

Operations in the Current Environment

CONTENTS

1. The company in a global environment
2. Evolution in the organisation of operations
3. The experience curve
4. Competitive advantages
5. Digitisation
6. Glossary

EDUCATIONAL OBJECTIVES

- Understanding the concept and specific tasks of operations management in a company and becoming capable of differentiating them from those of production.
- Contextualizing operations management in a global (extended chain) and highly competitive (value chain) environment.
- Understanding the concepts of experience curve, breakeven point, and the importance of an efficient allocation of resources.
- Knowing the role of operations management in generating a company's competitive advantages.
- Understanding how corporate digitisation has led to defining the concept of Industry 4.0, where operations, production processes, and information technologies are integrated through the internet.

KEYWORDS

Operations management, competitiveness, globalization, experience curve, economies of scale, value chain, corporate digitisation, additive manufacturing, Internet of Things, big data analysis.

OUTLINE

**THE COMPANY
IN A GLOBAL
ENVIRONMENT**

- Internationalization
- Globalization
- The extended enterprise

**OPERATIONS
MANAGEMENT**

- Definition and responsibilities
- Organisational localization
- Innovation
- The experience curve
- Breakeven point
- Efficient allocation of resources

**THE CONTRIBUTION
OF OPERATIONS
TO ACHIEVING
COMPETITIVE
ADVANTAGES**

- Cost leadership
- Differentiation leadership
- Segmentation leadership
- Flexible response

**DIGITISATION OF
OPERATIONS**

- Operations in the digital era
- Industry 4.0
- Big data analysis
- Additive manufacturing
- Internet of Things



SUMMARY

In order to understand the main challenges faced in operations management, it is first necessary to understand the environment in which companies operate today. Chapter I begins with an exposition of how companies exist in a global environment where internationalization has played a crucial role. It also explains concepts such as competitiveness, which are vital in operations. As it will be shown, the generalization of new instruments and mechanisms used to reduce risk, technological innovation, and the transformation of the company's framework resulting from globalization, represent a new and more complex reality for operations management.

The evolution of operations management has been closely linked to significant historical developments that range from the Industrial Revolution to the present day marked by awareness of social responsibility.

Today, the study of operations involves analysing how a company interacts with its environment and how internally cohesive it is, so that it is possible to design an effective system of response to change or, in other words, a mechanism of progress and survival for a highly competitive environment.

We will delve into the concepts of experience curves, cost reduction, and breakeven point analysis.

Finally, this chapter lays out the key concepts of the digital revolution in the industrial sector and the great advances in production organisation and operations management techniques derived from this revolution. We will address Industry 4.0 and concepts related to corporate digitisation, where big data analysis, additive manufacturing, and the Internet of Things are instrumental. This way, by Chapter II the reader will be ready to understand what it means to manage operations in today's companies and the kinds of decisions that must be made.

“ There is nothing so useless as doing efficiently that which should not be done at all.” Peter Drucker.

“ Entrepreneurial profit is the expression of the value of what the entrepreneur contributes to production.” Joseph A. Schumpeter.

1. THE COMPANY IN A GLOBAL ENVIRONMENT

In order to understand the current challenges faced by operations management, it is necessary to examine how companies are configured in a fully globalized environment. This environment, as defined by Professor Izquierdo-Triana, H (2016), is characterized by “companies competing in a global, multipolar, and hostile environment where information is democratised, competitors are capable of working more for less and international corporations have a higher turnover than many countries’ GDP, with economic and competitive intelligence structures, and in a new industrial revolution based on data analysis and utilization. Therefore, they compete in a business world that is far from comfort zones but also full of opportunities.”

As can be seen in the current environment, internationalization arises as a natural response to the transformation lived in world trade. There are several models that collect the business initiatives that have led companies to expand their geographic markets, which we will now proceed to explain.

The 1970s saw the emergence of theories such as industrial organisation, which explained internationalization as a process achieved by locating production facilities and infrastructure in foreign countries. Other theories, such as internationalization, argued that the motivation for going abroad could be explained by the cost advantages and economies of scale that were found in other countries. At a halfway point between industrial organisation and internationalization, there was an intermediate theory: Dunning’s research. This maintained that companies chose to go abroad because of the synergies they could achieve in their business. This explained from a rational point of view the attractiveness of certain markets in the long term.

