

Production and Operations Management

2023/2024



Lisbon School
of Economics
& Management

U LISBOA | UNIVERSIDADE
DE LISBOA

Operations and Productivity Strategy in Operations

Chapters 1 and 2

CLASS 1&2

Presentation

Operations – O what they are? (Chapter 1)

Operations and Strategy (Chapter 2)

Topics

- Presentation from the discipline
- What Operations Management?
- New challenges from the Management in Operations
- The Productivity Challenge
- Development in missions It is strategies
- Operations and Strategy – Mission and Strategy
 - Differentiation, Cost, Response
- 5 Competitive Objectives

Body Teacher:

Course Coordinator: Graça Miranda Silva
(gracamsilva@iseg.ulisboa.pt)

Course Lecturer: Ricardo Simões Santos (E11, E12)
(ricardo.santos@iseg.ulisboa.pt)

Main objective of the course

The aim of this course is to familiarize students with the main operational issues that confront operations managers, and provide them with the fundamental concepts, models, techniques, and analytical tools to deal with these issues in order to gain competitive advantage through operational excellence.

Assessment

Student evaluation is defined by School Regulations. The reading of the regulations is strongly advised. The course evaluation consists of a **final exam**, and a **Work Group**.

Work Group: 50% - Individual grade divided as following:

- 25% Workshop I (Presentation and Slides); 25% Workshop II (Presentation and Slides); 50% Final Report.
- Each student must evaluate the contribution of the remaining members of the group. The individual grade can be adjusted according to this information, as well as the participation in both presentations. The evaluation of the group members must be sent by email to the teacher on the date of submission of the Final Report. If not, the respective final grade will not be published.
- There is a 10% penalty in the individual grade if the student does not attend at least one session in each workshop.

Assessment

Final Exam: 50% - Regular period exam and Retake exam

- The final exam covers all the topics and a **minimum grade of 8.5** is required.

The continuous evaluation will only be considered in two periods of examination (Regular period exam and Retake exam). In the case of the special exam and grade improvements the final grade will be equal to that of the final exam.

Students are not allowed to take any notes to the exam. A formula sheet and necessary tables will be provided. Students must bring their own calculator to the final exam. Usage of any other electronic device with computational capabilities, such as cellular phones, is forbidden. Sharing of calculators among students during the final exam will not be tolerated.

| <u>Important dates</u> | <u>Deliverables</u> |
|---|---|
| February 26 th | <ul style="list-style-type: none"> Submission of groups' information (send by email to your class teacher) |
| March 18 th | <ul style="list-style-type: none"> Submission of a proposal of the company and the process to be analyze. (send by email to your class teacher) |
| Week of 8 th to 12 th April | <p>WORKSHOP I</p> <ul style="list-style-type: none"> On the presentation day, each group must hand one copy of the Workshop I Slides: Project Management Plan and Process Description (Slides format). |
| April 15 th | <ul style="list-style-type: none"> Submission of a proposal of the chosen theme. (send by email to your class teacher) |
| Week of 13 th to 17 th May | <p>WORKSHOP II</p> <ul style="list-style-type: none"> On the presentation day, each group must hand one copy of the Workshop II Slides. |
| May 16 th | Submission of the Final Report. (send by email to your class teacher) |
| June 6 th | Regular Period Exam |
| June 25 th | Retake Exam |
| March 5 th | Special Exam |
| September 5 th | Special Exam |



Support Material

The course materials will include lecture slides presented in the sessions as well as problem sets to be solved in-class. The lecture slides and problem sets are relevant to the exam and will be made available online on the course webpage.

Recommended Book:

[1] Heizer, J., Render, B., & Munson, C. (2020). *Operations Management, Global Edition*, (13th ed.). Essex: Pearson Education Limited.

Additional Bibliography:

[2] Slack, N., & Brandon-Jones, A. (2019). *Operations Management*, (9th ed.). Essex: Pearson Education Limited.



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



Contents

1. Operations and Productivity
2. Operations Strategy
3. Project Management
4. Capacity and Constraint Management
5. Managing Quality
6. Inventory Management
7. Short-Term Scheduling
8. Waiting-Line Models
9. Sustainability



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



What Is Operations Management?

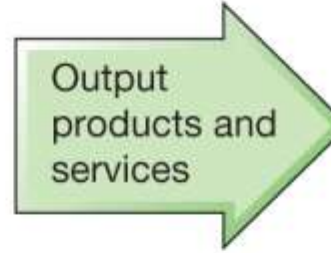
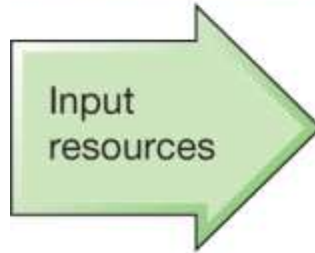
Production is the creation of goods and services

Operations management (OM) is the set of activities that create value in the form of goods and services by transforming inputs into outputs

Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

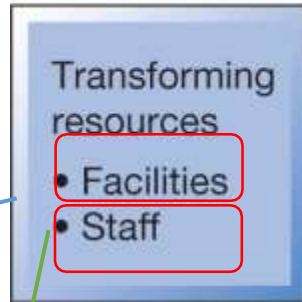
All to the Operations involve inputs – Process in transformation-Outputs

The resources that are treated, transformed or converted in the process.



Causing the smaller Environmental, Social and Economical impacts

The resources that act over the processed resources



the buildings, equipment, plant and process technology of the

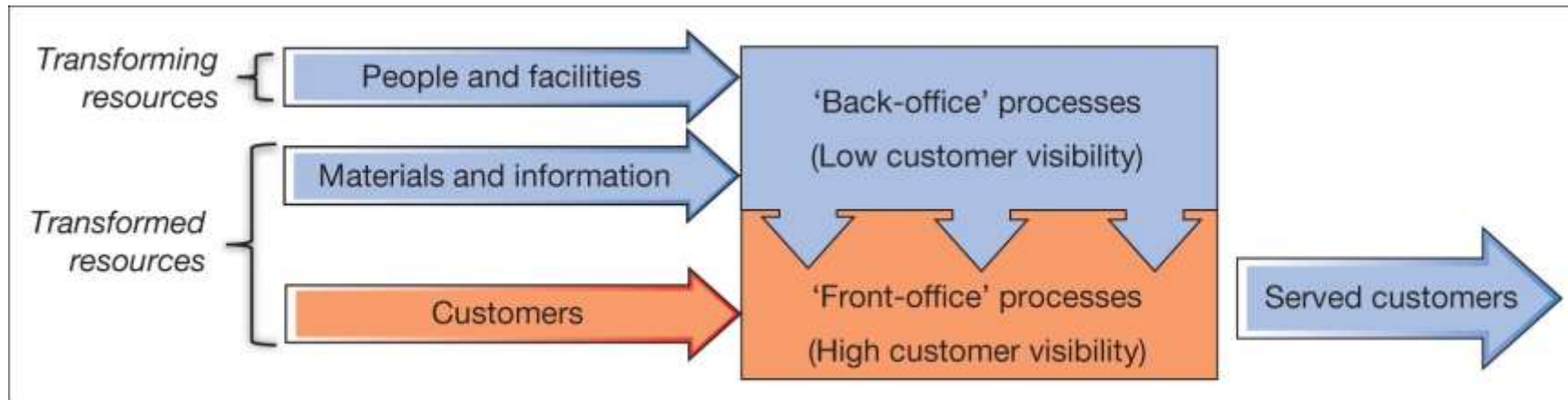
the people who operate, maintain, plan and manage the operations

