citizens' Clients' Society's Students' etc.

**Requirements Demands** Needs Concerns **Expectations Dreams** etc.

**Transforming** resources

**Transformation** objectives

Nature of the transformation

product/service

Performance

Nature of the objectives

The operation's customers

**Customers'** objectives



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standard









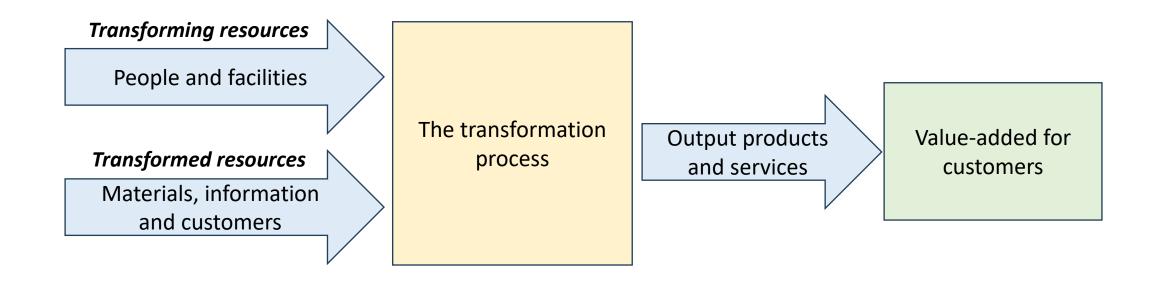






#### The input-transformation-output process

All operations create and deliver services and products by changing inputs into outputs using an 'input-transformation-output' process.



























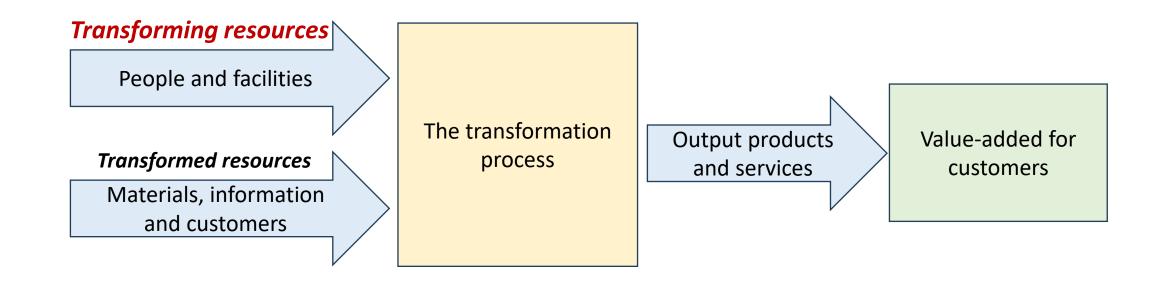








#### The input-transformation-output process



**Transforming resources** are those that act upon the transformed resources. It includes facilities (buildings, equipment, plant and process technology) and staff (people who operate, maintain, plan and manage the operation).























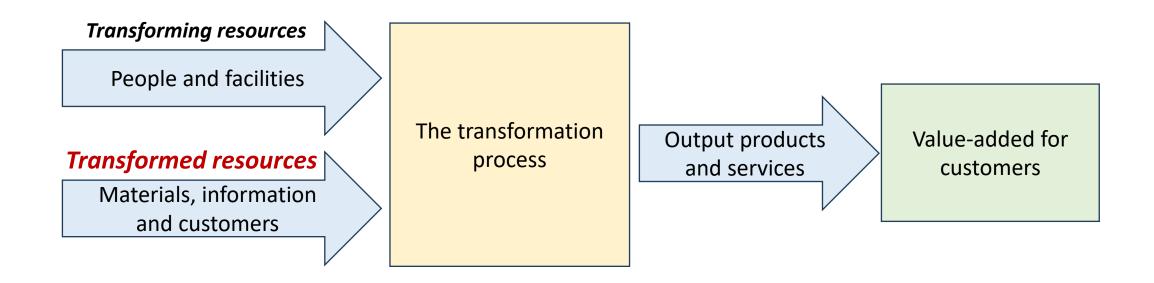








#### The input-transformation-output process



**Transformed resources** are those that are treated, transformed or converted in the process. It includes materials, information or customers.

























#### The input-transformation-output process Transformed resources

Predominantly processing inputs of materials	Predominantly processing inputs of information	Predominantly processing inputs of customer
► All manufacturing operations	► Accountants	► Hairdressers
► Mining companies	➤ Bank headquarters	► Hotels
► Retail operations	► Market research company	► Hospitals
▶ Warehouses	➤ Financial analysts	► Mass rapid transports
► Postal services	➤ News service	► Theatres
Container shipping lines	University research unit	► Theme parks
► Trucking companies	➤ Telecoms company	▶ Dentists





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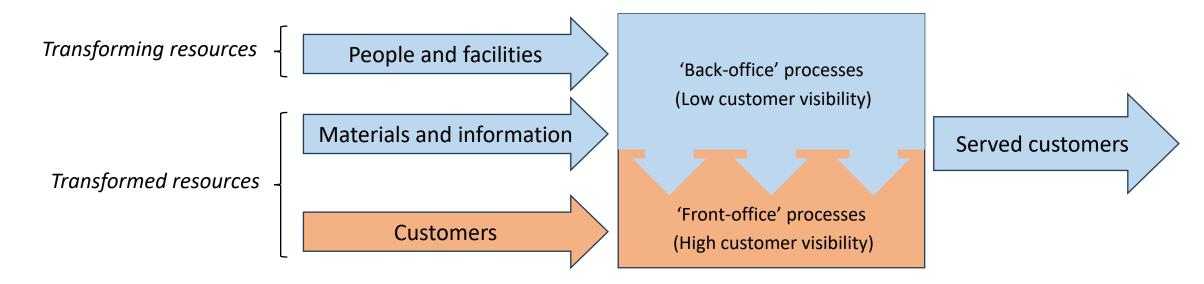






# The input-transformation-output process When transformed resources are customers

When the main transformed resource is the customers themselves, it is useful to distinguish between 'front-office' processes that act on customers directly and 'back-office' processes that provide indirect services.





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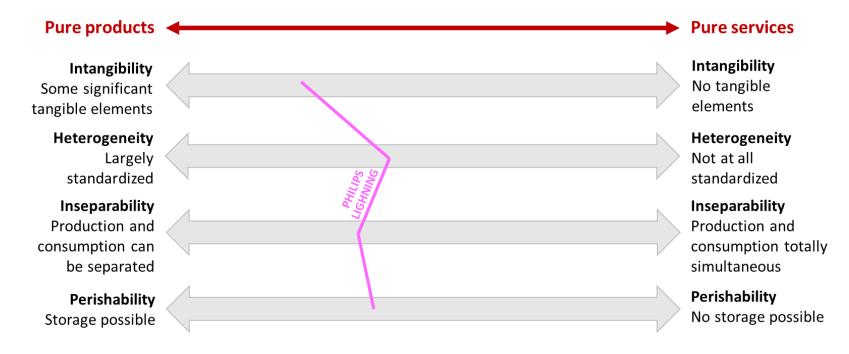




#### Servitization

Lighting as-a-service' (LaaS), where it takes care of its customers' lighting needs from the initial design and installation of the lighting, to the operation and maintenance.





It involves (often manufacturing) firms developing the capabilities they need to provide services and solutions that supplement their traditional product offerings (e.g. customer support, maintenance, training, online services, after sales, ...).





























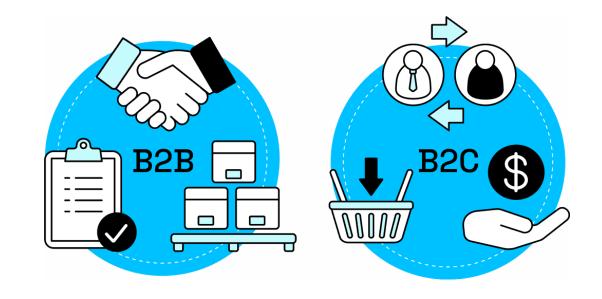




#### **B2B** and **B2C** operations

**B2B** (Business-to-Business) operations are those that provide their products or services to other businesses.

**B2C** (Business-to-Consumer) operations are those that provide their products or services direct to the consumers who (generally) are the ultimate users of the outputs from the operation.























