# Basic notions of economics

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# Introduction

This first module introduces the main concepts of product economics and focuses particularly on the specific features of the business of information and communication technologies. These concepts are intended to lay the foundations for understanding the different actions and business models established by the business policy, which we will see later.

The first section introduces the basic notions of product value according to supply and demand and of competitive advantage over rivals as essential tools for business viability.

In the second section, we will describe the main economic effects relating to the features of technology products and software in general. In it, we will explain how a company can act on the market by establishing a policy to manipulate these effects in order to create a scenario that will afford it the best possible position over its competitors.

# Objectives

After completing this module, students should have achieved the following aims:

**1.** To understand the basics of the relationship between supply and demand, particularly with concepts concerning value creation.

**2.** To identify and analyse the key economic features of the software industry.

**3.** To obtain a detailed knowledge of and link the economic effects associated with the software market.

**4.** To identify and analyse the economic effects likely to transmit value or a competitive advantage to products based on free software.

**5.** To obtain a detailed understanding of the management policies and strategies of the free software market.

# 1. Value creation

To ensure the viability of a given business, there must be people or businesses willing to pay, as customers, for the product or service offered to them, and these payments must compensate their providers for the expenses incurred. First of all, we will explain in simple terms the basic economic concepts at work in this interaction between the company organising the business and the prospective clients of its product or service.

## 1.1. Product demand

First of all, we need to introduce some of the possible rules of conduct for the businesses and households that we want to convert into customers of our business.

A consumer (if we are talking about consumer goods) or a company (if purchasing machinery, raw materials, etc). will consider buying a particular product or service if the amount of money asked of them in exchange (payment) seems reasonable to them.

In this situation, the prospective buyer makes the following argument:

**1)** Firstly, he/she considers it reasonable to pay at most an amount of money V to acquire the product or service being offered in exchange. Therefore, if he/she is asked for an amount of money P less than V, he/she will consider it worthwhile to acquire the product. So, for someone to consider becoming our customer, the following conditions must be fulfilled:

Assessment of product – its price = V-P > 0

To put it another way, a company will not be paid more than V for its product or service. However, this will not guarantee that the customer will buy the product.

**2)** Secondly, the customer will compare this offer with the available alternatives. Of two or more similar products, the consumer will choose the one in which the difference of V–P is greater.

**Example**

A family is thinking about buying a car. The family values the model of manufacturer A at €40,000 (Va = €40,000) although the selling price is €30,000, Pa = 30,000. The family values the model of manufacturer B at a lower price; to be exact, let's suppose that it values the car less due to inferior features (for example, it is a smaller vehicle) at €35,000, Vb = €35,000.

The family in our example will buy the model of manufacturer A, even though it is more expensive, so long as the car of manufacturer B is sold at over €25,000, and vice versa: it will buy manufacturer B's car if it is cheap enough, i.e. if its price is under €25,000:

We can conclude that:

It will only purchase the product of manufacturer A if

$$Va–Pa = 40,000 – 30,000 > Vb–Pb = 35,000–Pb,$$

i.e. only if Pb > 25,000.

It will only purchase the product of manufacturer B if

$$Va–Pa = 40,000 – 30,000 < Vb–Pb = 35,000–Pb,$$

i.e. only if Pb < 25,000.

The **demand** for a particular product consists of the series of customers obtained for each possible price of the product in question.

In our example, if every family values these products in the same way for prices over €25,000, there will be no demand for manufacturer B's product, while for lower prices, we have the demand of all of the families that value the product of the same family that we have discussed.

On what does the value V that a prospective customer gives to a product or service depend? First and foremost, it depends on the intrinsic ability of the product to meet the customer's needs, but also:

**1)**On the customer's ability to adequately evaluate the product, which depends largely on his/her background and education.

It would be difficult for a customer to evaluate the GNU/Linux operating system, for example, if he/she does not even know what an operating system is and has never even considered that a computer is not necessarily required to have the Microsoft Windows operating system installed.

**2)**On the importance of the availability of secondary products to complement the main product that we are being offered (a car is more valuable if roads are better and petrol stations are easy to come across, and less valuable if roads are congested, public transport is good, if petrol becomes more expensive, etc).

**3)**On the real spread of the product offered to us, i.e. the number of other people who have it: telephone and e-mail are more valuable the more people who use them.

