

Production and Operations Management

2024/2025



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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**.

Knowledge assessment is established by the General Knowledge Assessment Regulation (RGAC) in force, which is strongly recommended to read.

The assessment of the GPO curricular unit consists of the following:

- **Final exam (50%)**, which covers all topics, with a minimum grade of 8.5.
- **Group work: (50%)** - Individual classification is divided as follows:
 - 25% Workshop (presentation during class)
 - 75% Final Report
- Students **can only take the regular exam if they have completed group work.**

In All assessments are carried out without consulting study materials. Additional information, such as statistical tables or formulas, will be provided along with the exam questions. Students must bring their own calculator to the final exam. The use of any other electronic device with calculation capabilities, such as cell phones, is prohibited. The sharing of calculators between students during the final exam will not be tolerated.



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<u>Important dates</u>	<u>Deliverables</u>
February 7 th	<ul style="list-style-type: none"> Submission of groups' information (send by email_to your class teacher)
February 15 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)
February 28 th	<ul style="list-style-type: none"> Submission of a proposal of the chosen theme. (send by email_to your class teacher)
Week of 22 th to 31 th April	<p>WORKSHOP</p> <ul style="list-style-type: none"> On the presentation day, each group must hand one copy of the Workshop II Slides.
May 1 st	Submission of the Final Report. (send by email_to your class teacher)
May 7 th	Regular Period Exam
June 3 rd	Retake Exam
July 3 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.

[3] Kreye, M. E. (2023). *Sustainable Operations and Supply Chain Management*. Routledge



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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

What Is Operations Management?

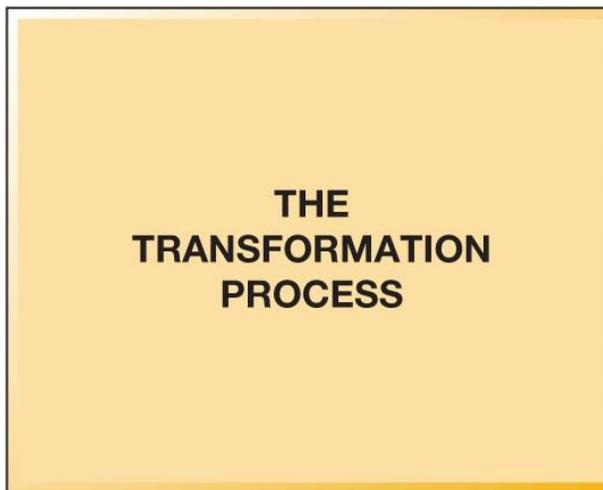
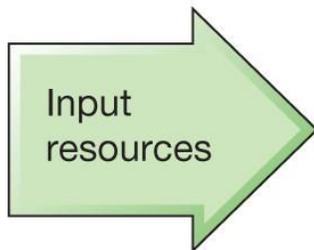
Production is the creation of goods and services

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

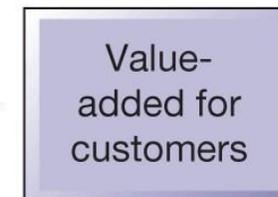
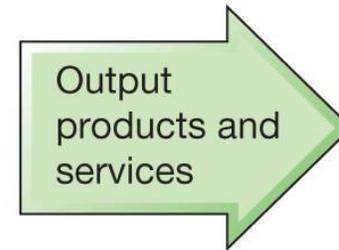
Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

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

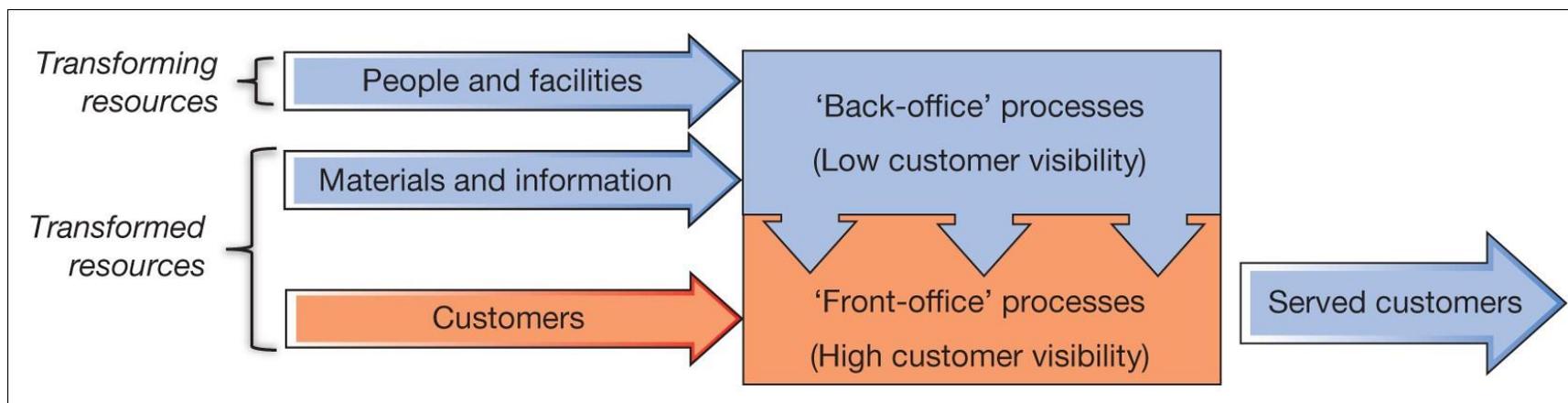
the people who operate, maintain, plan and manage the operations