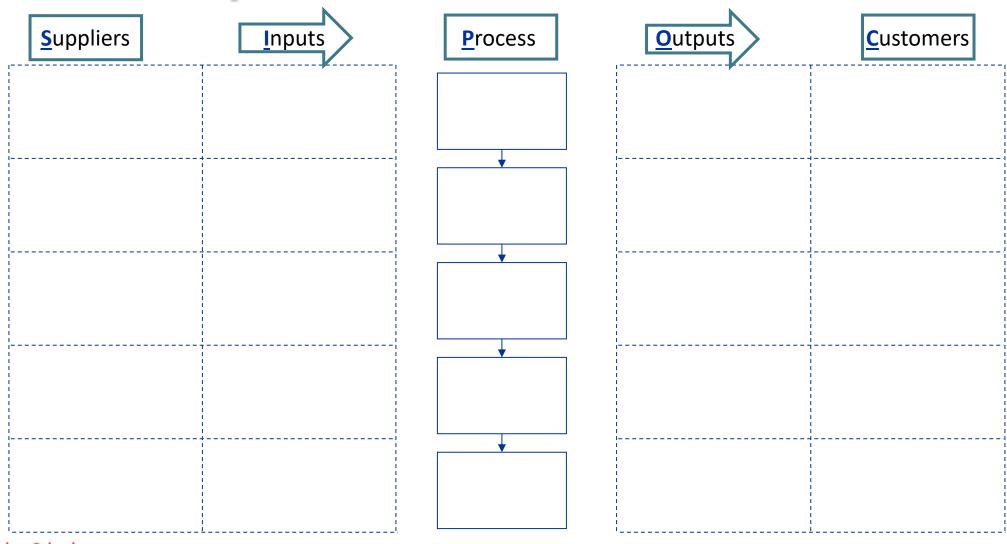
















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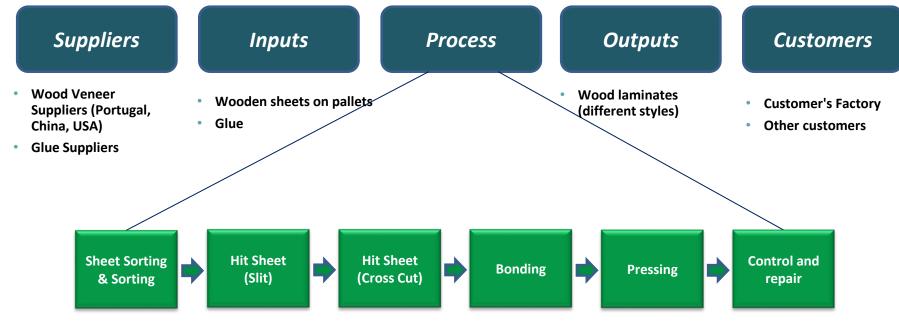


































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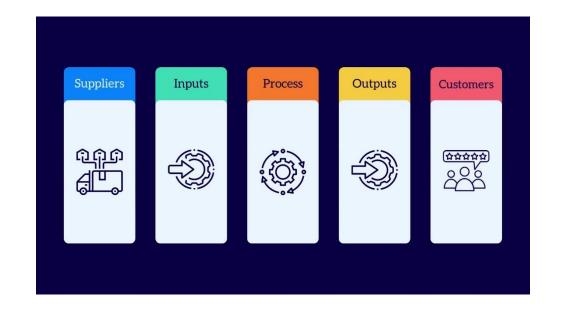








It is a method of **formalizing a process at a** relatively general rather than a detailed level. The advantage of such an analysis is that it helps all those involved in the process to understand and agree what it involves and where it fits within the business.

























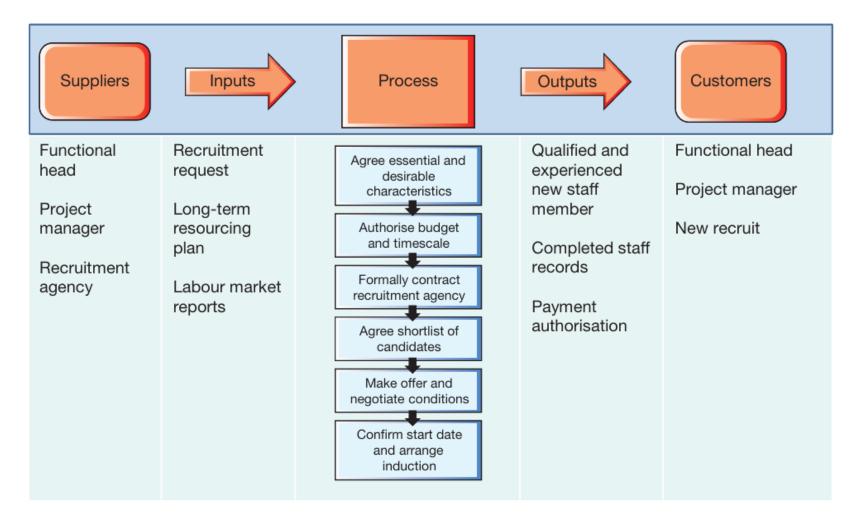


















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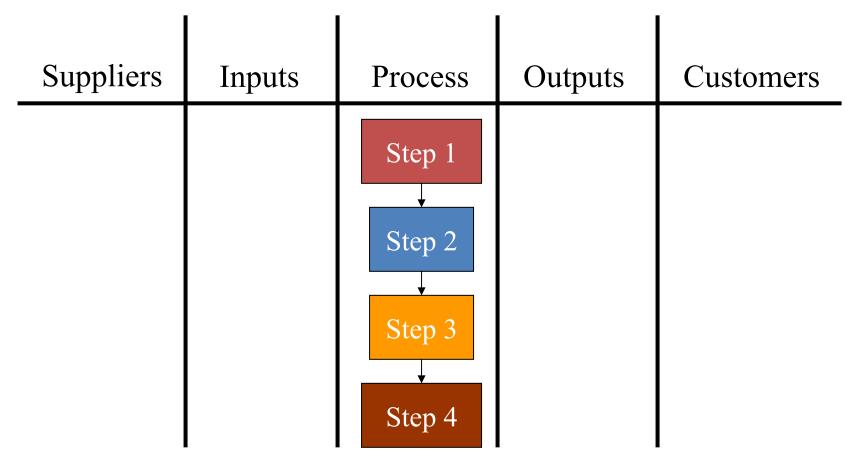
