- Assembly
- Transportation
- Extraction
- Cultivation
- Fabrication
- Storage

- Processes can involve both **goods and services**.
- Processes can have **multiple inputs** and/ or **multiple outputs**.

Adapted from Slack, N., Chambers, S., & Johnston, R. (2019). Operations Management, (9th Edition), Prentice Hall.

All to the Operations involve inputs – Process in transformation-Outputs



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

Adapted from Slack & Brandon-Jones (2019). *Operations Management Powerpoints on the web*, 9th edition © Nigel Slack, Alistair Brandon-Jones 2019

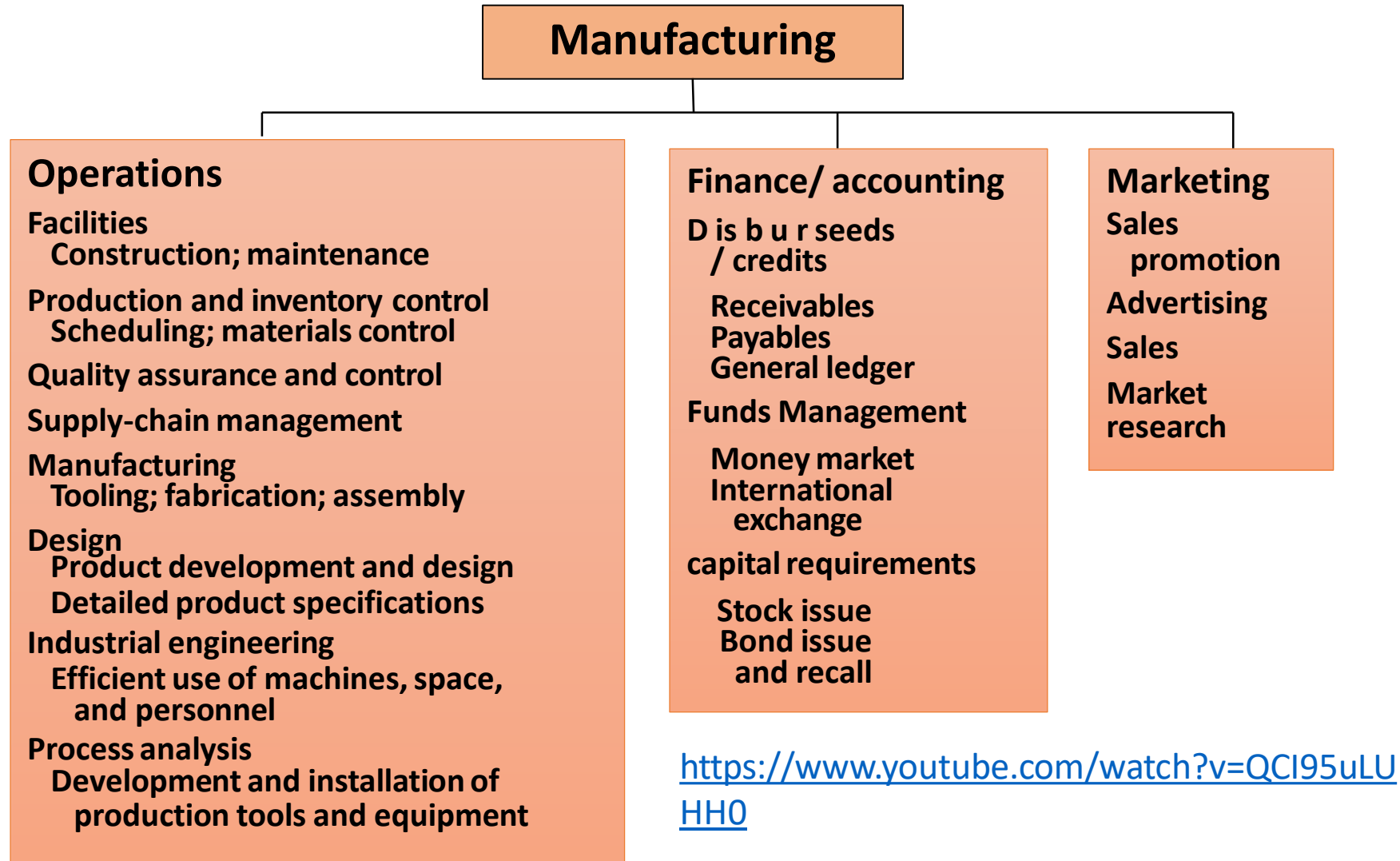
Organize to produce goods and services

Functions essentials:

1. **Marketing** – generates search
2. **Production/Operations** – creates the product
3. **Finance/Accounting** – register O performance of the organization, pays the bills and receive the money

Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

Production sector



Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Services

Airline/Services

Operations
Ground support equipment
Maintenance
Ground Operations
Facility maintenance
Catering
Flight Operations
Crew scheduling
Flying
Communications
Dispatching
Management science

Finance/ accounting
Accounting
Payables
Receivables
General Ledger
Finance
Cash control
International exchange

Marketing
Traffic administration
Reservations
Schedules
Tariffs (pricing)
Sales
Advertising



Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

<https://www.youtube.com/watch?v=qIKQ2rPDkvg>



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Ten Critical Decisions

| DECISION |
|--|
| 1. <i>Design of goods and services</i> |
| 2. <i>Managing quality</i> |
| 3. <i>Process and capacity strategy</i> |
| 4. <i>Location strategy</i> |
| 5. <i>Layout strategy</i> |
| 6. <i>Human resources and job design</i> |
| 7. <i>Supply-chain management</i> |
| 8. <i>Inventory management</i> |
| 9. <i>Scheduling</i> |
| 10. <i>Maintenance</i> |

Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

Ten Critical Decisions

1. Design of goods and services

- ▶ Defines what is required of operations
- ▶ Product design determines quality, sustainability and human resources

2. Managing quality

- ▶ Determine the customer's quality expectations
- ▶ Establish policies and procedures to identify and achieve that quality

Ten Critical Decisions

3. Process and capacity design

- ▶ How is a good or service produced?
- ▶ Commits management to specific technology, quality, resources, and investment

4. Location strategy

- ▶ Nearness to customers, suppliers, and talent
- ▶ Considering costs, infrastructure, logistics, and government

Ten Critical Decisions

5. Layout strategy

- ▶ Integrate capacity needs, personnel levels, technology, and inventory
- ▶ Determine the efficient flow of materials, people, and information

6. Human resources and job design

- ▶ Recruit, motivate, and retain personnel with the required talent and skills
- ▶ Integral and expensive part of the total system design

Ten Critical Decisions

7. Supply chain management

- ▶ Integrate supply chain into the firm's strategy
- ▶ Determine what is to be purchased, from whom, and under what conditions

8. Inventory management

- ▶ Inventory ordering and holding decisions
- ▶ Optimize considering customer satisfaction, supplier capability, and production schedules

Ten Critical Decisions

9. Scheduling

- ▶ Determine and implement intermediate, and short-term, schedules
- ▶ Utilize personnel and facilities while meeting customer demands

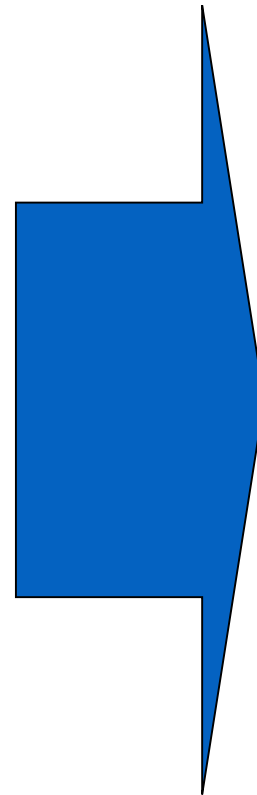
10. Maintenance

- ▶ Consider facility capacity, production demands, and personnel
- ▶ Maintain a reliable and stable process

New Challenges in OM

From

- ◆ Local or national focus
- ◆ Batch shipments
- ◆ Low bid purchasing
- ◆ Lengthy product development
- ◆ Standard products
- ◆ Job specialization



To

- ◆ Global focus
- ◆ Just-in-time
- ◆ Supply-chain partnering
- ◆ Rapid product development, alliances
- ◆ Mass customization
- ◆ Empowered employees, teams



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



New Challenges in OM

- ▶ Globalization
- ▶ Supply chain partnerships
- ▶ Sustainability
- ▶ Rapid product development
- ▶ Mass Customization
- ▶ Lean operations

+

COVID 19

Ethics, Social Responsibility and Sustainability

Challenges for Operations Managers:

- ▶ Develop and produce safe, high quality and environmentally friendly products
- ▶ Train and motivate employees in a safe workplace
- ▶ Honouring commitments with stakeholders

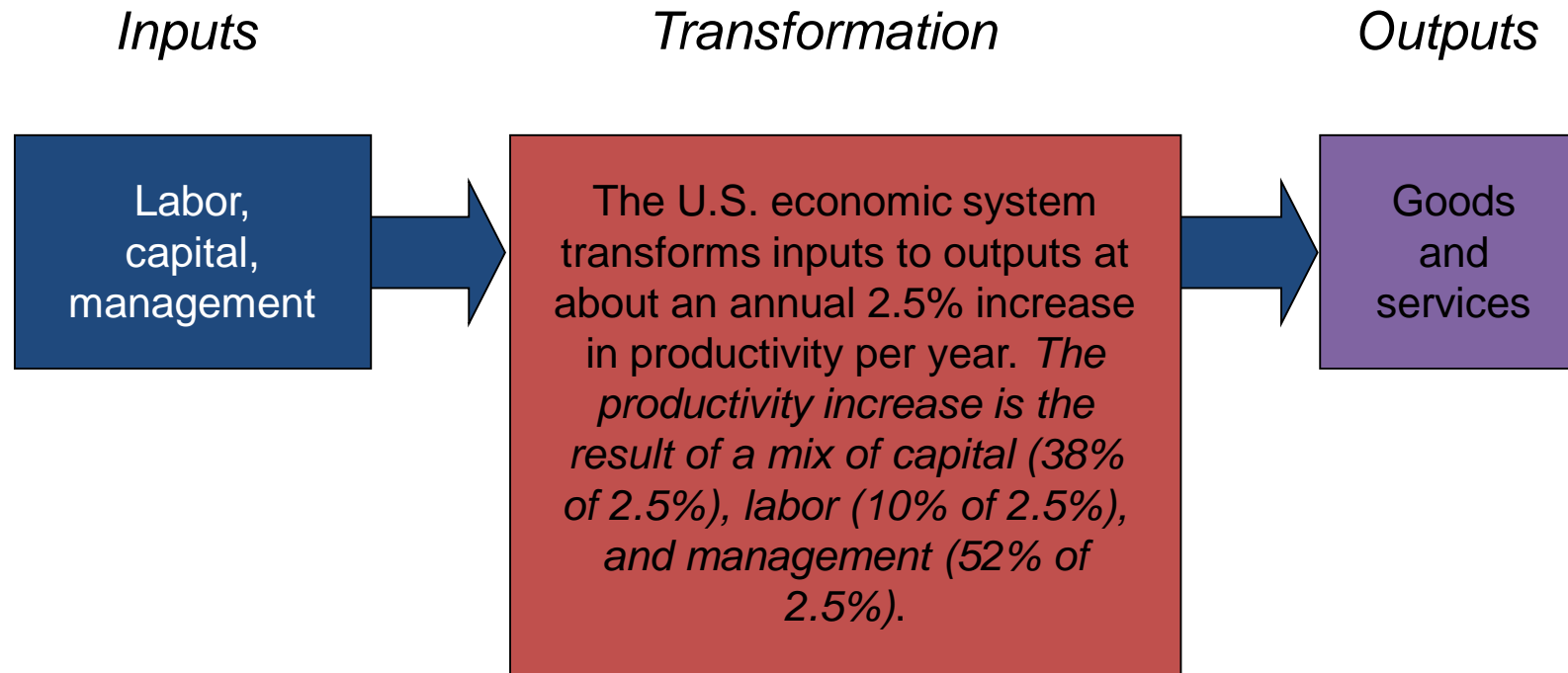
Productivity Challenge

Productivity is the ratio of outputs (goods and services) divided by the inputs (resources such as labor and capital)

The objective is to improve productivity!