- 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

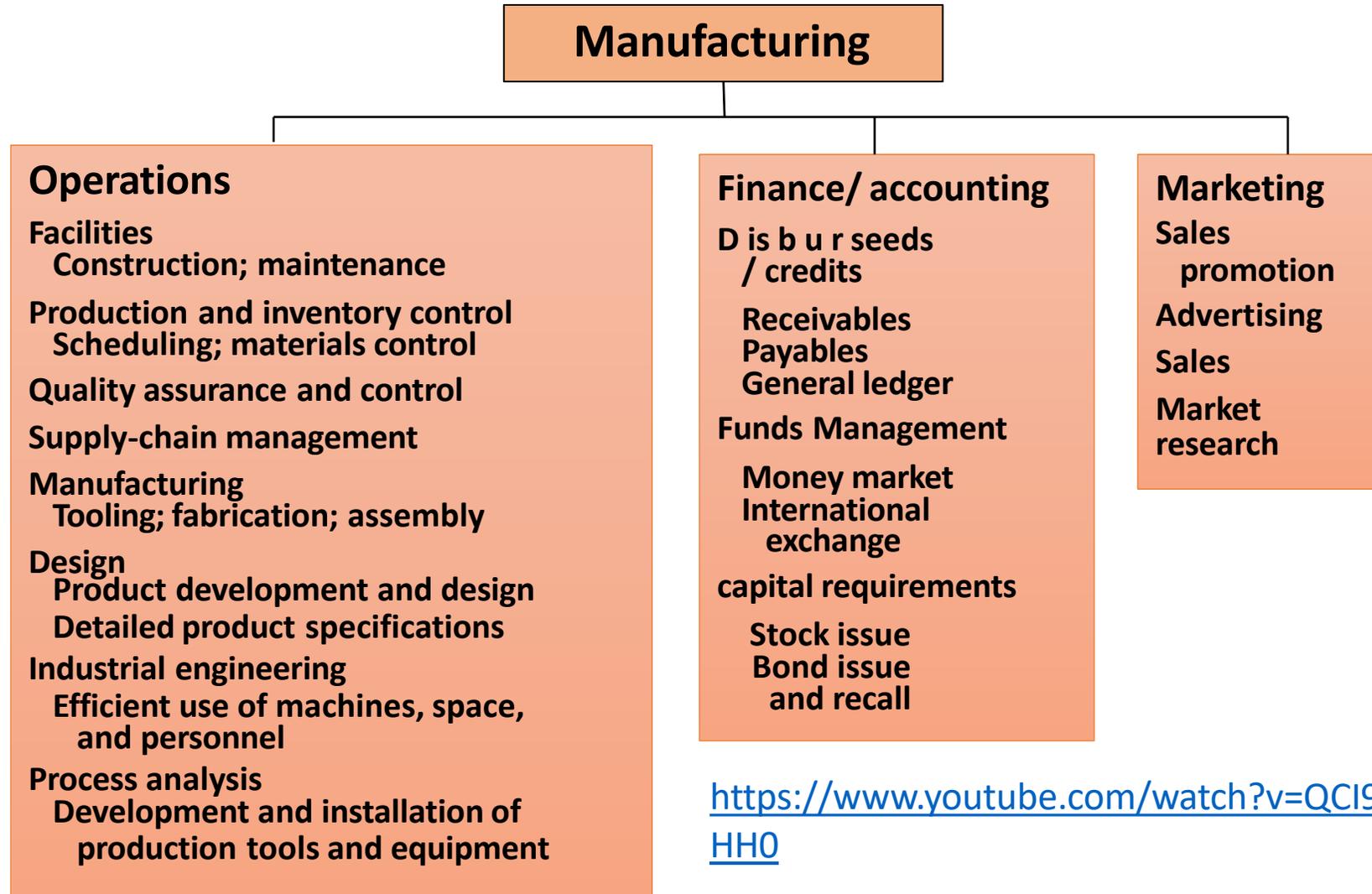
Organize to produce goods and services

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

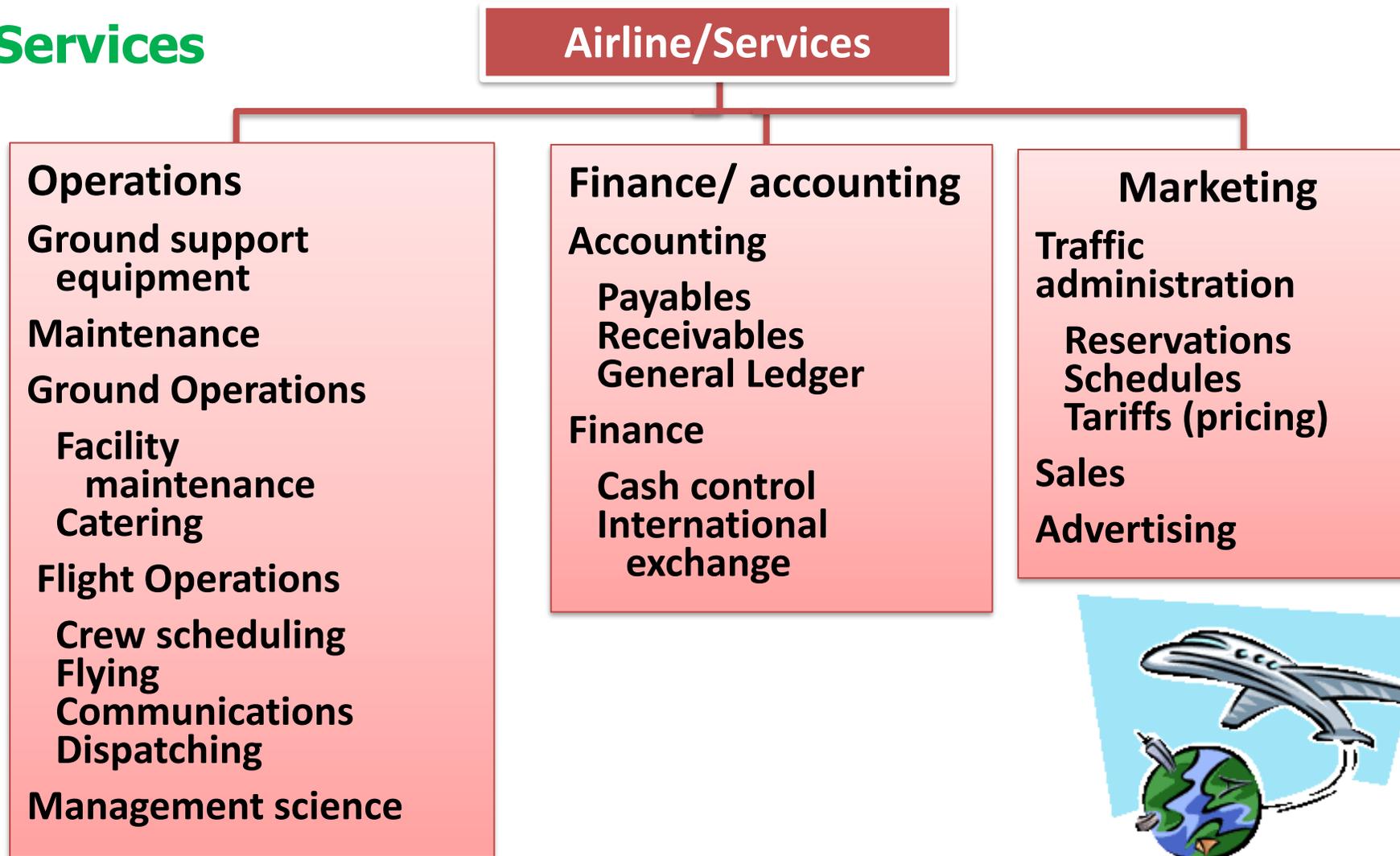
Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