## 1.2. Product supply

For their part, employers will concentrate on a certain product so long as they can obtain a reasonable profit from it, which requires them to consider two key aspects:

1) The costs of looking after customers.

2) What they would gain by engaging in another activity.

**Example**

Let's say a couple decides to open a bar. At the end of the first year, they have obtained a revenue of €150,000, while the costs of serving patrons, hire of the premises, etc. amount to €120,000. We can see that the first condition is fulfilled because the revenue has far exceeded the costs; accountants would tell us that we have a profit, since the revenue covers costs.

However, imagine that, in order to open the bar, this couple gave up their jobs as paid workers, which had given them an annual income of €40,000. These alternative incomes are what economists call the opportunity cost of setting up the bar as a business. We can see that the second aspect is not covered in the example:

The business is not really making money because

$$\text{Revenue} - \text{costs} = 150{,}000 - 120{,}000 = 30{,}000$$

$$< \text{Opportunity cost} = 40{,}000$$

Of course, this couple may still prefer to run the bar than to work as employees, so we can consider their sacrifice in terms of the money left over at the end of the year reasonable if the satisfaction of running their own business compensates for this. Our point is, firstly, that they are not running a good business from a strictly monetary perspective, and secondly, that their decision will only seem reasonable if it is a lucid decision, that is, if they consciously accept this loss of revenue; it would not be reasonable if they did not accept that they would have less money.

To turn the bar into a good business, the profits must outweigh the "profit" from the alternative activity or opportunity cost.

If the annual revenue of the bar is €180,000, for example, then we would be talking about a good business:

This would be a good business because

$$\text{Revenue} - \text{costs} = 180{,}000 - 120{,}000 = 60{,}000$$

$$> \text{Opportunity cost} = 40{,}000$$

We can conclude that, in order to sustain a business, the profits obtained must exceed the opportunity costs of engaging in alternative activities.

## 1.3. Value creation and competitive advantage

Based on what we have seen so far, we can consider the requirements that need to be met for a business to be profitable.

Firstly, it is necessary to create value, i.e. that the valuation V made of the product on offer by prospective customers exceeds its costs:

For a business to be viable, it is essential for

product valuation – costs – opportunity cost > 0

Only when this is true can we say that a company creates value and can be viable, because only then can we find a price that is fair for both the customer and the company.

**Example**

If the value of a product for a customer is V = €100 and the cost of taking care of the latter is C = 60, we can find a satisfactory price for the customer and the company, such as P = 80, and the exchange will be satisfactory for both because the following conditions hold true:

V – P > 0

and

P – total costs > 0

Fulfilment of the condition V – C > 0, however, does not guarantee the viability of a business. To illustrate this, we will go back to our previous example in section 1.1 (product demand), though this time from the point of view of two rival companies trying to win over a customer:

**Example**

We have two car manufacturers offering two similar models. We have seen that the family valued one of the cars at Va = 40,000 and the other at Vb = 35,000.

Imagine that the manufacturing costs of company A are Ca = 20,000, while those of company B are Cb = 10,000. Both companies manufacture at costs far below the respective Va and Vb valuations.

Therefore, if they had no rival, both companies would clearly be viable as a business.

Now imagine that company B decides to sell its vehicles at the price of Pb = 18,000. Customer satisfaction is

Vb – Pb = 35,000 – 18,000 = 17,000.

Company A must provide a greater – or at least similar – level of satisfaction to gain customers:

Company A gains customers if:

Va – Pa > Vb – Pb = 17,000 only if < 23,000.

Company A therefore has the ability to attract clients and cover costs. However, if we look closely, we see that this company is at the mercy of its rival:

If company B decides to lower its prices to less than 15,000 (e.g. Pb = 14,000), company A cannot continue to attract customers without incurring losses:

Vb – Pb = 35,000 – 14,000 = 21,000 and

Va – Pa > Vb – Pb = 21,000 only if Pa < 19,000, but then

Pa – Ca < 0 !

In this example, company B has a competitive advantage over its rival, company A. The result is that one of two situations occurs:

1) Company B attracts all of the customers, such as when it establishes Pb = 14,000, or

2) The two companies share out the customers, but company B makes more money on each:

They divide the customers between them if Va – Pa = Vb – Pb, but this means that Pa – Ca < Pb – Cb, for example if Pb = 18,000 and Pa = 23,000.