Other approaches to the phenomenon of companies’ internationalization can be found in Vernon’s product life cycle theory, the U-model, and the Uppsala model. Vernon’s product life cycle links moving the company abroad to the life cycle of existing products in the company, the U-model attributes in-



ternationalization to an evolutionary business process, and the Uppsala model addresses the need to understand foreign markets.

Currently, internationalization is affected by the determination to minimize risks and innovate in a highly competitive environment. Therefore, as Petra Mateos (1998) affirmed, companies need their management style to be contingent and adaptive. She also emphasized the need to provide flexibility to organisations and work management by creating networks of companies.

In recent years, network theory has been gaining more relevance. Companies work in collaborative networks regardless of their size. These networks allow them to share resources and capabilities to compete in a globalized environment.

Figure 1.1 shows the company as an extended network in which everything is interrelated from the supplier to the customer, including external agents that also influence the business's value.

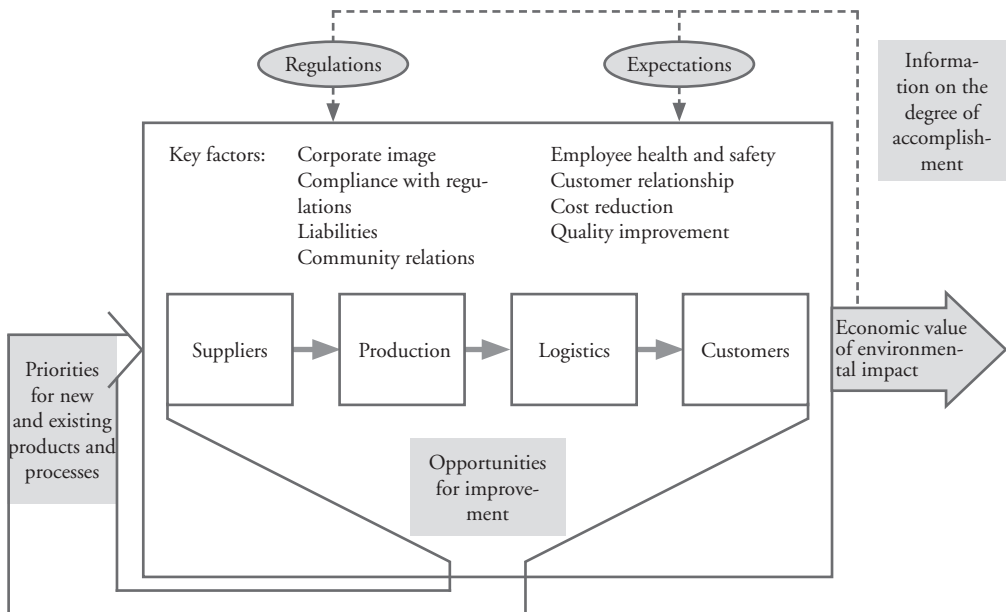


Figure 1.1. Sustainability and the extended enterprise

Source: Kleindorfer Paul et al. (2005)

One of the phenomena associated with the internationalization process of companies is experienced by some businesses with accelerated internationalization, also known as “born global” companies. These are characterized by having a global focus from their inception.

Rialp et al. (2001) identified relevant factors that explain the proliferation of this type of company. These are mainly related to flexibility, intangible assets, and value creation.

It should be noted that for most authors, “born global” companies are small-sized businesses that focus on the broad spectrum of tech and whose mission is to supply international markets.

Now that we have contextualised companies in the global environment, let us see how this affects the subject of operations management, starting by defining what operations are and what are their main responsibilities, as well as their place within an organisation.

2. EVOLUTION IN THE ORGANISATION OF OPERATIONS

The three most important functional areas in an organisation are finance, sales, and production, and they must be perfectly coordinated. The finance area is responsible for managing and financing the company’s investments. Sales serves to connect the inside of the company with the outside by taking into account consumer preferences. Finally, the production area is responsible of transforming raw materials into products or services for the end consumer.

There is often confusion between the tasks of production management and activities belonging to operations management, so it may be useful to clarify from the get-go the main difference that will help identify the tasks attributable to each management area. While production focuses on strategic aspects, operations studies tactical and operational aspects from a more analytical standpoint (design, management, and improvement of operations).