Production sector



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

Services



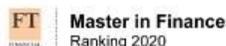
Based on Power Point presentation to accompany Operations Management 12E (Heizer & Render)

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



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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

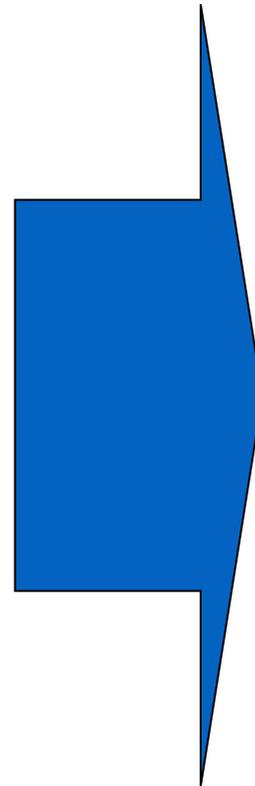
10. Maintenance

- ▶ 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

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

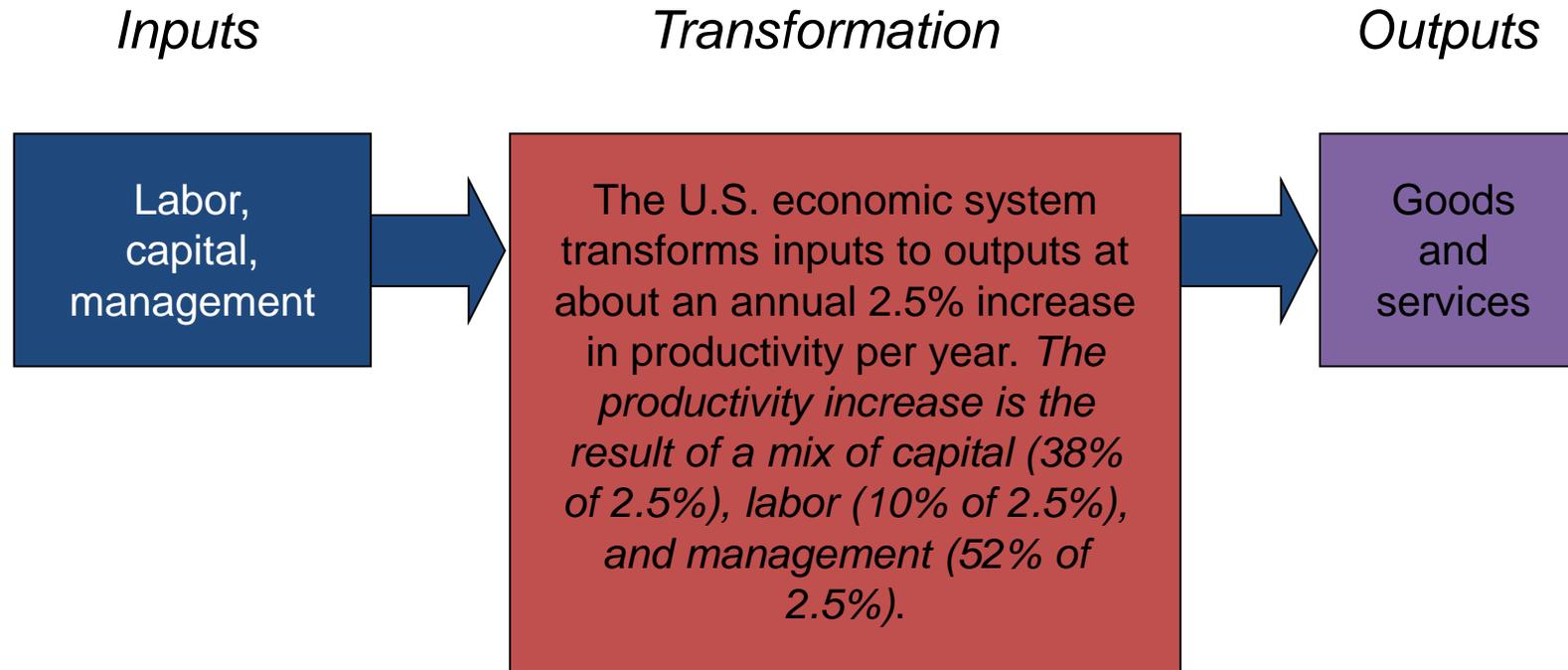
Productivity Challenge

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

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**



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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



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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?

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

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

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>



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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.