Ultimately, the company with the competitive advantage will guarantee its survival and, in all events, make more money than its rivals.

In the above example, company B had a competitive advantage in costs: although the product was perhaps not best suited to the needs of customers, Va > Vb, was able to produce a reasonable product with costs well below those of its rival.

**Inditex**

An interesting example for us to consider on this course is **Inditex**, the company that owns the clothing retailer Zara. The fashion clothing industry, of which the company forms part, is a highly competitive sector in which companies can copy each other's designs without limits. Nevertheless, there is a very high degree of inventiveness, with new models appearing every season, year after year (and naturally, a considerable number of companies that engage in this activity), and at very low prices. As customers, therefore, we can reap the benefits of a highly competitive and innovative industry.

Despite all of this, Inditex manages to expand its market share each year (i.e. it attracts an increasing proportion of customers) because of its competitive advantage in costs, which appears to consist basically of (1) rapidly detecting the designs that sell best in a given season and (2) immediately adapting production to these designs. As a result, costs are lower because it does not produce clothing that does not sell and it sells a lot of the clothing preferred that year.

And it would appear that this achievement is no mean feat, because its competitors are incapable of copying their behaviour (at least in such a clever way).

A company with a competitive advantage in costs will gain more customers and obtain higher profits because it can sell its products more cheaply.

Alternatively, a company might have a competitive advantage through differentiation, i.e. in offering a product more highly valued than that of its rivals at a reasonable cost.

**Adobe**

Adobe and its Acrobat software is a good example of a better valued product at a reasonable cost.

And this superior valuation can be general, in the sense that all potential customers consider the product to be of a higher quality (this is the case of prestigious German car brands, for example), or of a niche, i.e. it is a specialised

product for a particular type of customer (any village shop fulfils this requirement: it is a shop geared to a particular type of customer, namely, the residents of the village, the only ones for whom it is more convenient to buy bread or the newspaper there).

Competitive advantage through differentiation allows the company to sell more expensively without losing customers.

### 1.4. Summary

We have seen in basic terms and from an economic point of view what setting up a **viable business** is all about. To summarise, it consists of creating a product or service that is beneficial to our customers, so that we can charge for it while keeping costs under control.

When setting up a business based on free software, the crucial financial question is: what product or service can I charge the customer for? Before moving on to discuss this in the next section, we will look at a series of relevant economic features of the software industry that we will need to understand in order to answer this question.

# 2. Economic features of the software industry

As we explained at the beginning, no economic legislation has changed and none of the economic phenomena related to information and knowledge technology industries are qualitatively new. What has changed, if anything, is the relative importance of certain economic effects on our society. In ICT industries specifically, in the market interaction between companies and their customers, there is a series of very important economic phenomena that can distort the operation of these markets. We will now look briefly at the following effects:

1) The costs of copying and distributing digital technology.

2) The economics of intellectual property and ideas.

3) Complementarities.

4) Network effects.

5) Compatible products and standards.

6) Costs of change and captive customers.

7) Policies of compatibility and standardisation within a platform and between platforms.

A recent example of this last point is **compatibility across platforms and the policy** adopted on this issue by the **proprietary software company Microsoft**, which has led to the intervention of the European Commission in defence of **free competition** between companies. Given its importance for the proper conduct of business models based on free software, we will also briefly discuss the approach of the European Commission to the matter.

## 2.1. The costs of producing, copying and distributing digital technology

Digital technology has a very specific cost structure: it is very expensive to develop a specific product as this requires major investments, and we cannot simply half-develop it.

However, making high quality copies of the developed product and distributing them is relatively cheap.

Thus, it is very economical to serve additional customers; the expensive part is the initial investment that will lead to the development of a product around which we can organise a business.

**Commercial aviation**

Similarly, a commercial aviation company must make a big investment in an aircraft if it wants to set up frequent connections between two airports. It is no use trying to purchase half an airplane, the company will need to buy the whole aircraft. However, serving additional customers – until the plane is full – will work out very cheap for the company.

Naturally, the huge reduction in the costs of copying and distributing the products and services developed with digital technology has led to significant changes in certain industries.

**The music industry**

A typical example is the music industry, which was based around control over the copying (understood to mean a copy of a similar quality; with analogue technology, the sound quality of a cassette tape copy was far inferior to that of a record or CD) and distribution of the product (primarily through specialised shops).