*Important Note:
Production is a measure of output only
and not a measure of efficiency!*

The Economic System



Improving Productivity at Starbucks

A team of 10 analysts continually look for ways to shave time. Some improvements:



Stop requiring signatures on credit card purchases under \$25



Saved 8 seconds per transaction

Change the size of the ice scoop



Saved 14 seconds per drink

New espresso machines



Saved 12 seconds per shot



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Improving Productivity at Starbucks

A team of 10 analysts continually look for ways to shave time. Some improvements



Operations improvements have helped Starbucks increase yearly revenue per outlet by \$250,000 to \$1,000,000.

Productivity has improved by 27%, or about 4.5% per year.

Productivity

$$\text{Productivity} = \frac{\text{Units produced}}{\text{Input used}}$$

- ▶ Measure of **process improvement**
- ▶ Represents output relative to input
- ▶ Only through productivity increases can our standard of living improve

Productivity calculations

Labor Productivity

$$\begin{aligned} \text{Productivity (single-factor)} &= \frac{\text{Units produced}}{\text{Labor-hours used}} \\ &= \frac{1,000}{250} = 4 \text{ units/labor-hour} \end{aligned}$$

One resource input ⇒ **single-factor productivity**



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Productivity Calculations

$$\text{Multifactor} = \frac{\text{Output}}{\text{Labor} + \text{Material} + \text{Energy} + \text{Capital} + \text{Miscellaneous}}$$

- ▶ Also known as **Total Factor Productivity (TFP)**
- ▶ Outputs and inputs are often expressed in monetary units (dollars, euros, etc.).

Multiple resource inputs ⇒ multi-factor productivity



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Example:

The company RODAR produces wheels for bicycles. To produce 1000 wheels/day the company needs:

| | |
|----------------|---------------------------------------|
| Working hours: | 400 hours/day (cost 12,50 euros/hour) |
| Raw material: | 9072 kg (cost = 1 euro/kg) |
| Energy: | 5000 euros/day |
| Capital costs: | 10000 euros/day |

- What is the labor productivity per hour?
- What is the Total Factor Productivity (TFP) of RODAR?

Example (cont.):

a) What is the labor productivity per hour?

Labor productivity = (1000 units/day)/(400 hours/day) = **2,5 units/hour**

b) What is the TFP of RODAR?

$$\text{TFP} = \frac{(1000 \text{ units/day})}{(400 \text{ hours/day} \times 12,50 \text{ euros/hour} + 9072 \text{ kg/day} \times 1 \text{ euro/kg} + 5000 \text{ euros/day} + 10000 \text{ euros/day})} = \mathbf{0,024 \text{ units/euro}}$$



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Developing Missions and Strategies

Mission statements tell an organization where it is going

The **Strategy** tells the organization how to get there

Missions

- ◆ **Mission** - where are you going?
 - ◆ Organization's purpose for being
 - ◆ Answers the question: 'What do we provide society?'
 - ◆ Provides boundaries and focus

Mission and strategy development

An organization's **mission** establishes a direction (where the organization is going).

An organization's strategy defines how to get there.

- The organization's reason for being
- Answers the question “what is does the organization provide to society?”
- Defines boundaries and objectives



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS

FT Master in Finance
Ranking 2020



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



Our Vision

Fruits, vegetables and water inspire us as indispensable sources of nutrition, hydration and pleasure.

Our ambition is to attract consumers through the excellent flavors and unique brands that we develop with science and art.

We are proud to contribute daily to a more sustainable world.

Our Winning Aspiration

To be an international reference company in fruit and vegetable beverages.

To lead the non-alcoholic drinks in Portugal and to lead the fruit and vegetable drinks in Angola and Mozambique.

Create value with balance and satisfaction.

To reach a turnover of more than 450million euros in 2022, with an EBITDA margin of more than 14%.



sumol+compal

It is in our nature.

Our Values

| | | | | |
|---|---|---|---|---|
|  |  |  |  |  |
| + Passion and Ambition | + Results | + Innovation | + Team | + Integrity |
| ^ | ^ | ^ | ^ | ^ |

Link: <https://sumolcompal.pt/en/who-we-are>



Lisbon School of Economics & Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



AMORIM

MISSION

To add value to cork, in a competitive, distinctive and innovative way that is in perfect harmony with Nature.

VISION

To be a sustainable company, providing suitable value for the capital invested while promoting social equity and environmental safeguards, with differentiating factors at product and service level.

VALUES

- ▶ Pride
- ▶ Ambition
- ▶ Initiative
- ▶ Discretion
- ▶ Attitude

[Link: https://www.amorim.com/en/who-are-we/mission-vision-and-values/](https://www.amorim.com/en/who-are-we/mission-vision-and-values/)

Values

Eight fundamental values lie at the core of the Luz Saúde culture:

A tireless quest for results

Intellectual accuracy

Ongoing learning

Personal accountability

Respect and humbleness

Positive attitude

Integrity

Team spirit

Vision

Luz Saúde vision is to be a leading healthcare provider recognised as a reference of excellence and innovation in highly specialised and complex medical care.

Luz Saúde commitment is absolute and unequivocal: to ensure the best diagnosis and medical treatment that talent, innovation and dedication can provide.

Luz Saúde offers a full range of healthcare services that ensures continuity of care and can respond to changing health needs of people throughout their lives.

Mission

Achieve the best health outcomes from the perspective of patients through rapid and effective diagnosis and treatment, with absolute respect for the patients individuality, and to build an organisation capable of attracting, developing and retaining exceptional people.

In order to fulfil its mission, Luz Saúde, through its employees, is committed to:

- Excellence in Healthcare +
- Technology and Innovation +
- Talent and Training +

Link: <https://www.luzsaude.pt/en/luz-saude/about-us/who-we-are-vision-mission-and-values>



PepsiCo

Our mission is to be the world's premier consumer products company focused on convenient foods and beverages. We seek to produce financial rewards to investors as we provide opportunities for growth and enrichment to our employees, our business partners and the communities in which we operate. And in everything we do, we strive for honesty, fairness and integrity.