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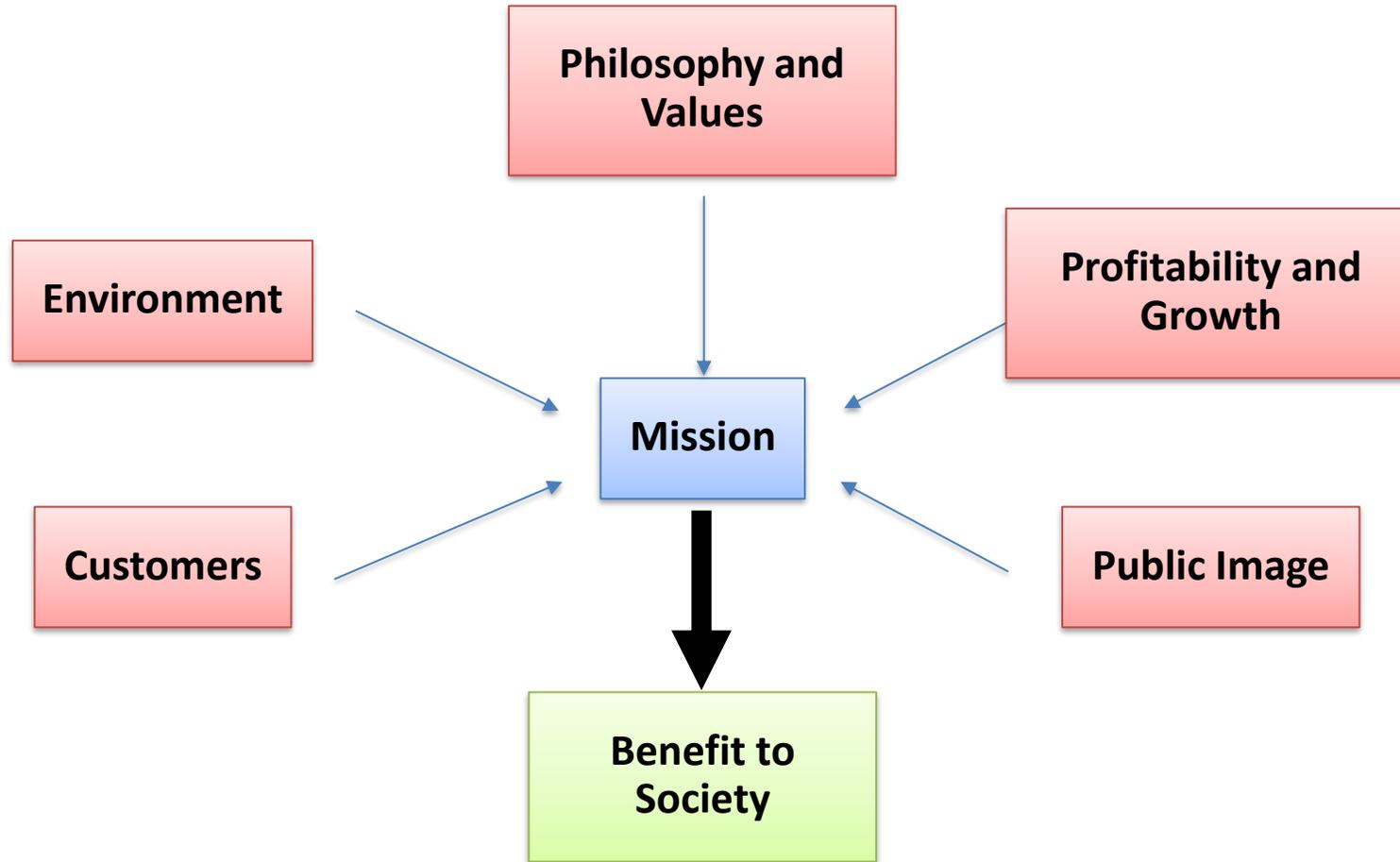
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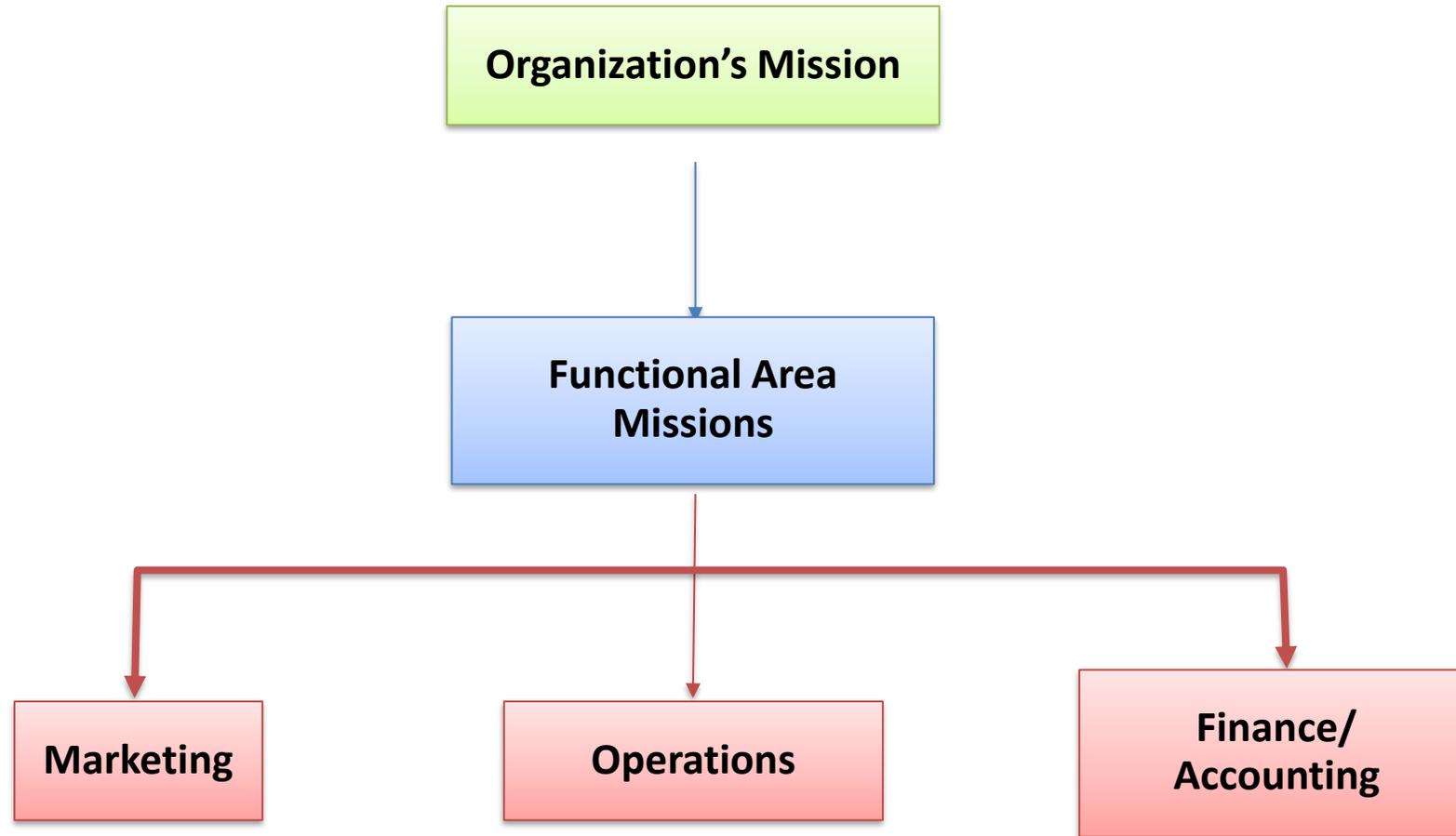
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Factors Affecting Mission