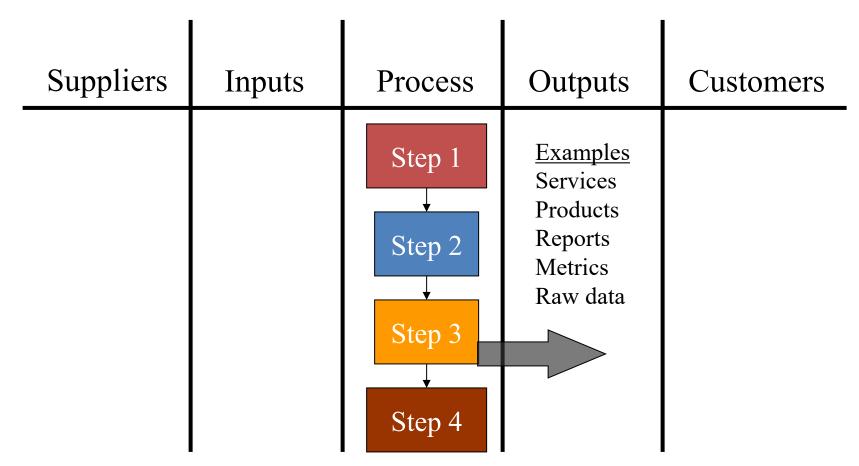
































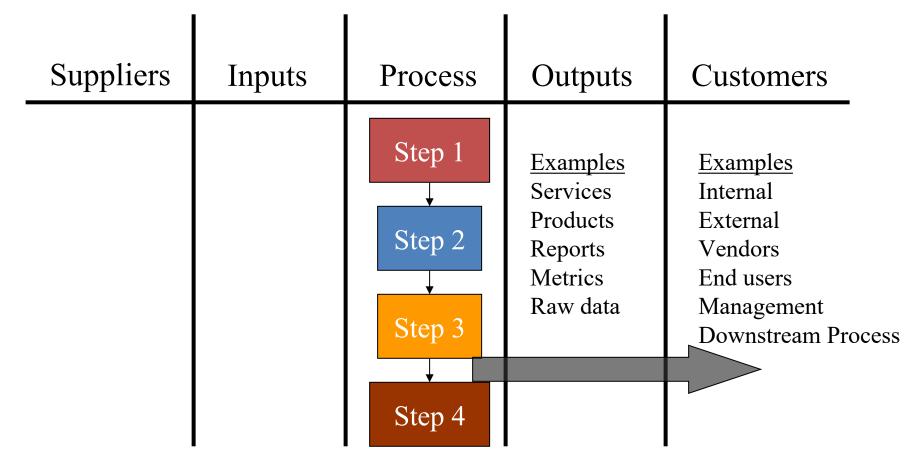
































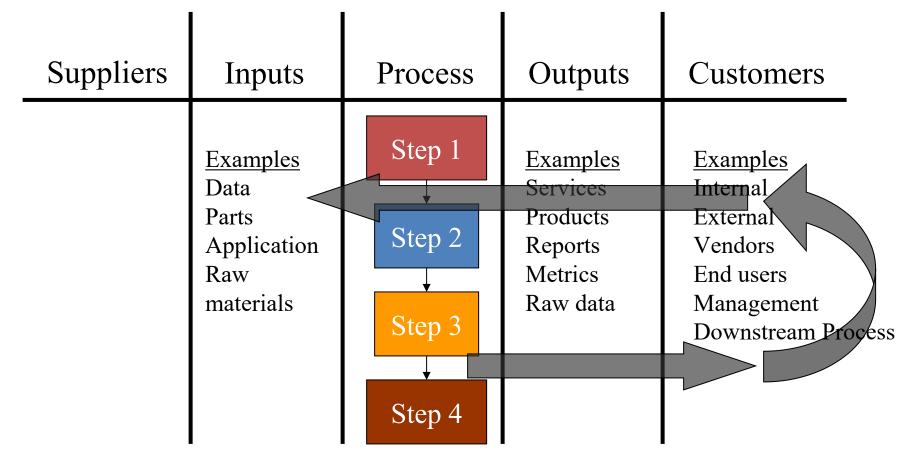
































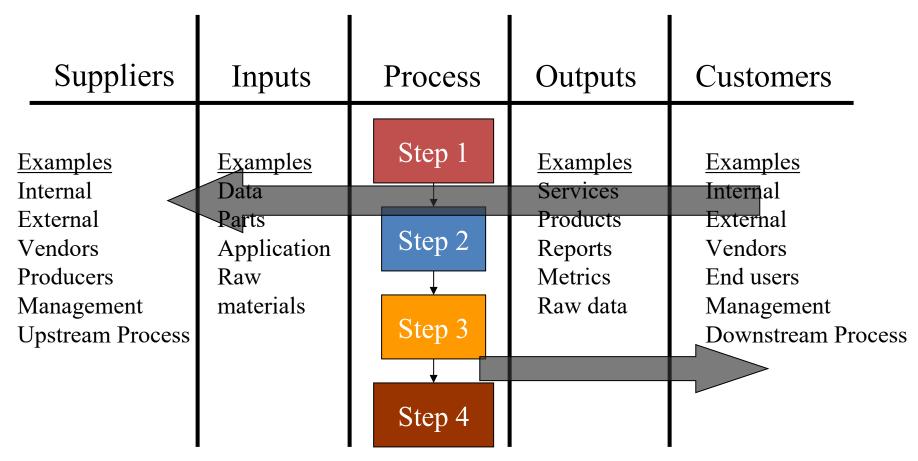


































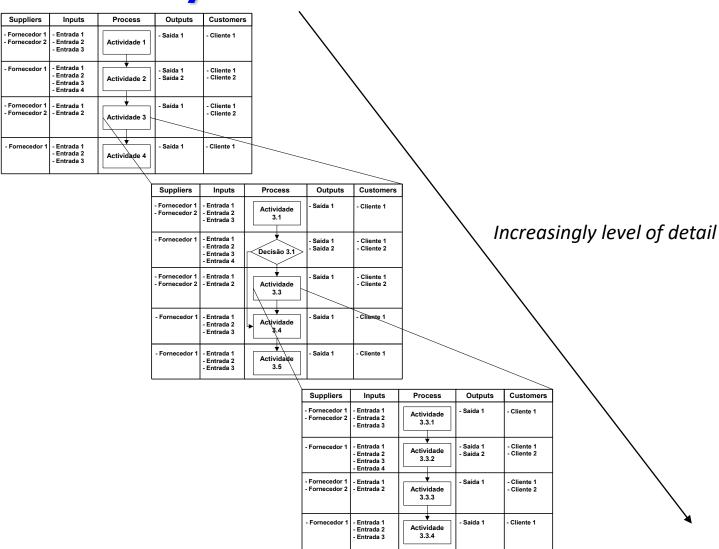








#### **Process hierarchy**

























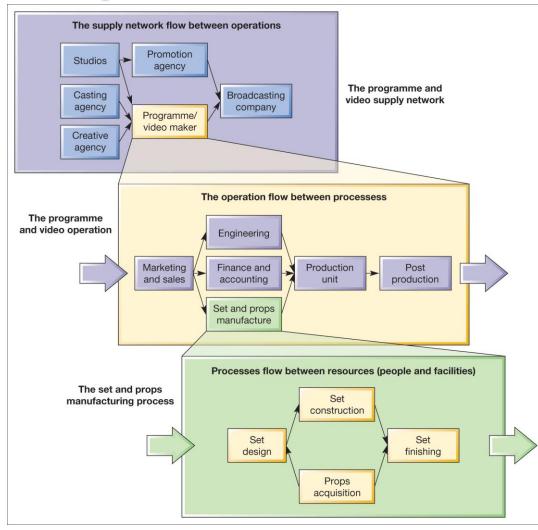








#### **Process hierarchy**





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Adapted from Slack, N. et al. (2022). Operations Management (10th ed.), Pearson Higher Education





















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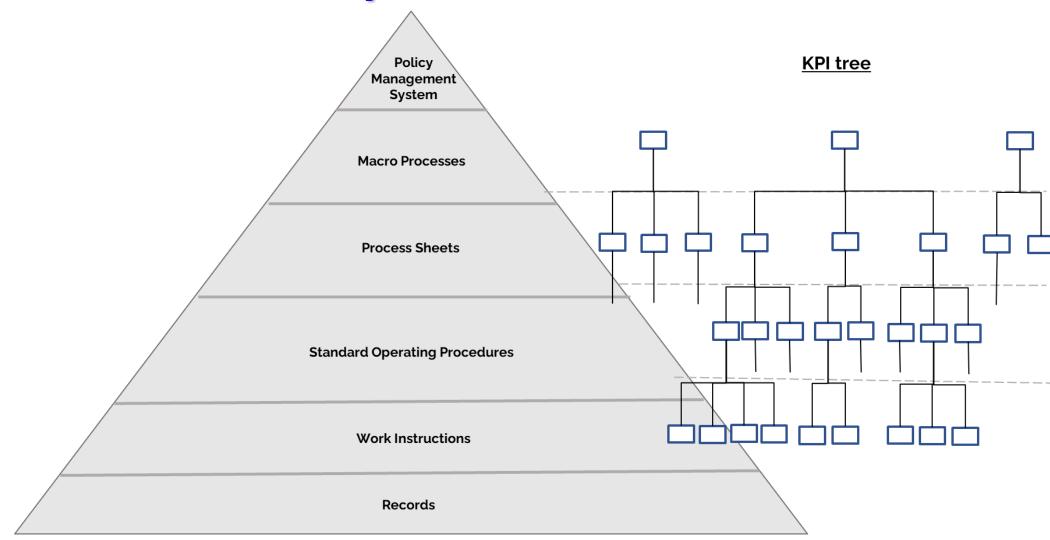