Lisbon School
of Economics
& Management
Universidade de Lisboa

RANKINGS



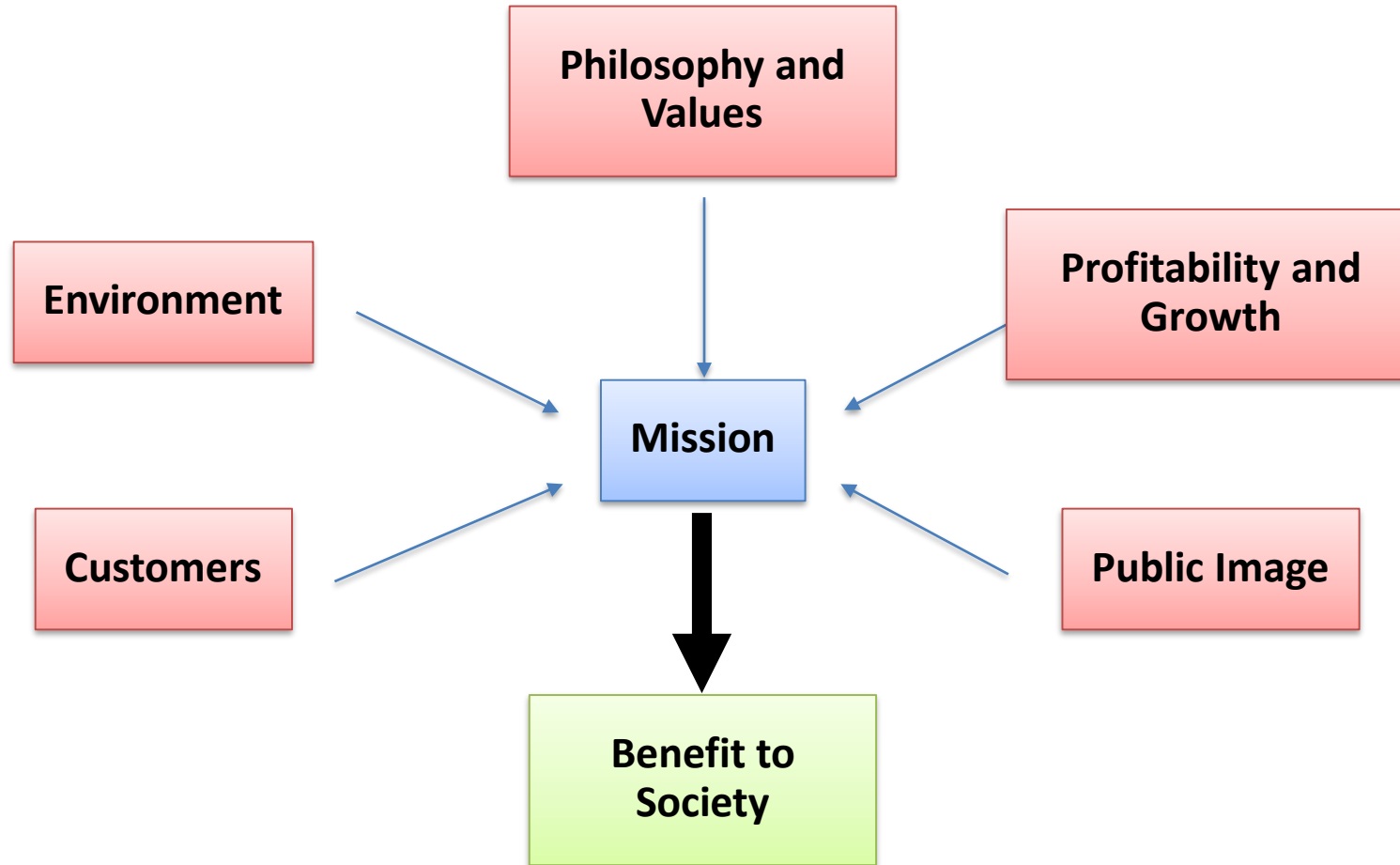
MEMBER



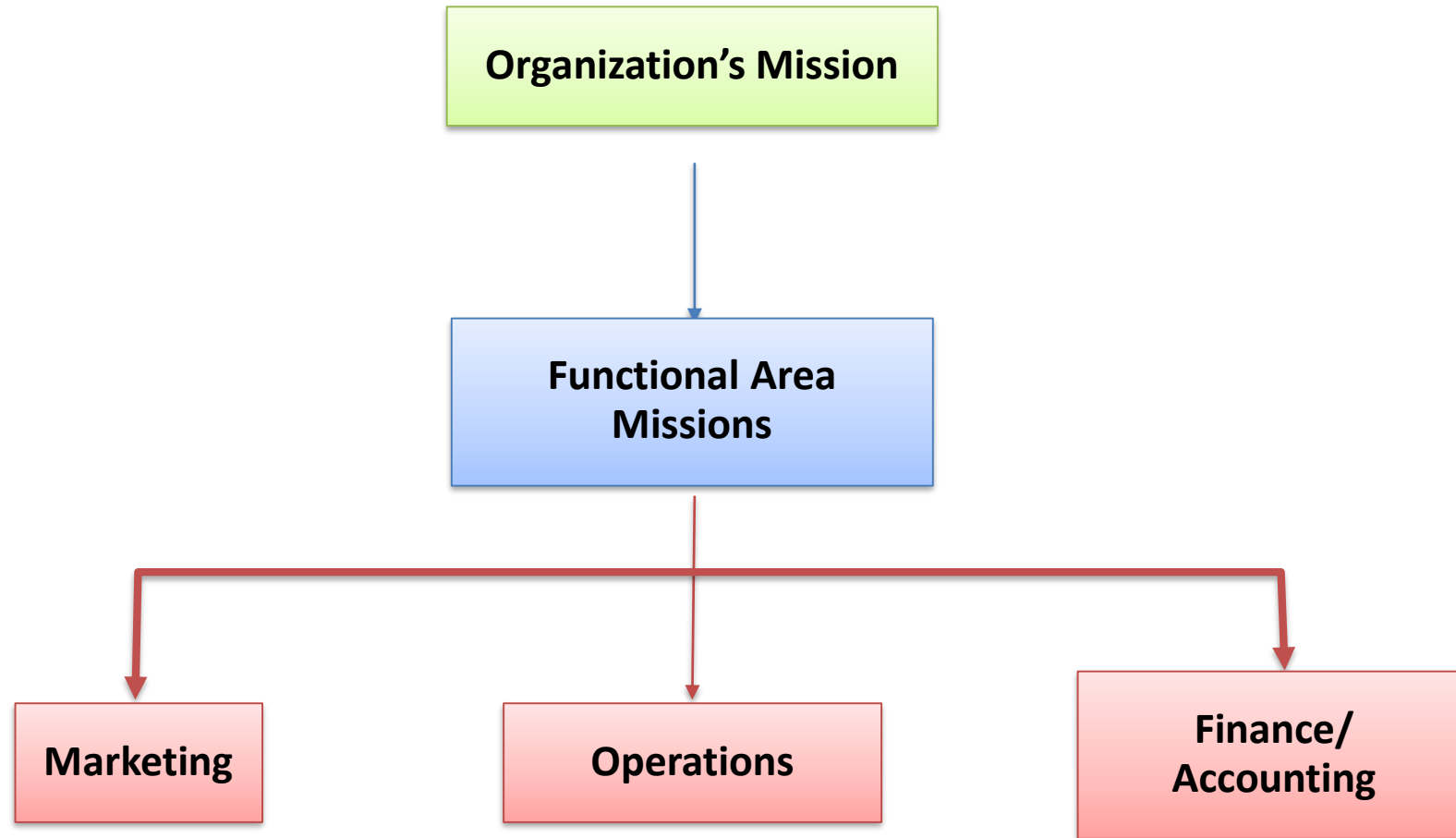
ACCREDITATIONS AND PARTNERSHIPS



Factors Affecting Mission



Strategic Process



Strategy

- ◆ Action plan to achieve mission
- ◆ Functional areas have strategies
- ◆ Strategies exploit opportunities and strengths, neutralize threats, and avoid weaknesses

Strategies for Competitive Advantage

Differentiation – better, or at least different

Cost leadership – cheaper

Response – rapid response

Competing on Differentiation