Strategic Process

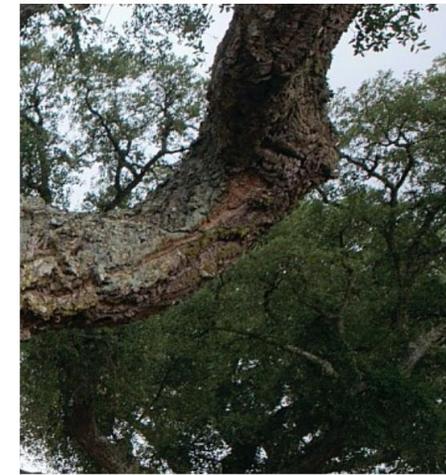


AMORIM



Missão

Acrescentar valor à cortiça, de forma competitiva, diferenciada e inovadora, em perfeita harmonia com a Natureza.



Valores

Orgulho
Ambição
Iniciativa
Sobriedade
Atitude

Visão

Ser uma empresa sustentável, remunerando adequadamente o capital investido, na promoção da equidade social e da salvaguarda ambiental e com fatores de diferenciação ao nível do produto e do serviço.

<https://www.amorim.com/pt/corticeira-amorim/missao-visao-valores/>

LUZ SAÚDE

Valores

A Luz Saúde tem como base 8 valores fundamentais:

Procura incansável de resultados

Rigor intelectual

Aprendizagem constante

Responsabilidade pessoal

Respeito e humildade

Atitude positiva

Integridade

Espírito de equipa

Visão

A visão da Luz Saúde é ser um operador de referência na prestação de cuidados de saúde, pela prática de uma medicina de excelência e inovação em cuidados de elevada especialização e complexidade.

O compromisso da Luz Saúde é total e absoluto: garantir o melhor diagnóstico e tratamento médico que o talento, a inovação e a dedicação podem proporcionar.

A Luz Saúde disponibiliza uma oferta global que assegura a continuidade de cuidados e que responde à evolução das necessidades de saúde ao longo da vida das pessoas.

Missão

Alcançar os melhores resultados de saúde na perspetiva dos doentes através de um diagnóstico e tratamento rápido e eficaz, com absoluto respeito pela sua individualidade e criar uma organização capaz de atrair, desenvolver e reter pessoas excecionais.

Por forma a cumprir a sua Missão, a Luz Saúde, através dos seus colaboradores, assume o compromisso de:

Excelência em Cuidados de Saúde

+

Tecnologia e Inovação

+

Talento e Formação

+



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Quem somos: visão, missão e valores | Luz Saúde (luzsaude.pt)



A NOSSA MISSÃO

CRIAR MAIS SORRISOS DESFRUTANDO DOS NOSSOS PRODUTOS

- **PARA OS NOSSOS CONSUMIDORES:**
Criando momentos felizes com os nossos deliciosos produtos e experiências únicas junto das nossas marcas.
- **PARA OS NOSSOS CLIENTES:**
Ao sermos o melhor parceiro possível, impulsionando a inovação e proporcionando um nível de crescimento incomparável na nossa indústria.
- **PARA OS NOSSOS PARCEIROS E PARA AS NOSSAS COMUNIDADES:**
Criando novas oportunidades de trabalho, proporcionando novas competências e construindo em conjunto carreiras de sucesso num local de trabalho diverso e inclusivo.
- **PARA O NOSSO PLANETA:**
Conservando os recursos valiosos da nossa natureza e promovendo um planeta mais sustentável para as gerações futuras.
- **PARA OS NOSSOS ACCIONISTAS:**
Distribuindo retorno do investimento e adotando a melhor gestão corporativa possível.

~

<https://www.pepsico.pt/pt-pt/sobre-n%C3%B3s/miss%C3%A3o-e-vis%C3%A3o>



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OUR VISION

BE THE GLOBAL LEADER IN CONVENIENT FOODS AND BEVERAGES BY WINNING WITH PURPOSE

This reflects our ambition to win sustainably in the marketplace and accelerate our top line growth, whilst keeping our commitment to do good for the planet and our communities. It builds on decades of progress we've made since PepsiCo was founded in 1965, while setting a firm foundation for a new era of growth and prosperity. To help us achieve this vision, we've defined a new set of aspirations: to become Faster, Stronger, and Better.