# **Process hierarchy**





































# The four Vs of operations

#### **Implications**

Low repetition Each staff member performs more of each task Less systemisation

High unit costs



**Implications** 

High repeatability Specialisation Capital intensive Low unit costs

Flexible Complex Match customer needs High unit costs



Well defined Routine Standardised Regular Low unit costs

Changing capacity Anticipation Flexibility In touch with demand High unit costs



Stable Routine Predictable High utilisation Low unit costs

Short waiting tolerance Satisfaction governed by customer perception Customer contact skills needed Received variety is high High unit costs



Time lag between production and consumption Standardisation Low contact skills High staff utilisation Centralisation Low unit costs



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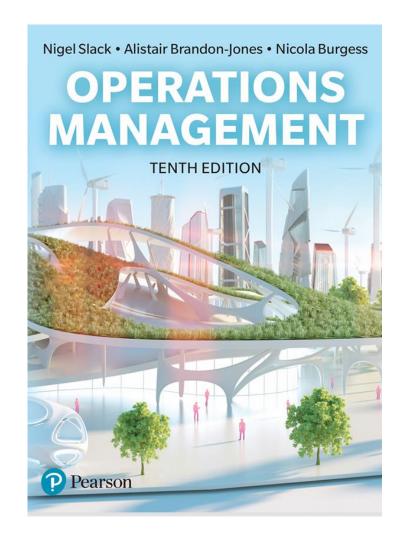








## **References:**



























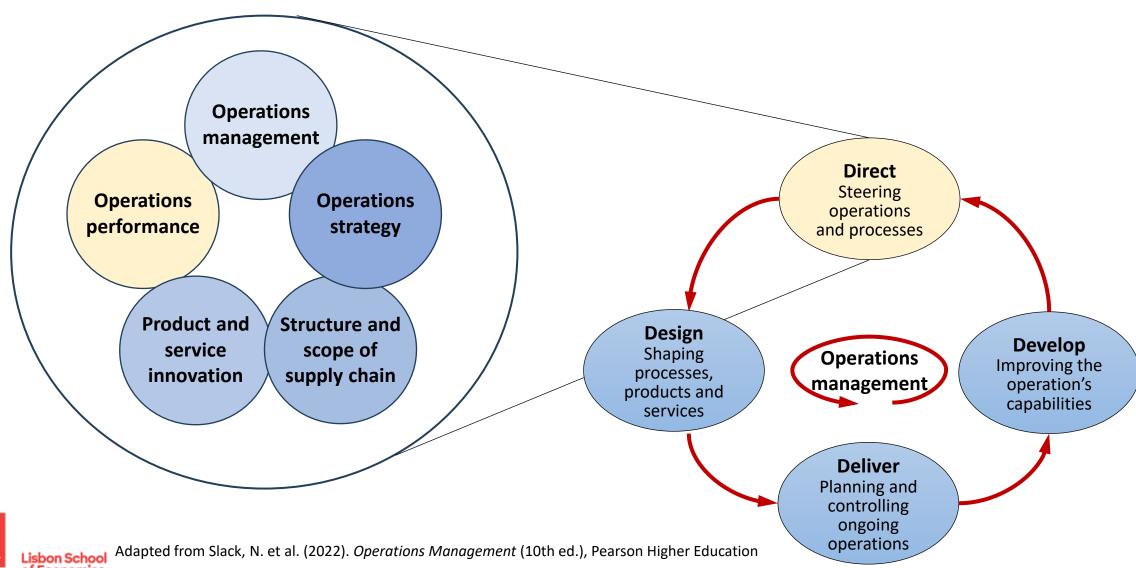








# Operations management lifecycle (4D's model)





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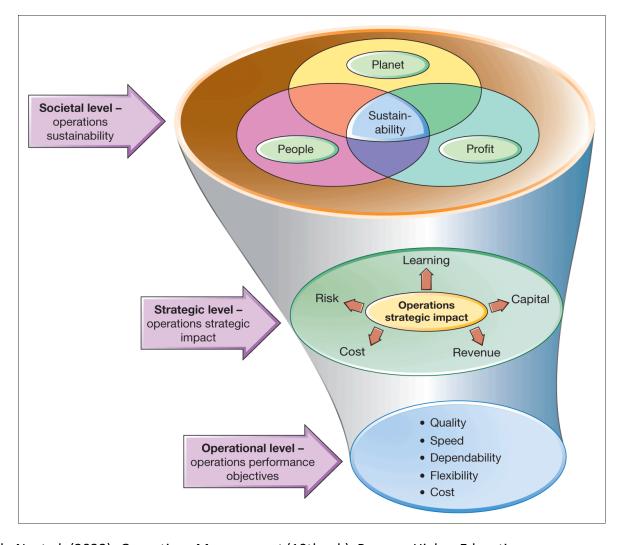








# Three levels of operations performance





Adapted from Slack, N. et al. (2022). Operations Management (10th ed.), Pearson Higher Education



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## **Customers and Stakeholders**

#### Government

- Conformance to legal requirements
- Contribution to economy

#### 'Society'

- Minimise negative effects from the operation (noise, traffic, etc.)
- Maximise positive effects (jobs, local sponsorship, etc.)

#### **Shareholders**

- Return on investment
- Stability of earnings
- Liquidity of investment

## **Suppliers**

- Early notice of requirements
- Long-term orders
- Fair price
- On-time payment



### Top management

- Acceptable profit
- Return on investment
- Low risk of failure
- Future innovation

#### Staff

- Fair wages
- Good working conditions
- Personal/career development

### Staff representative bodies

- Conformance with national agreements
- Consultation



#### Customers

- Acceptable price
- Good service
- Quality offerings

## Lobby groups

 Alignment of the organisation's activities with whatever the groups are promoting

#### **Regulatory bodies**

- Conformance to regulations
- Feedback on effectiveness of regulations



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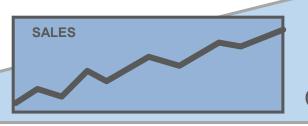




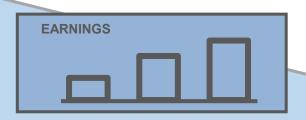




## The G-QCD-M model



Growth Results Contribution



## Work Excellency

Q.C.D. Improvement

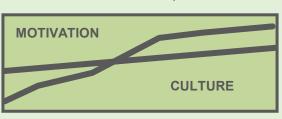






## **Develop People and Organization**

Competent and Qualified Personnel, Excellent Leadership





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## The G-QCD-M model

**Growth** (sustainable results)

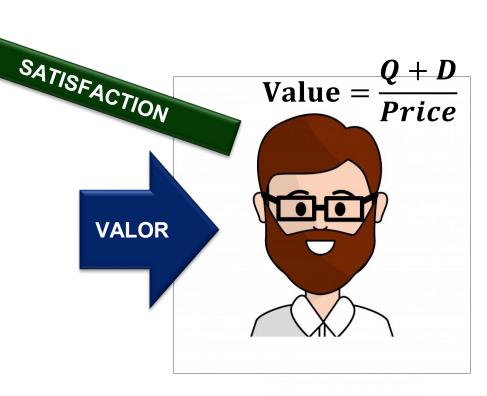


Quality (comply with requirements)