Uniqueness can go beyond both the physical characteristics and service attributes to encompass everything that impacts customer's perception of value

- Safeskin gloves – leading edge products
- Walt Disney Magic Kingdom – experience differentiation
- Hard Rock Cafe – dining experience

Competing on cost

Provide the maximum value as perceived by customer.
Does not imply low quality.

Easy Jet
Lidl

Competing on response

Flexibility is matching market changes in design innovation and volumes

- A way of life at Hewlett-Packard

Reliability is meeting schedules

- German machine industry

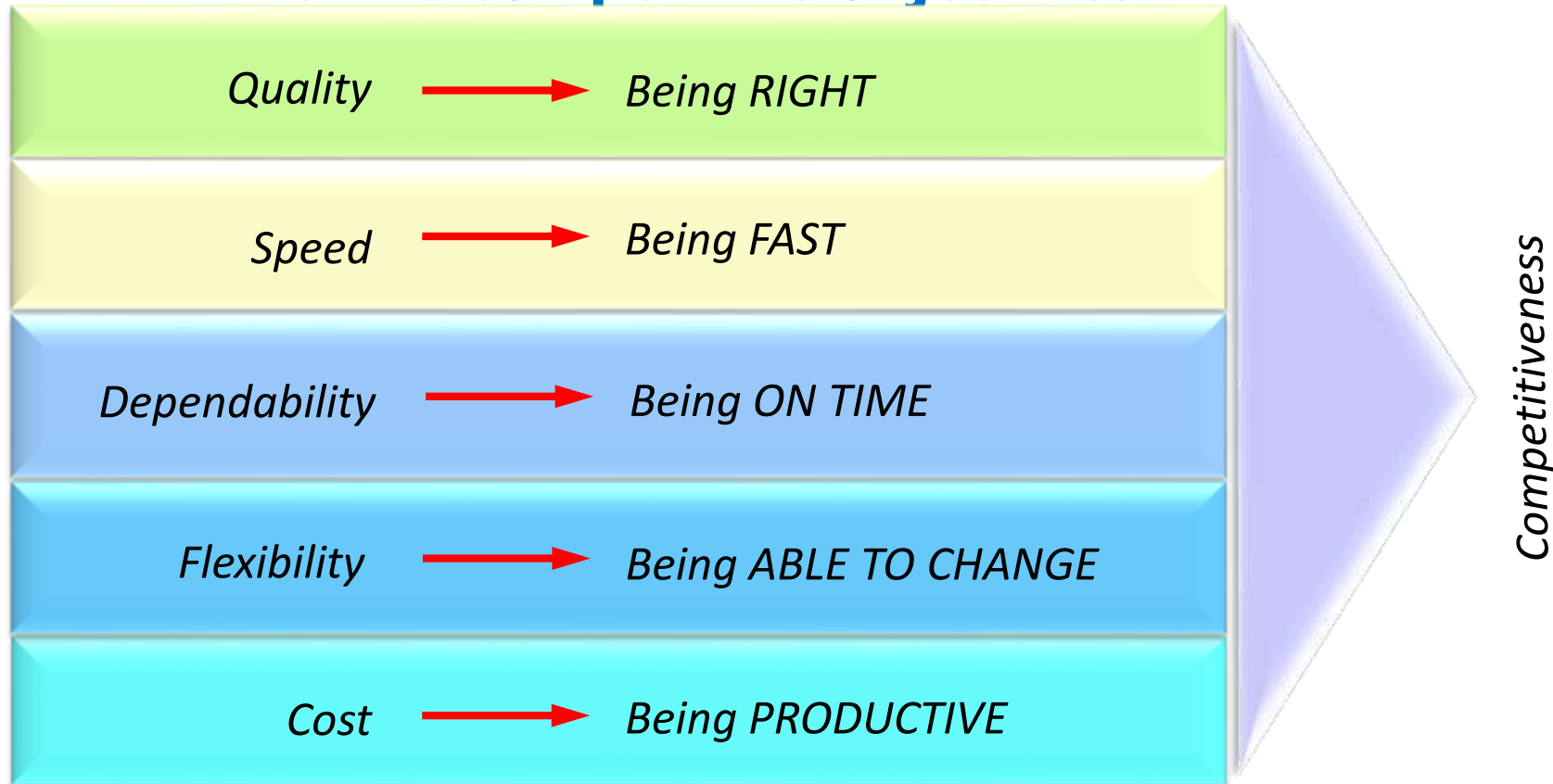
Timeliness is quickness in design, production, and delivery