OUR ASPIRATIONS

Faster

Stronger

Better

<https://www.pepsico.pt/pt-pt/sobre-n%C3%B3s/miss%C3%A3o-e-vis%C3%A3o>



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- Inovação
- Sustentabilidade
- Capacidade de Produção
- Projetos
- Responsabilidade

BEM-VINDO

Conhece a Casa Mendes Gonçalves e fica a saber porque somos o parceiro certo para trabalhar com a tua empresa.



O nosso compromisso com a segurança...

SEGURANÇA ALIMENTAR E DE PROCESSOS

A nossa capacidade de Rastreabilidade, totalmente automatizada, permite a nível de segurança alimentar:

- Diminuir erro humano.
- Ter dados disponíveis ao momento.
- Exercícios de rastreabilidade de forma rápida e simples.
- Guardar informação de forma segura e sem período definido.
- Maior segurança na introdução de dados.
- De A a Z, desde a receção de materiais até à expedição de produto.

...e a qualidade

O PILAR DA QUALIDADE

O Departamento de Qualidade da Mendes Gonçalves é multidisciplinar e é composto por 10 colaboradores com competências técnicas na área Alimentar, Química e Microbiológica que atuam em diversos temas como:

- Análises laboratoriais de físico-química, microbiologia e análises sensoriais.
- Análise de tendências de resultados e proposta de ações correctivas ou de melhoria.
- Planos de Auditorias (internas ou externas).
- Certificação BRC Global Standard for Food Safety.
- Acompanhamento de fornecedores e planos de avaliação rigorosos.



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Our Values



“We believe that business, at its best, serves the public good, empowers people around the world, and binds us together as never before.”

-Apple CEO Tim Cook

We are committed to demonstrating that business can and should be a force for good. Achieving that takes innovation, collaboration, and a focus on serving others. It also means leading with our values in the technology we make, the way we make it, and how we treat people and the planet we share. We're always working to leave the world better than we found it, and to create powerful tools that empower others to do the same.

https://investor.apple.com/our_values/default.aspx



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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

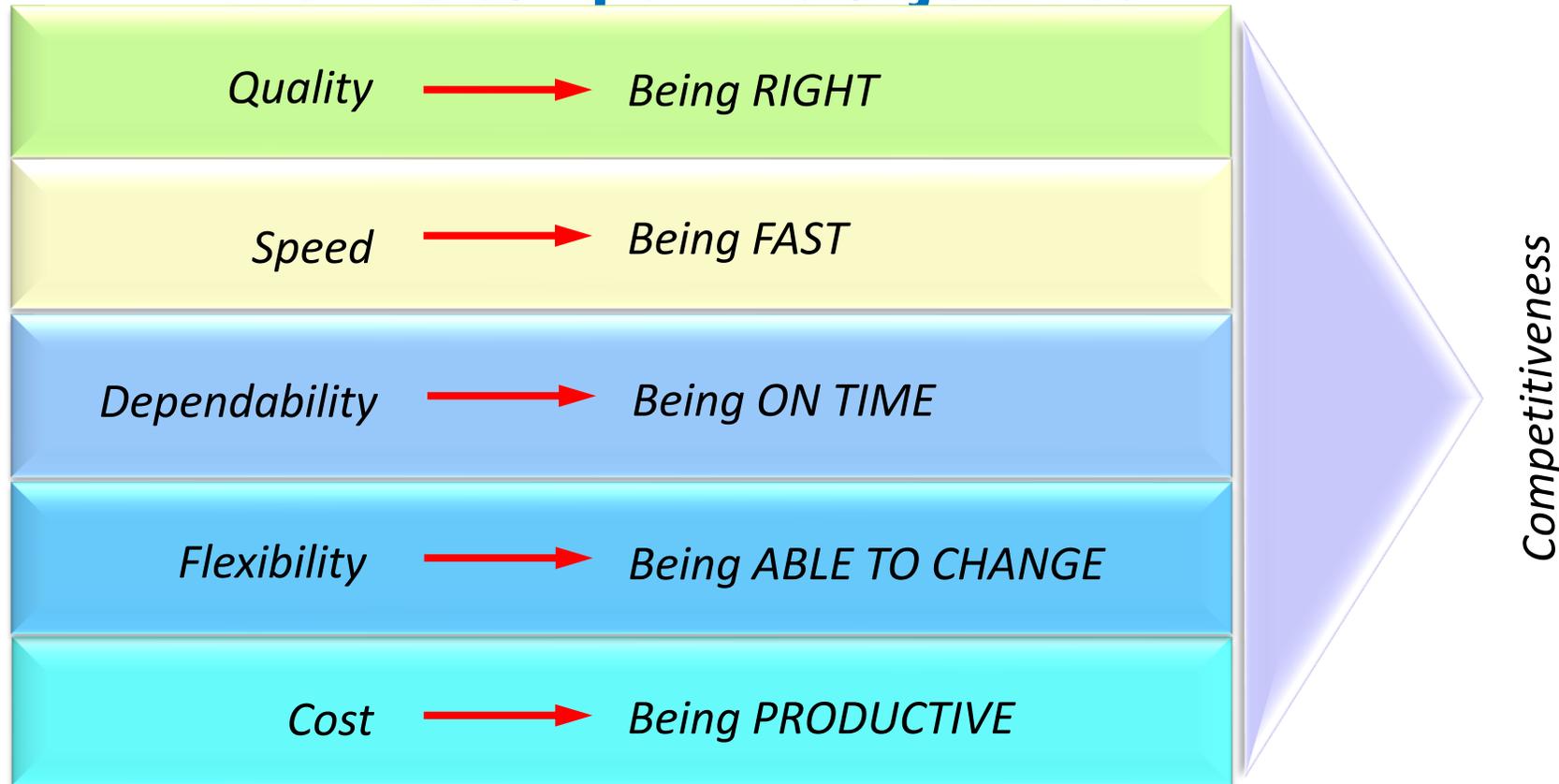
Timeliness is quickness in design, production, and delivery