**Cost** (efficiency and produtivity)

<u>Delivery</u> (speed, service, flexibility)







































# The G-QCD-M model | example

Current Situation/Reasons for Action	Objectives G: Growth		
Reduction in sales/m² (Slump in Sales) Change in Consumption channels (online sales) Increase in knowledge of clients (Internet) Increase in product technological dynamics (Progress) Need to motivate employees	Increase Sales Improve Margin Increase Productivity		
Field/Level of Management	Q.C.D.M. Objectives		
Store Operations	Q: Improve Quality Expectation (Complaint Rate) Q: Improve After-Sales Service and the Client Experience in General		
	A: Increase Productivity A: Increase Sales Efficiency		
	D: Reduce Lead Time D: Increase % of Clients Expected within the Level of Service		
	M: Increase Motivation M: Improve the Incentive System		



Adapted from: Kaizen Institute, 2017























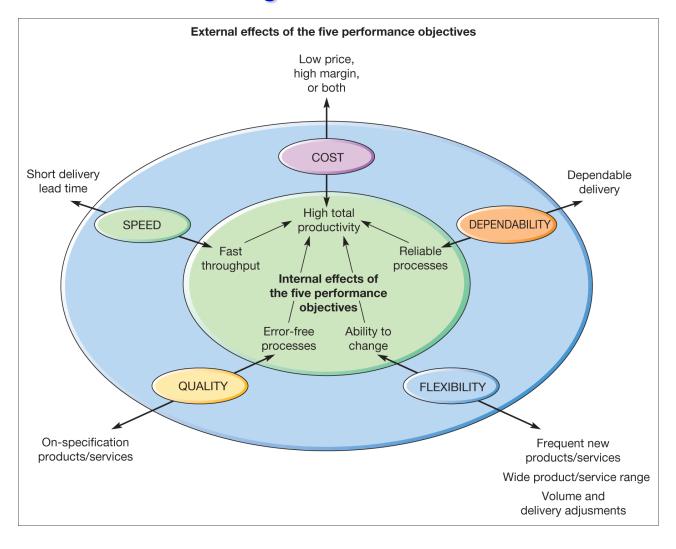








# Five performance objectives





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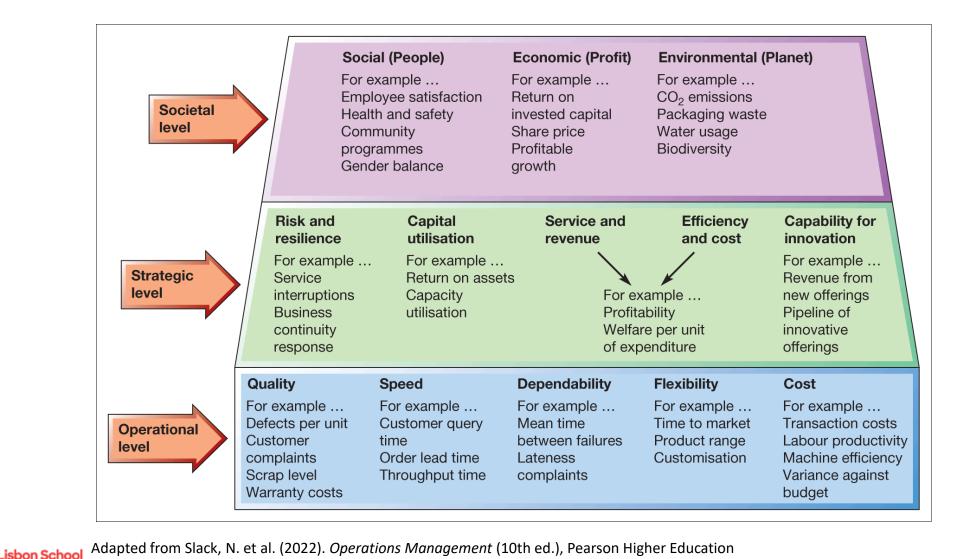








## Performance measures at the three levels











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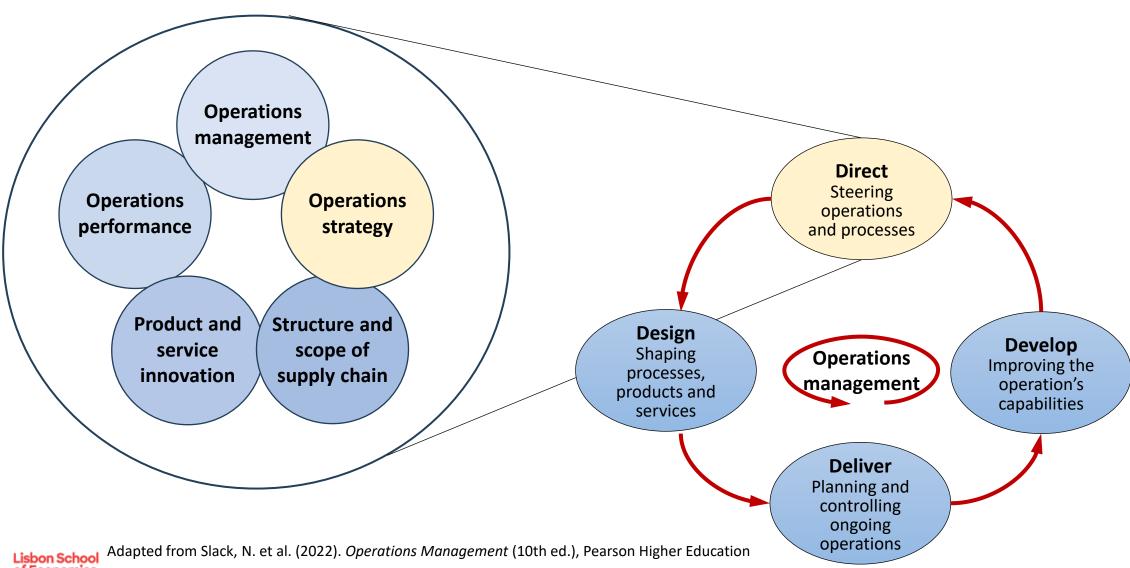