- Johnson Electric, Pizza Hut, Motorola

Competitive priorities

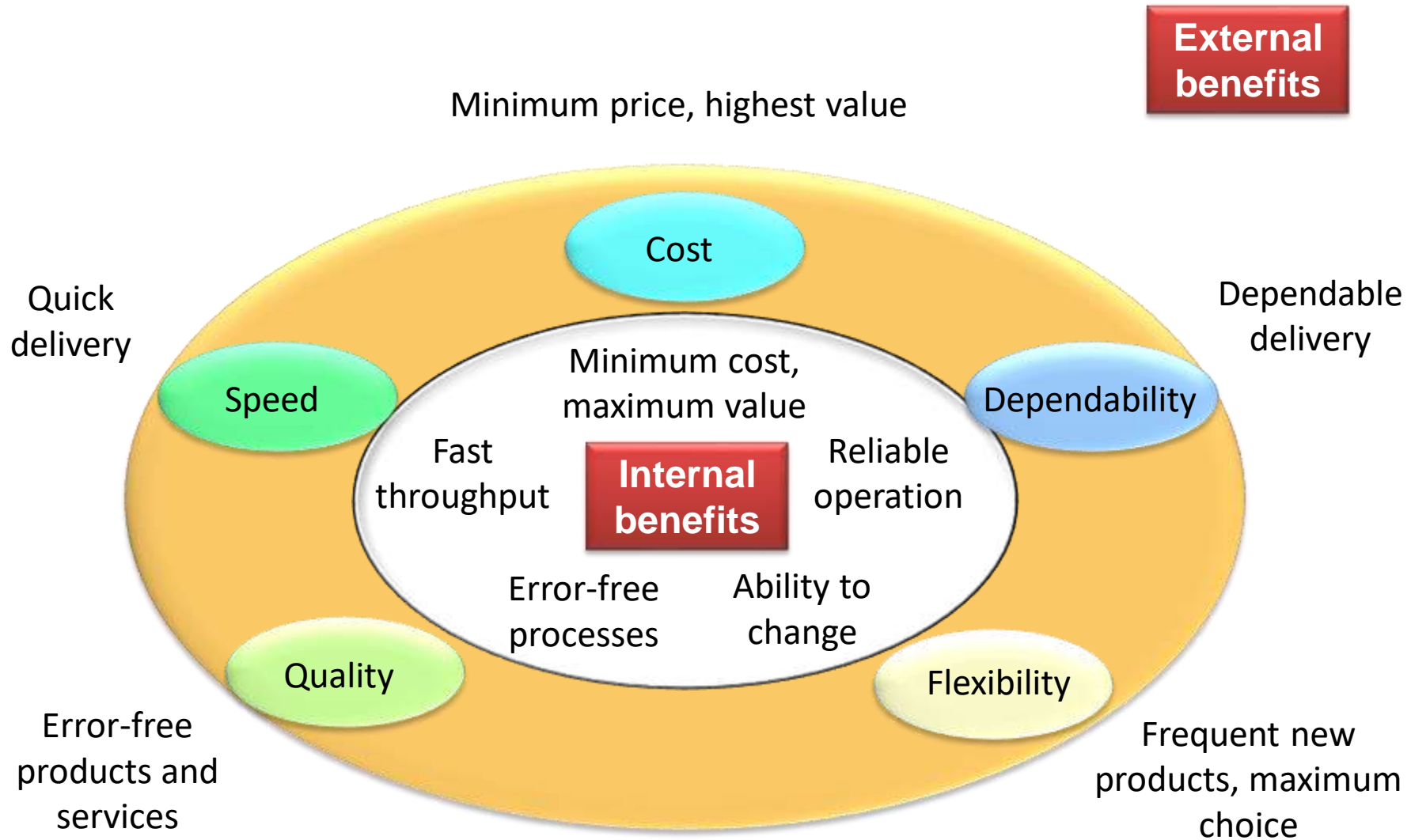
.....capabilities that operations management can develop in order to create competitive advantage for organizations (Reid and Sanders, 2010)

The five competitive objectives



Adapted from Slack, Brandon-Jones and Johnston, *Operations Management PowerPoints on the Web*, 7th edition © Nigel Slack, Alistair Brandon-Jones and Robert Johnston 2014

The benefits of excelling at the five objectives



Based on Slack, Brandon-Jones and Johnston, *Operations Management PowerPoints on the Web*, 7th edition © Nigel Slack, Alistair Brandon-Jones and Robert Johnston, 2014



Lisbon School of Economics & Management
Universidade de Lisboa

RANKINGS



MEMBER



ACCREDITATIONS AND PARTNERSHIPS



What does Quality mean in.....

.... a Hospital?



- Patients receive the most appropriate treatment
- Treatment is carried out in the correct manner
- Patients are consulted and kept informed
- Staff are courteous, friendly and helpful

Based on Slack, Brandon-Jones and Johnston, *Operations Management PowerPoints on the Web*, 7th edition © Nigel Slack, Alistair Brandon-Jones and Robert Johnston 2014

What does Quality mean in..... an automobile plant?



- All assembly is to specification
- Product is reliable
- All parts are made to specification
- The product is attractive and blemish-free

Based on Slack, Brandon-Jones and Johnston, *Operations Management PowerPoints on the Web*, 7th edition © Nigel Slack, Alistair Brandon-Jones and Robert Johnston 2014

What does Quality mean in.....