- 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



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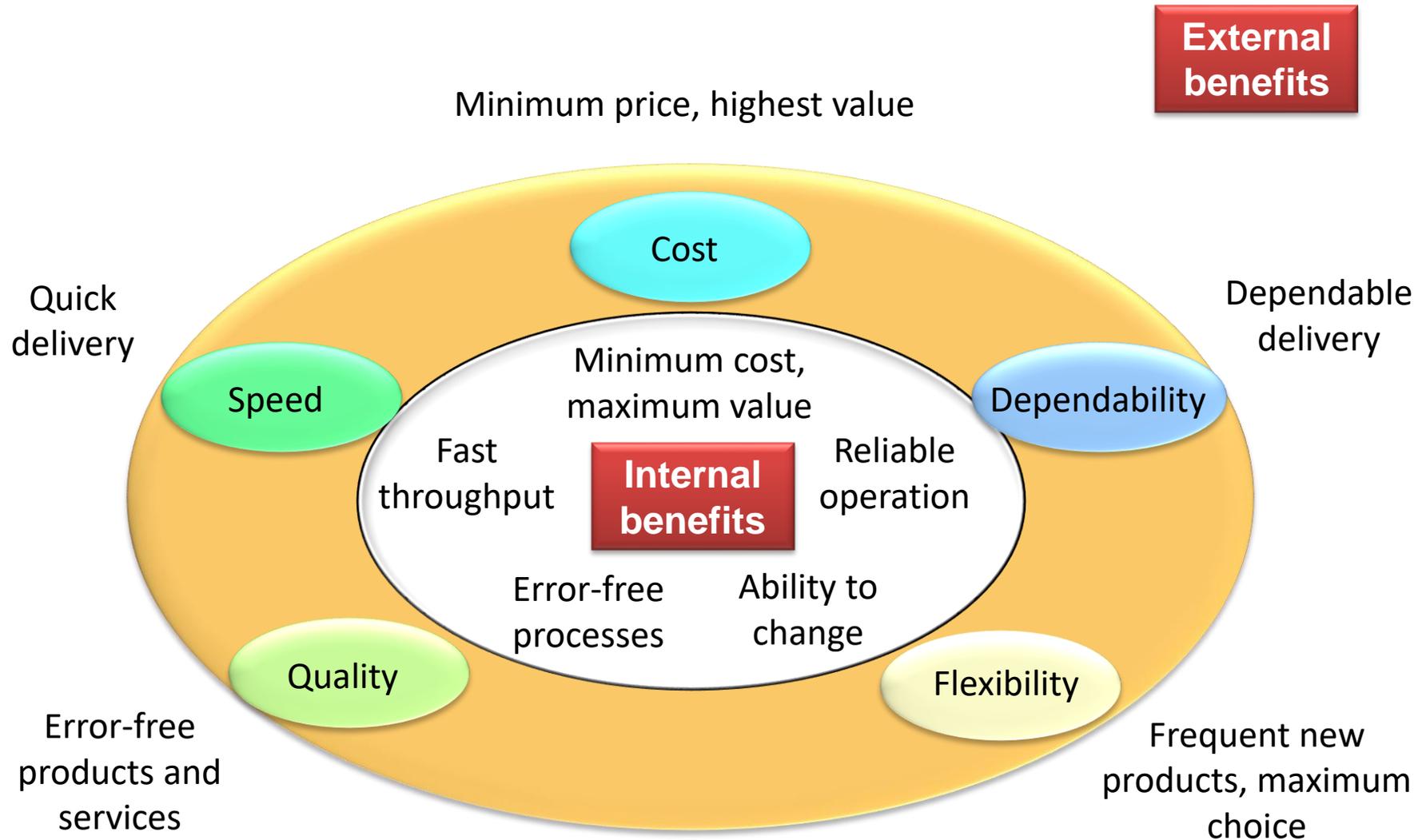
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The benefits of excelling at the five objectives



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



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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

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What does Quality mean in.....