Strategic decisions are those that set the direction of the company and are designed for the long term, thus affecting the entire organisation. Tactical decisions are short and medium-term and are related to the company’s day-to-day operations, aiming to efficiently allocate the available resources to achieve the



strategic objectives. The short-term time horizon is usually close to one year, while the medium and long term are usually between 3 and 5 years.

Typically, some of the core responsibilities of operations management in the short term include:

- Demand estimation
- Production planning
- Monitoring and control
- Equipment maintenance
- Quality management

However, it is true that the assignment of these responsibilities is also influenced by the size and structure of the organisation.

Operations management is responsible for creating value in the transformation of resources into products. The table below (Table 1.1) shows a list of activities typically associated with operations management from a tactical and operational standpoint.

Table 1.1. Activities typically associated with operations management

Source: Edelman, A. (2007)

Operations (and organisations) as processes	Manufacture, purchase, store, and distribute goods
<ul style="list-style-type: none"> ■ Analysis and improvement of processes ■ Process management ■ Process reengineering 	<ul style="list-style-type: none"> ■ Production planning and scheduling ■ Purchasing management ■ Inventory management ■ Logistics ■ Supply Chain Management
Projects/Management of unique events	
<ul style="list-style-type: none"> ■ Project management ■ Project portfolios 	Design, manage, and deliver services
Quality	
<ul style="list-style-type: none"> ■ Service quality ■ Measurement of customer satisfaction ■ Quality improvement processes ■ Quality assurance ■ Excellence models/Total Quality 	<ul style="list-style-type: none"> ■ Excellence models in services ■ Design of service warranties ■ Service operations ■ Use of technology in services

Operations management usually plays a prominent role at an organisational level as it is closely linked to value creation in companies. As an example, see the organisational chart of the Spanish company RENFE Operadora in 2016 in the Figure 1.2 below.

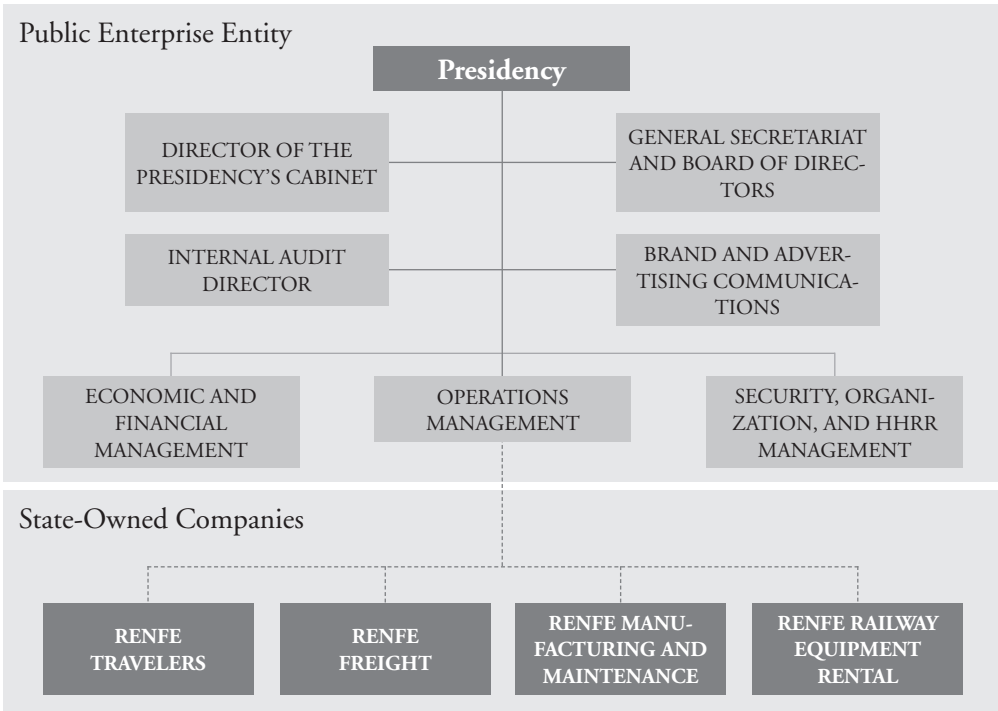


Figure 1.2. Organisational chart of the state-owned enterprise RENFE

Source: RENFE Operadora

As can be observed, the Operations General Directorate is part of the Company's Management Committee, which reports directly to the Presidency.