## 2.2. The economics of intellectual property and ideas

ICTs are characterised by the fact that they allow the manipulation, broadcasting and reproduction of information and ideas. As a result, the advance of these technologies has the basic effect of **encouraging the spread of ideas and their use**.

Ideas, as an economic asset, have the quality of being **non-rival goods:** just because a person uses an idea does not mean that others cannot use it too.

**Non-rival goods**

If Peter eats an apple, John cannot eat it. In contrast, if Peter uses a recipe, John can also use it.

ICT industries spend a lot of financial resources on **developing new knowledge**, with the aim of making a profit on the exploitation of these ideas. From the point of view of the interest of general society, every time new knowledge arises, whether it is a scientific discovery, a new technique, or something else, the diffusion of this new idea poses a problem. Firstly, it is clear that once this new knowledge is available, it is in the interest of society to disseminate the idea as far as possible. However, the companies that have developed this knowledge have done so in order to gain a profit from it, and they can only do this by restricting access to the new knowledge. Without some form of **protection against the immediate dissemination** of this knowledge, we run the risk that companies will not invest money in the search for and development of new ideas and knowledge.

Advanced societies have created different institutions and mechanisms to facilitate the generation of new scientific and technical knowledge. Scientific creation is financed through public resources. The development and funding of more practical and applied knowledge for the creation of new production

techniques and new products is generally left to the private sector. In these cases, public institutions adopt the role of promoting private-sector activity by protecting intellectual property through the institution of a series of legal concepts, most notably **copyright**, **patents**and **trade secrets**.

*Copyright*protects the particular expression of an idea.

**Cases of copyright**

A typical example is the right of the author of a song or book over his or her work, which means that nobody can publish or distribute it without his/her consent. A person or company that makes a useful discovery may apply for a patent on it, which prohibits others from using this discovery without consent for a specified number of years (usually 20). Lastly, with trade secrets, companies can keep new knowledge secret and receive legal protection for theft. In this case, the inventor is obviously not protected if others make the same discoveries independently through their own efforts.

While proper use of some of these concepts of intellectual property protection may actually stimulate technical and economic progress, unfortunately, they pose two problems: it is highly questionable that all these legal concepts really do protect the development of ideas and that, in recent years, many companies have made spurious use of the legal concepts that could be useful for them. Instead of legitimately protecting their innovation, many companies use their copyrights and patents as anti-competitive instruments to safeguard their market power and make it harder for more innovative rivals to enter.

In the case of software, the emergence of proprietary systems has made it easy for companies to keep trade secrets due to the possibility of distinguishing between the software's source code and binary code. We can use a program, i.e. we can get the hardware – be it a computer, mobile phone, game console, ATM, etc. – to work with a computer program by incorporating the binary code on to the computer without having access to its source code. Therefore, proprietary software companies use a business model based on charging money for providing a copy of the binary code of their software. The result is that, without knowing the source code, we cannot discover why the program works one way but not in another, and we naturally cannot edit it to allow us to do other things.

The **trade secret** (not revealing the source code), then, allows companies firstly to hide the developed product from their rivals and then, despite everything, to sell a product to consumers (the binary code of the software program).

**Free software** is the exact opposite since it is based on **sharing the source code** of the program. As we shall see, this requires the development of an entirely different business model based on offering a service: the ability to modify and adapt the software to customer needs using the expertise and knowledge of the computer engineer.

**Copyright, patents and innovation**

P. And you don't agree with patents in software either...

R. Let's just say that I am very sceptical that they serve the purpose they were supposedly designed for. Software is an industry where innovation is sequential. Every new discovery or improvement is constructed on what has been developed before, like a tower. A patent applied at a certain level of the tower slows down further developments. In practice, this works like a monopoly.

Interview with Eric Maskin, 2007 Nobel Laureate in Economics, published in *El País*, 29/06/2008.

**Recommended reading**

You can read the full interview in the article published in*El País* on 29/06/08 "Es difícil prevenir una burbuja"

Is it true that a creator is really that unprotected without copyright or patents on their ideas? Many creators seem to think so. For example, in a discussion with the CEO of the Bimbo company, published in *El País* on 11 August 2006, the famous chef Ferran Adrià said:

"One thing that has not been resolved in this country is the protection of creativity. You can copy without fear. R&D makes little sense. The same thing happens in restaurants."