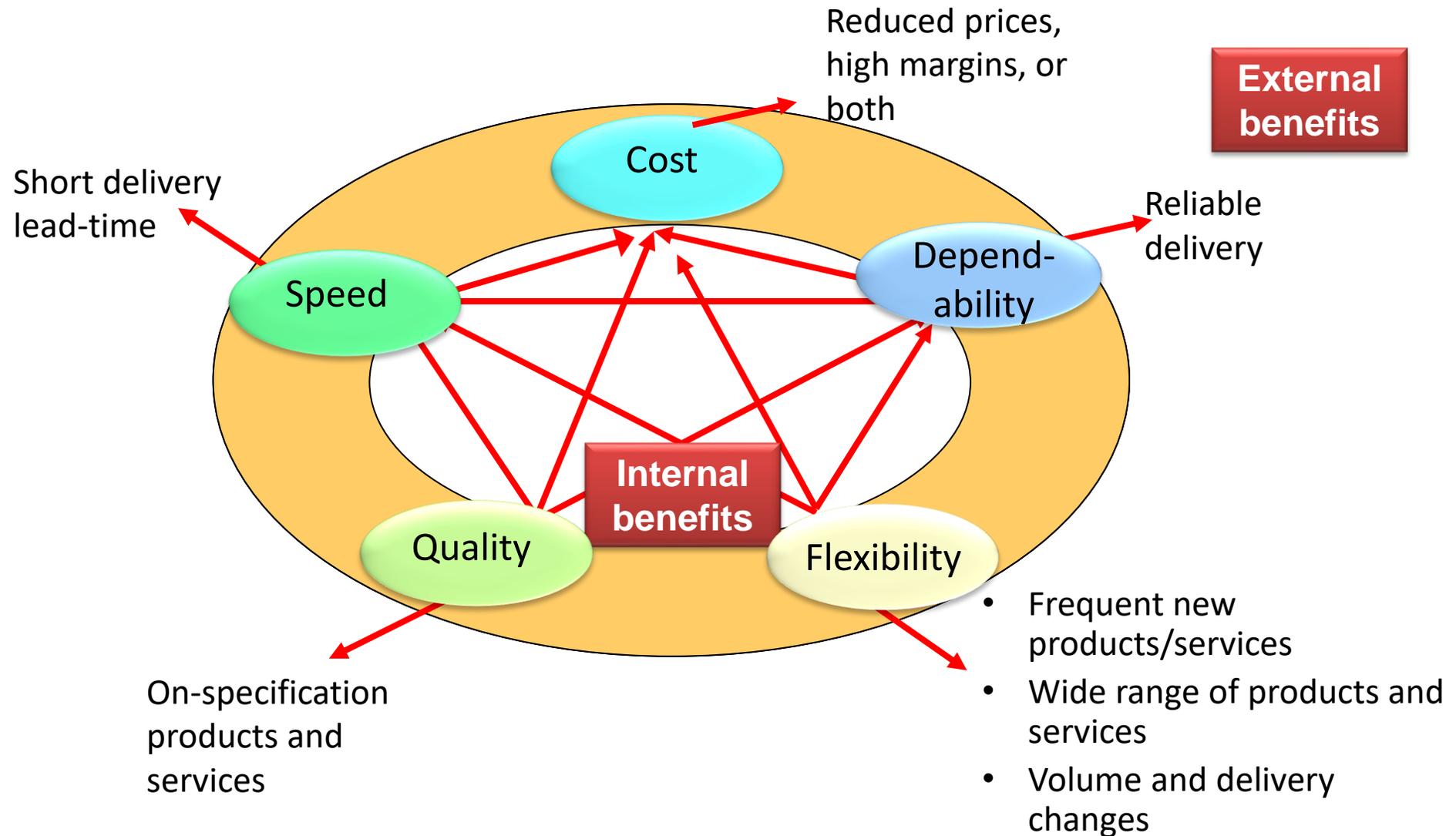
.... a bus company?



- 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

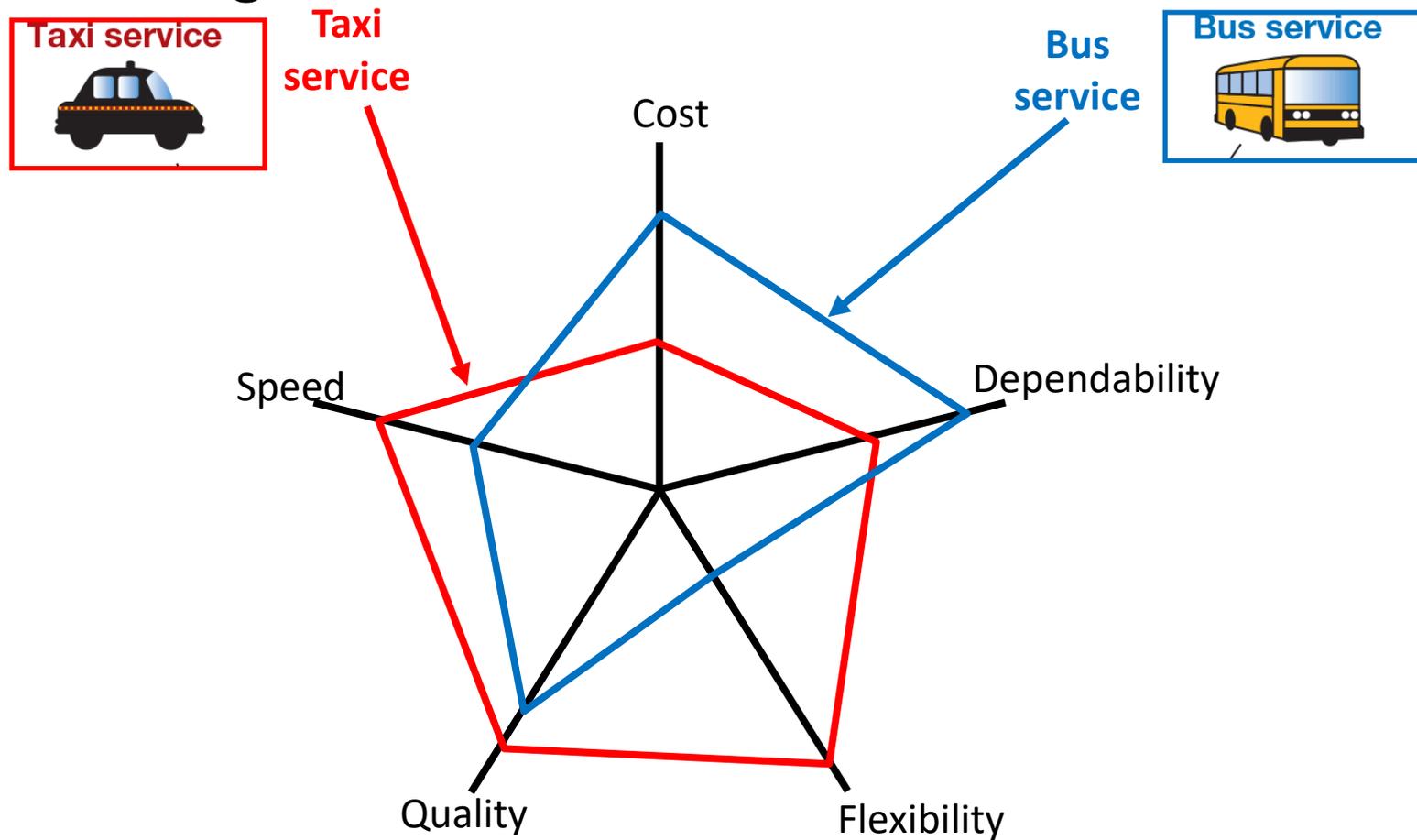
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External and Internal of performance objectives



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





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