Table 1.2. RENFE Operadora case study

Source: Own creation based on RENFE Operadora (2016) and BOE nº171, July 18, 2015, Section I. Page 59575.



RENFE Operadora is a Spanish public corporate entity that belongs to the Fomento Group. Its business purpose is to provide passenger and freight transportation services. The RENFE group and its subsidiaries have four lines of business, which we will now outline: first, passenger transportation and the sales of associated products; second, freight transportation and logistics services; third, maintenance and industrial work (RENFE Fabricación y Mantenimiento); and finally, rolling stock management. Can you imagine what it takes to plan and coordinate all the routes and services of this company?

Trains are considered catalysts in the environment in which they operate. They belong to a highly regulated sector in which safety plays a crucial role in operations.

The Railway Safety Regulations establish all the mandatory normative and operational procedures for trains to circulate safely and efficiently on the Railway Network. The image on the right shows an example of how fixed signals indicating a direction should be displayed.

These indications must appear at stations or along the track. They must be positioned on the mast of other signals or isolated and must indicate the direction and manoeuvres that trains have to follow.

Another example to help us understand the importance of Operations Management is the classification of trains. They are identified by a code that contains a number (representing the maximum speed at which the train can travel according to the track layout) and an uppercase letter.

The speed, composition, and braking procedures of a train are also regulated by a code consisting of a number and an uppercase letter. In this way, the code represents the maxi-

DIRECCIÓN	LUMINOSAS
	 A
	 B
	 C
	 D
	Señales F13 Color blanco

imum speed in km/h at which the train could travel under the most favourable conditions of track layout and class, and the letter identifies the type of train based on centrifugal accelerations (regulated) allowed in curves

As can be seen in Table 1.1, operations management plays a relevant strategic role in delivering the company's intended service.

Today, operations management, regardless of the observed sector, faces the introduction of new tools and work methods that will have a significant impact on the supply chain and the measurement and control of efficiency. All of this is driven by major technological advancements.

As it will be seen throughout this manual, the evolution of operations management has always been closely linked to important historical developments, ranging from the Industrial Revolution to the present day marked by a growing awareness of social responsibility. This latter aspect will be discussed in more detail in Chapter VIII.

Looking back, we find that Shumpeter (1942) studied the phenomenon of radical innovations and considered that they occurred when one of the following situations took place:

- A new product or an improvement to an existing product is introduced.
- A new method of production emerges.
- There is a new way of sourcing.
- A new market opens up.
- A new form of industrial organisation appears.

Tushman and Anderson (1986) conducted their research on incremental innovation and they identified that, in order to offer a product, it is necessary to build on existing knowledge in use.

As pointed out by Fernández, E. (2005): "We are facing a radical innovation, which both means breaking with the traditional way of doing things and redefining the industry." The author believes that it is necessary to establish a bridge between the past and the technological future, thus striking a balance between incremental and radical innovation.

In the coming years, we will continue to see operations management taking on an increasingly prominent role in a global market where flexibility and



speed of response to the customer are crucial, both concepts closely linked to innovation.

3. THE LEARNING CURVE

Aguirre, A. (1985) already pointed out that economies of scale depend on the production rate, and that, as workers improve at performing a task, they become more efficient at it.

The learning curve is a concept closely related to efficiency and, therefore, to operations. It is based on the learning capacity of individuals, whereby the more someone knows about their work, the better they can adjust the means and efforts to complete the activity.

The experience curve allows for cost improvement, contributes to generating economies of scale (let us remember that this concept means that the more a company produces, the less each unit costs to produce), and achieves process improvements. Operations also aim to enable cost reduction in companies through appropriate designs and a proper plant layout, as well as clear and effective procedures that ensure the efficiency of all resources used. An example clarifying the importance of proper plant layout is shown at the end of this section.

Next, let us put the effects of the learning curve into practice with the following exercise proposed by Aguirre A.:

Exercise 1: Please calculate the type of evolution of total and average times required for the production of the first units in a series, assuming that the constant percentage or rate of time reduction has been evaluated at eighty percent due to the learning effect, and that 70 hours were required to obtain the first unit.

Units produced	Accumulated hours	Hours per unit
1	70	70
2	112	56 (70 × 0,8)
4	179,2	44,8 (56 × 0,80)
8	186,72	35,84 (44,8 × 0,80)
16	458,75	28,67 (35,84 × 0,80)

Source: Aguirre, A. (1985)