...

"You invent something and a month later, somebody's copying you! In life, there are things that are wrong, things that don't work, and this is one of them. You can work on something for years with hope and ambition and, a month later, someone comes along and introduces it without having put in any effort whatsoever..."

**Recommended reading**

You can read the whole discussion in the article published in *El País* on 11 August 2006.

Is it really that easy to copy his ideas? Does this mean that his business model cannot work? We can be sure of one thing: his business is working. So what stops Ferran Adrià from running out of customers?

**1)**Firstly, what Ferran Adrià really sells to his customers is not an idea (a recipe) but rather the cooked dish. For the idea to be consumed by his customers, it must be incorporated into a specific cooked dish, just as one does not buy a concept of a car, but rather a specific car.

**2)** Secondly, in relation to the fact that we consume or use products and services that are the materialisation of an idea, it is not enough to have access to the idea, i.e. the "recipe". To turn it into the cooked dish, we must have the skill and knowledge and the right tools. With regards the latter (tools), Adrià himself often says that the public should not expect to repeat the dishes he cooks in his restaurant because home kitchens do not have the right tools. He recommends cooking simple things at home.

Therefore, the investment in the tools that will enable us to replicate the idea puts limits on the possible number of imitators, and hence, on the number of true copies, that is, dishes cooked by professionals to rival his own. This is a fundamental point to bear in mind with any industry. Copying an idea is not as obvious as it seems, i.e. transforming it into a product or service requires some knowledge (be it the expertise that comes with experience or the knowledge gained by study, or both) and investments in machinery, tools, raw materials, etc., which limit the true rivalry in the industry.

**The professional technician**

This is something that probably occurs in every professional activity. We may be able to change or regulate the taps in our homes, but we will probably not have the tools that a plumber has (buying them just to change a tap every number of years would be excessive), even if we really believe that we have the technical skills to do it.

**3)**Thirdly, as Maskin notes in the case of software – and as is also the case of textile design and software development – culinary innovation is sequential and cumulative: each new recipe is not started from scratch; it is based on previous results. This is something that Adrià himself explains in a series of articles written in conjunction with Xavier Moret and published in August 2002 in *El País*, chronicling his travels to different countries:

"Trips are now adopted as a method of creation; that is, we go to be inspired, to seek out the sparks that will give us ideas, or specific ideas from other cuisines that can evolve our own cuisine.[...] I think that this approach of knowing what others do is vital in any activity in which you want to evolve."

Thus, innovation does not appear to come from scratch. On the contrary, each time he comes up with a new recipe, it is inspired to a greater or lesser extent by that of his predecessors, whether in the established cuisine of the culinary tradition of his own country or in the cuisine of other countries. His reputation as an inventor of recipes and good executor of them (his reputation, built on the experience of those who have dined at his restaurant) allows him to enjoy what we call in section 1.3. "competitive advantage through differentiation", which means that he can charge a higher price than other chefs (perhaps his imitators) without losing his clientele.

Alternatively, a company can base its competitive advantage on its lower costs, as we saw above with Zara: while perhaps not the most innovative company of its sector, it is inspired by or adapts the designs of other companies with a certain style (i.e., people like to wear the clothing it sells in its stores) and it is capable of doing so at lower costs than its rivals.

## 2.3. Complementarities

When dealing with software, we need to remember that what we actually value is not the product by itself, but a series of products that complement one another; in fact, the software is simply one of the parts of the system that we actually use.

It is common to see complementarities in products and services related to ICTs.

**Complementary products**

There are televisions with very diverse levels of quality, but even the best television is a completely useless appliance if we have no connection to television channels, DVD player, etc.

**The complementarity of computer equipment**

Similarly, we do not simply want a computer (taking "computer" to mean the physical object, as we saw above with the television), we also want the physical objects that complement the computer, such as printers, digital cameras, scanners, etc. And all these physical objects are not enough; we also need software. We need to have everything that will make the computer run (i.e. the operating system), along with the software we call applications, which allow us to use the computer to perform different tasks. Examples of application software include office automation packages, Internet browsers, e-mail, etc.