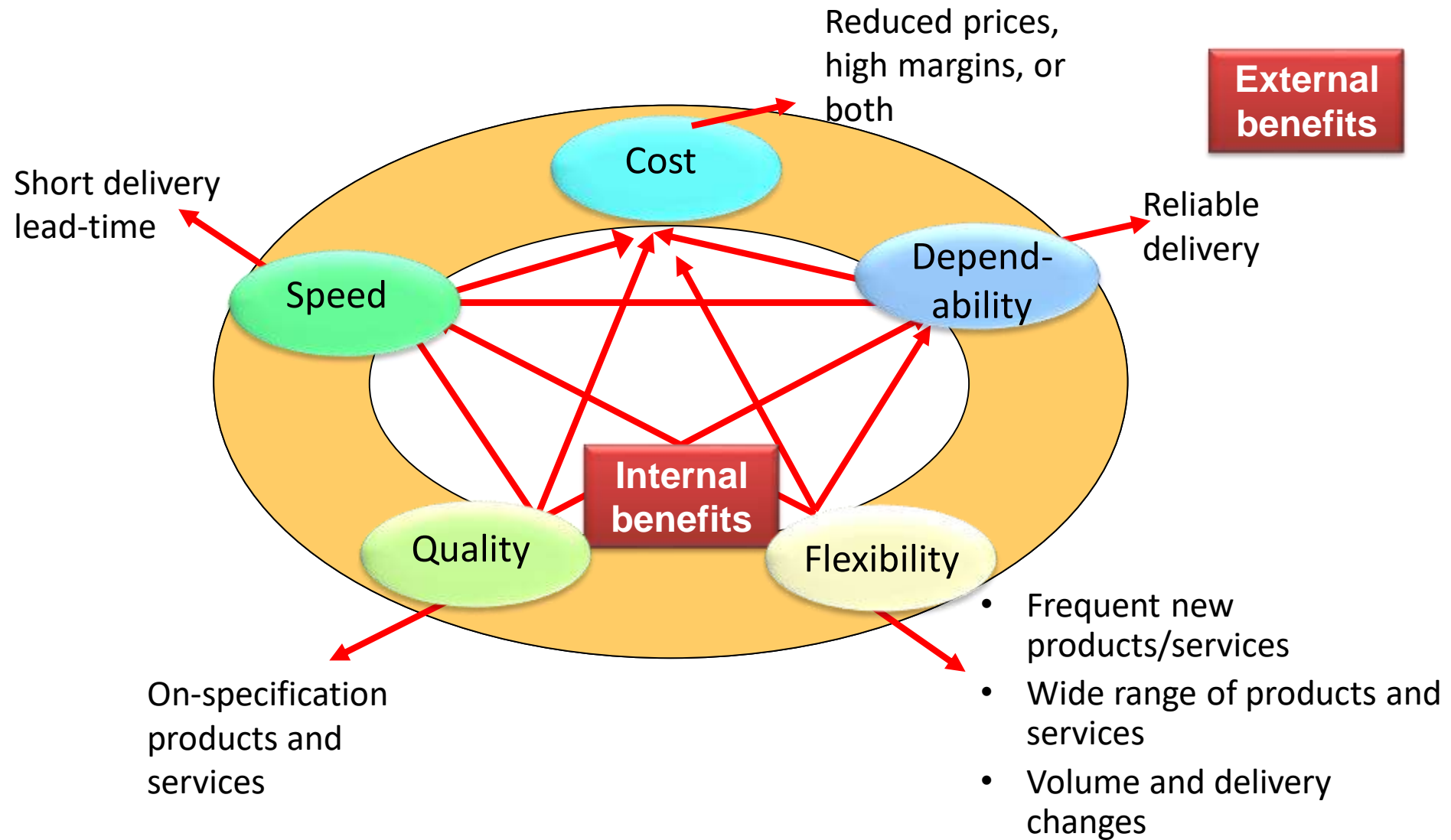
.... a bus company?



- The buses are clean and tidy
- The buses are quiet and fume-free
- The timetable is accurate and user-friendly
- Staff are courteous, friendly and helpful

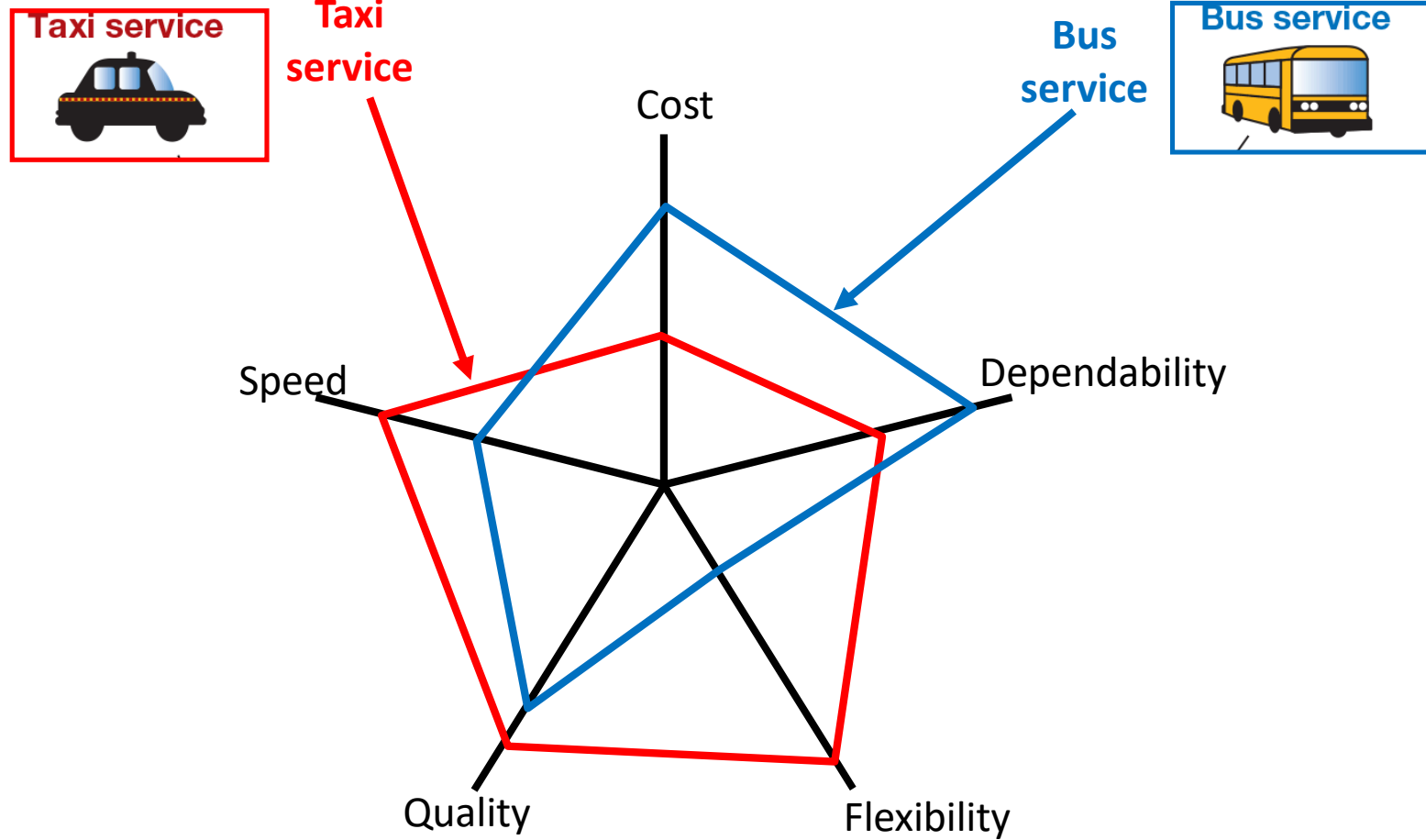
Based on Slack, Brandon-Jones and Johnston, *Operations Management PowerPoints on the Web*, 7th edition © Nigel Slack, Alistair Brandon-Jones and Robert Johnston 2014

External and Internal of performance objectives



Based on Slack, Brandon-Jones and Johnston, *Operations Management PowerPoints on the Web*, 7th edition © Nigel Slack, Alistair Brandon-Jones and Robert Johnston 2014

Polar Diagrams for a **Taxi service** versus a **Bus service**





**OPEN
MINDS.
GRAB
THE FUTURE.**