# Operations management lifecycle (4D's model)













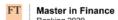












# Strategic contribution of operations



























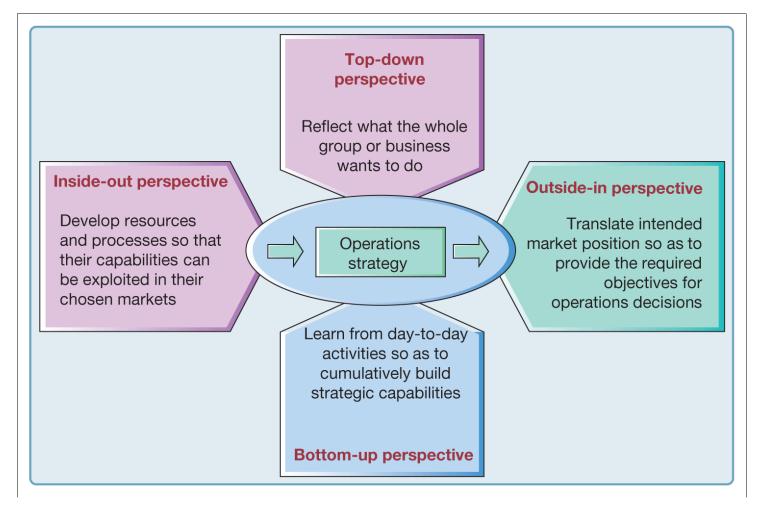








# The four perspectives on operations strategy

























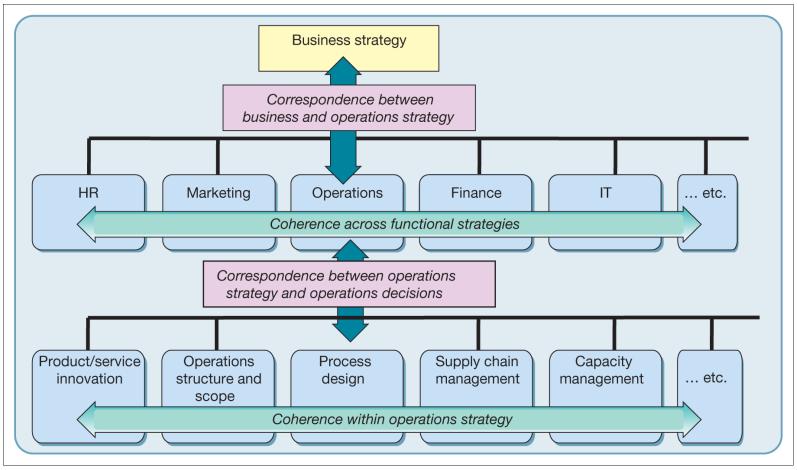








# Alignement of operations strategy with business strategy ('top-down')





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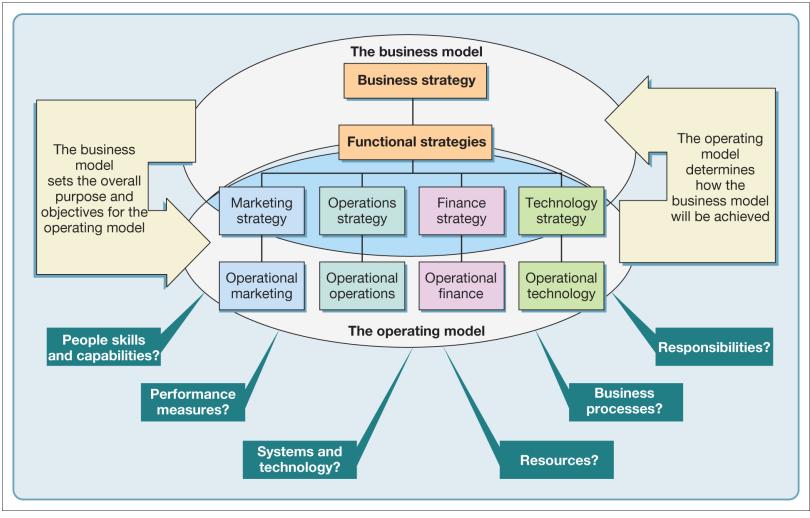








# The business model and the operating model



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# Strategy deployment | X-Matrix of Hoshin Kanri

Step 1: WHAT **Breakthrough Thinking** 

Step 2 : HOW FAR **Annual Breakthroughs** 

> Step 3: HOW Identify Key Driver **Processes**

Step 4: HOW MUCH/WHEN **Determine Metrics & Targets** 

Step 5: WHO Identify Key Owners & **Milestones** 

Dots show linkage from How target back to (key breakthrough initiatives) Deploy All items are How far How much listed in priority Who (specific KPI's (owners) order starting and targets) objectives) from the center and What (long-term Secondary responsibility Primary responsibility objectives) Owner The whole picture of your company on one sheet of paper

Adapted from Kaizen Institute, 2017



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Matrix

Transfer











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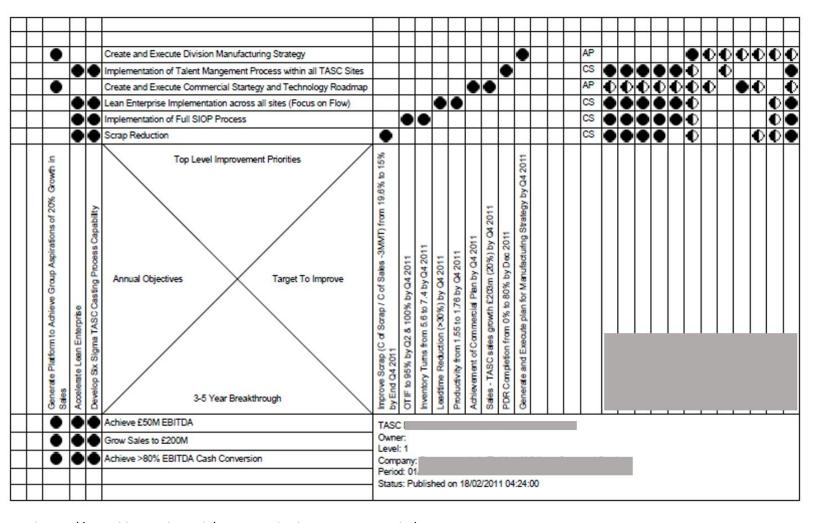








# Strategy deployment | X-Matrix of Hoshin Kanri





Source: https://tcmuklimited.co.uk/strategy-deployment-example/





















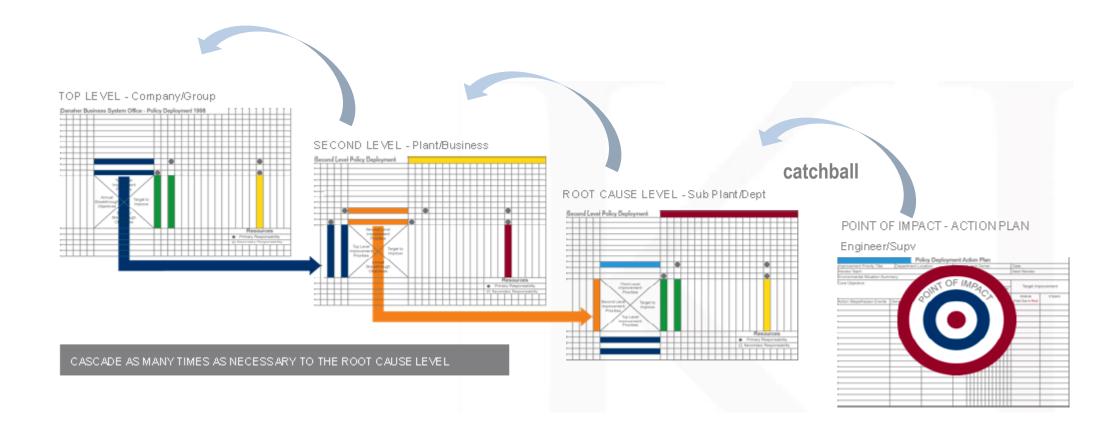








# Strategy deployment | X-Matrix of Hoshin Kanri





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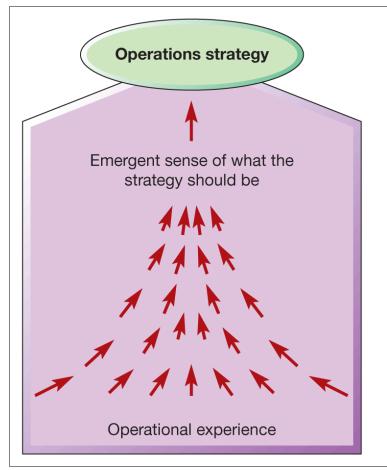


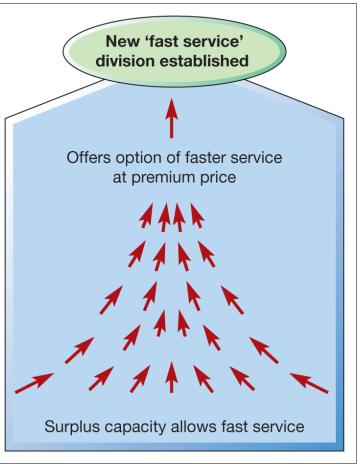




The 'bottom-up' perspective of operations

strategy







Adapted from Slack, N. et al. (2022). Operations Management (10th ed.), Pearson Higher Education