Therefore, the complementarity of the various products that make up a system in any digital technology (not only the computer) means that each element of the system in isolation does not really serve much purpose. Naturally, this means that it is essential for these different parts to fit each other and to work properly as a whole, i.e. the various components need to be compatible with one another.

## 2.4. Network effects

We say that there are network effects or externalities when the value of a product or system for each person who uses it increases the more people who use it. Network externalities can be of two different types:

1) Direct.

2) Indirect or virtual.

**Direct externality** is perhaps easier to understand: we often find a product more valuable the more widespread it is, since we can then share its use with more people.

**Direct externality**

Obvious examples of this are telephones, fax machines, e-mails, etc. Note that to truly take advantage of the mass of people who also have a phone, it is essential that theirs and ours are compatible (they understand each other). It is pointless for us to have a fax and for others to have one too if their fax does not accept or understand the messages sent to them by our machine.

As we will explain in more detail in the next section, potential network effects are not used to advantage unless there is a standardisation process ensuring that the objects in the hands of different people are compatible, since only then can we really communicate with lots of people.

**Mobile telephony**

In the United States, the various mobile telephony companies could not agree on using the same system. As a result, mobile telephony in the US is much less useful than in Europe, where the European Commission promoted the use of a single standard for all countries. The immediate consequence is that mobile telephony is much less widespread in the United States, to the detriment of the entire industry, companies and clients.

**Indirect network externalities** are a more subtle economic effect. When a product is actually a system made up of different parts that complement one another and are not very valuable individually, the value of a product depends on its popularity, since we will have more complements (or better quality parts) the more people who become interested in the product.

In any case, direct and indirect effects have one thing in common: again, it is essential for other individuals and companies to have **compatible products**.

In these cases, to ensure that the markets for these products take off, one of two situations must occur: either the government must intervene or the initiative must be taken by an economic agent with sufficient power to modify the market conditions by itself and sufficient financial resources to withstand years of customer adaptation.

**Direct and indirect effects**

Here are two examples of the importance of these effects for the launch of products with network externalities:

1) The new high-definition video formats. The manufacturers of the new design have secured the commitment of the major film producers, who have said that they will broadcast their new productions in this format. Thus, the customers who use the complement for the new video players will be guaranteed support to make the most of the superior resolution of these appliances.

2) The next example shows that this economic effect is present in other sectors too, not just in ICTs. We will not buy a car that runs on the new biodiesel fuels (i.e. produced from vegetable oils) if we cannot find service stations supplying these; in turn, individual service stations will have little interest in changing their pumps and deposits if they feel that they will not have any customers, manufacturers will not be encouraged to make biodiesel, etc.

In these cases, in contrast to what happens when other people also have fax machines, there is no direct service to be gained from other people having cars that run on biodiesel (i.e. there is no direct effect). Only when there is a considerable mass of people with biodiesel cars will service stations adapt their fuel deposits and pumps to the new fuel. We could say that, indirectly, any person who buys a biodiesel car is doing a favour to other biodiesel car buyers.

Indirect externalities thus explain the importance of the use of this new fuel for growth by the fact that the government subsidises the cost of its manufacture and the importance of the recent agreement between **Acciona**, currently the most technically advanced

company in Spain in the manufacture of biodiesel, and **Repsol**, with the largest fuel distribution network in Spain. The agreement between the two companies will ensure the supply of biodiesel fuel at service stations in the near future. Manufacturers and dealers will now be encouraged to sell biodiesel cars because they can guarantee buyers a no-nonsense fuel supply.

When the important features of products and services include complementarities and network effects, the most important consequence of this is that a product will not be viable if we do not achieve a sufficient critical mass of users: below a certain number of users, the product will not offer enough benefits to make it valuable, so the potential suppliers of complementary products will not make the necessary investments to make them available to customers.

**VHS format**

Inertia towards the use of a version can eliminate the viability of alternative versions that are technically feasible. **Betamax** video recorders disappeared when everybody decided to have **VHS** video recorders instead. Even though the total number of households with video recorders increased each year and the number of films available on video also grew, the owners of Betamax video recorders did not have access to them because most new titles only came out in VHS format, which was much more popular. After a time, manufacturers only made the effort to improve the VHS versions of video recorders.

Another danger created by these effects is that a consolidated company with a considerable customer base may interrupt the normal operation of competition through strategic actions that make it difficult or impossible for the new products and services of its rivals to obtain a sufficient critical mass.