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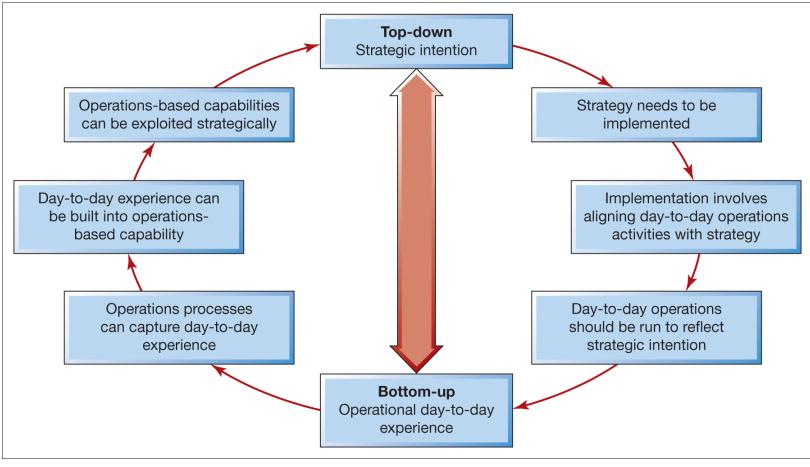








# The "top-down' and 'bottom-up' perspectives on operations strategy





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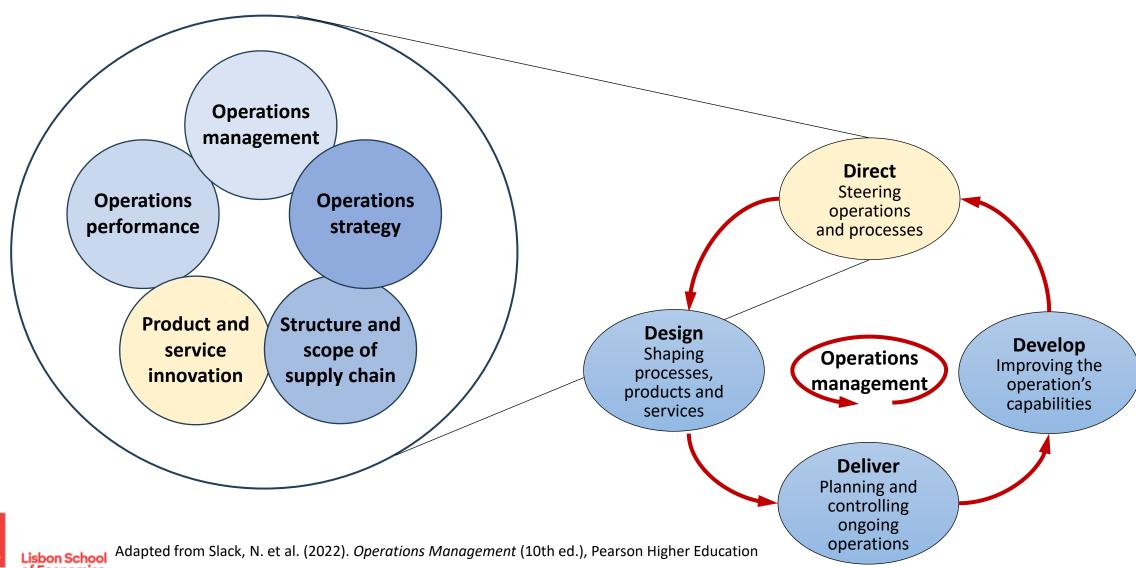








# Operations management lifecycle (4D's model)





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# Product/service lifecycle

Sales volume	Introduction into market	Growth in market acceptance	Maturity of market, sales level off	Decline as market becomes saturated
Customers	Innovators	Early adopters	Bulk of market	Laggards
Competitors	Few/none	Increasing numbers	Stable numbers	Declining numbers
Likely order winners	Product/service specification	Availability	Low price Dependable supply	Low price
Likely qualifiers	Quality Range	Price Range	Range Quality	Dependable supply
Dominant operations performance objectives	Flexibility Quality	Speed Dependability Quality	Cost Dependability	Cost



















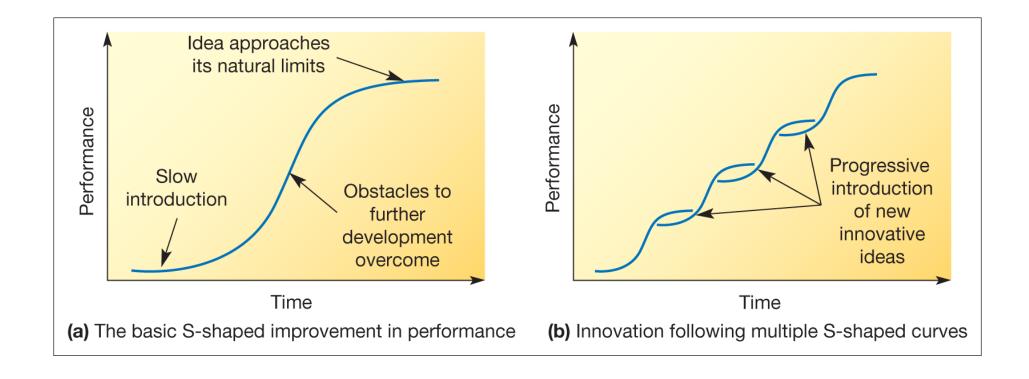








# The S-shaped curve of innovation





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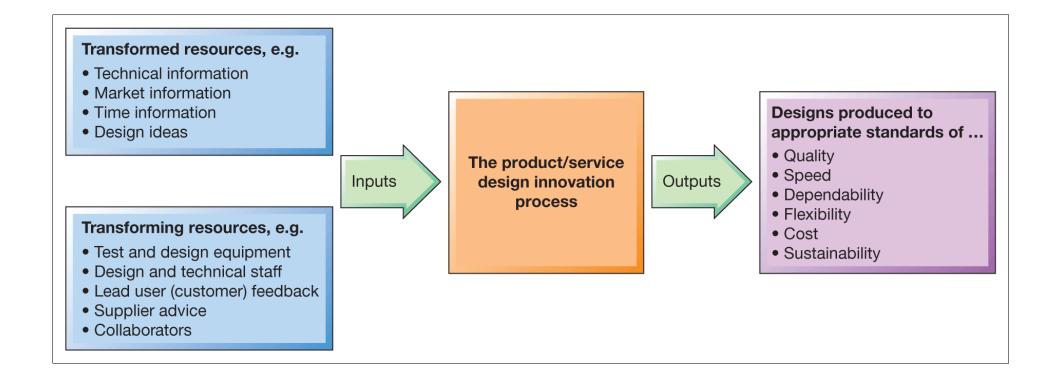








# The product and service design innovation activity as a process





Adapted from Slack, N. et al. (2022). Operations Management (10th ed.), Pearson Higher Education



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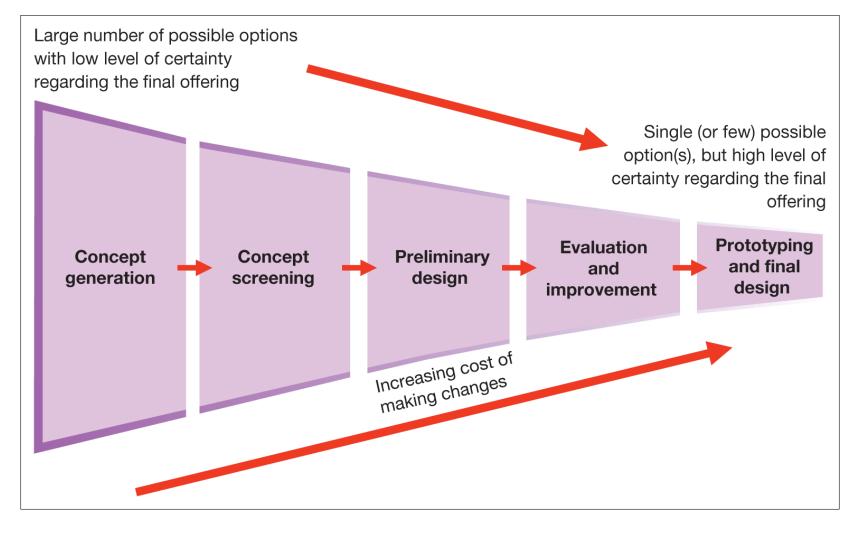








# The stages of product/service innovation





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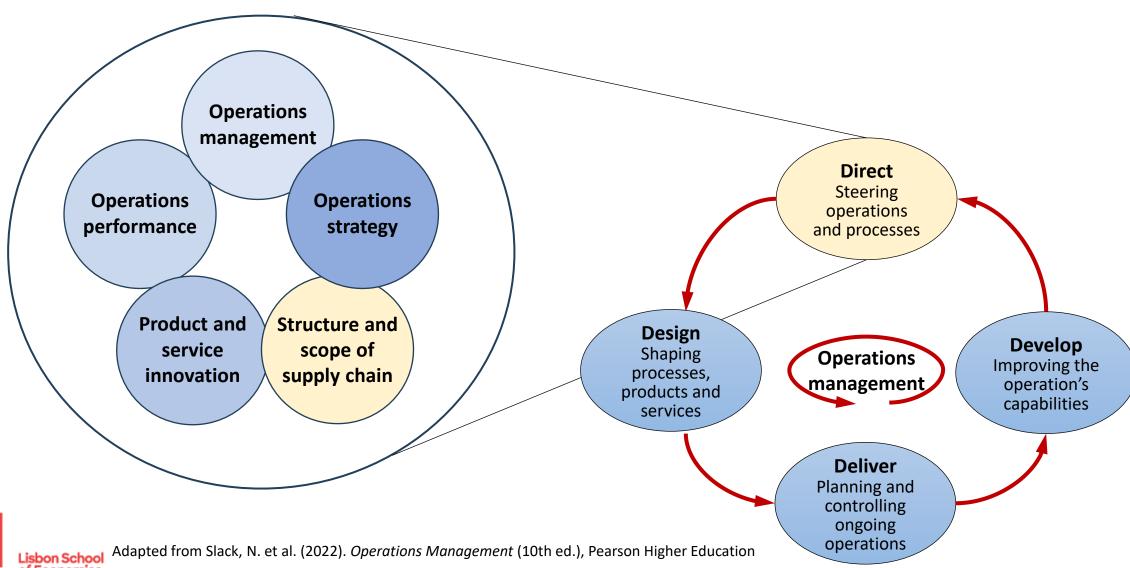








# Operations management lifecycle (4D's model)





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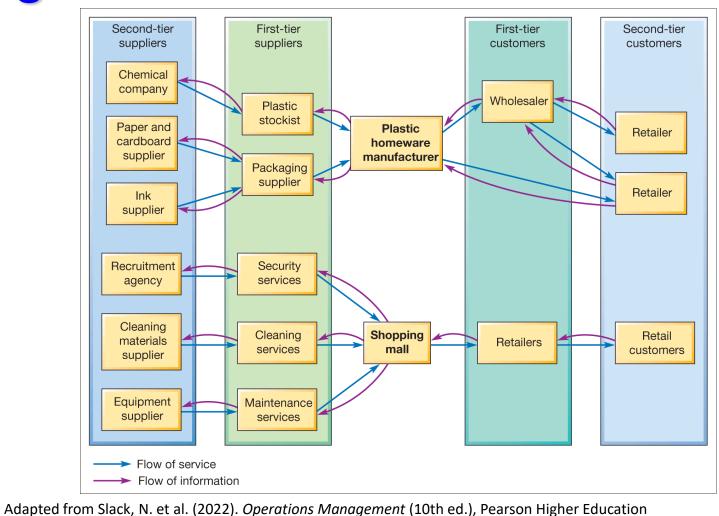








# Supply network for a plastic homeware and a shpping mall





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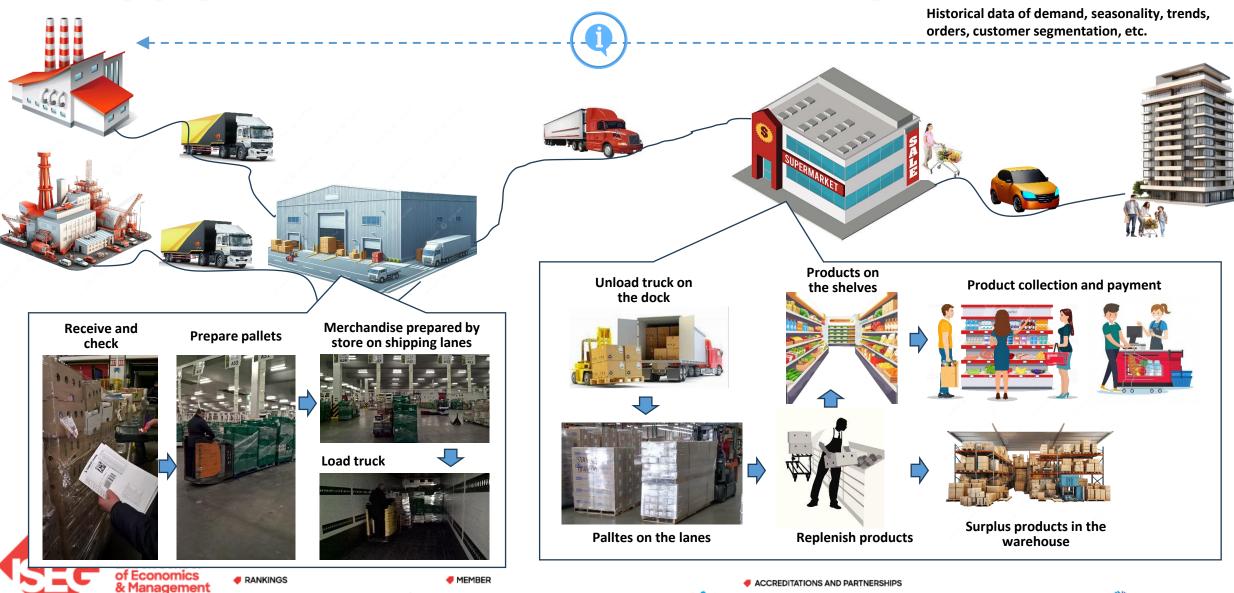








# Supply chain for a food retail enterprise





















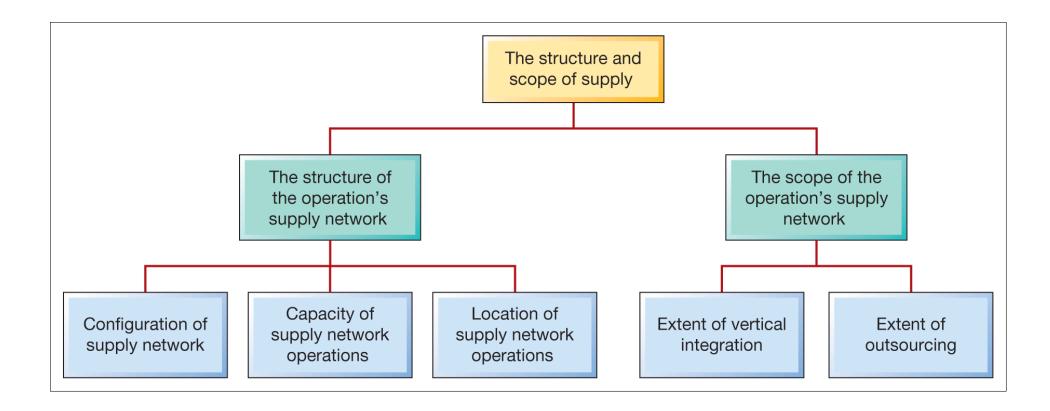








# What determines the structure and scope of supply?





Adapted from Slack, N. et al. (2022). Operations Management (10th ed.), Pearson Higher Education



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