In software, as we will see shortly, the main anti-competitive strategy is to make the product of the company dominating the market incompatible with the products of its rivals.

## 2.5. Compatible products and standards

We can define a standard as the set of technical specifications allowing compatibility between the different parts of a system.

As we saw in the preceding sections, the value of a product depends largely on the existence of accepted standards:

**1)** When a product is made up of different elements that complement each other.

**2)** When the network effects are significant.

In the ICT industry, it is clear that the standardisation of hardware (i.e. the physical devices) has, fortunately, advanced a great deal. Today, virtually any computer peripheral can be connected to a port on a computer (such as a

USB port), and when we buy a printer, for example, we know that we need not worry: when we get home, we will be able to connect it to the computer without a problem.

**Component obsolescence**

Those of us of a certain age will remember that things were quite different some years back. We have all had the experience of purchasing an electronic or computer device or part that has become obsolete simply because we can no longer connect it to the other components that it is supposed to form part of.

And the younger ones among us will understand what we mean if they think about all the chargers we have to lug around (mobile, laptop, etc.) because these devices do not work with the same charger – often even when the products are manufactured by the same manufacturer! If we decide to change our mobile one day, we can unfortunately be sure that we will have to throw away the charger because it will be of no use anymore.

## 2.6. Switching costs and captive customers

Very often, we have products designed to offer a similar service that are unfortunately not compatible with one another. This was the case of records and CDs, and more recently, with devices to play video in VHS and DVD format.

Objectively, in these two examples, we can say that one of the technologies is clearly superior to the other. So if we have to choose between the two technologies with no prior conditioning factors, we would be in no doubt about which to use.

Due to complementarities, however, for those who used the outdated technology, the switch was very expensive at the time. Those with vinyl records who wanted to change to CDs had to first buy a CD player and then buy their records again on CD if they wanted to play them using the new technology.

In general, due to complementarities and network effects in the world of ICTs, switching from one version of a product to a different and incompatible one is expensive, to the point that we will possibly continue to use the old technology for a long time unless we consider the improvement in quality to be very significant.

Naturally, with computers and particularly with software, these switching costs can be significant. They include the costs of learning new programs when we are already used to a given version. This is the reason why programmers tend to make new programs that are similar in appearance and operation to the programs we are already familiar with.

**Similar programs**

The OpenOffice word processor mimics Microsoft Word, which, in turn, imitated an earlier program, WordPerfect, which did the same with WordStar (i.e. the most popular word processor of the time in each case); Microsoft Excel mimics Lotus 1-2-3, which, in turn, imitated a previous program, VisiCalc. And we could continue with many other examples.

Given the costs of switching from one product to another, if incompatibilities arise, consolidated companies with a solid customer base can be tempted to inflate these switching costs, making it harder for customers to switch products or suppliers.

**Switching costs**

Years back, when rival companies emerged, the old telephone monopolies tried to force their customers to change their telephone number if they wanted to switch suppliers (the idea was that customers would not want to incur the cost involved in communicating the change of number to everybody they knew).

Similarly, with software, consolidated companies are tempted to make their products incompatible with those of their rivals.

## 2.7. Compatibility and standardisation policies within and between platforms

As we have seen, compatibility between the different parts that make up a product and between different products is essential if we are to make them much more functional. Hence, it is important to establish standards that will allow us to make **products compatible** with one another.

Very often, **standardisation** comes about when the format of an essential part of a system is adopted by everybody. This essential part that marks the standardisation process is sometimes called a platform.

These standardisation processes are sometimes the result of the work of bodies set up for the purpose of defining these standards. They can be state or supra-state bodies, or created by members of the industry.

In software, different standards are established for any given procedure, such as all communication protocols governing the transfer of information on the Internet.

Other times, however, a company from the industry controls a portion of it.

**Sony and Phillips**

These two companies were able to impose their technology for producing compact discs through the force of circumstance. As a result, all record labels now distribute their music on this digital format, all music devices are designed to play them, etc.

In software, obviously, the prime example of a platform in the sense we have explained is the Microsoft Windows operating system, installed on the vast majority of computers, both personal and servers.

It is important to understand the interests that guide the owner of a product that has been transformed into a platform in one way or another. In particular, we will look at the interests behind the policies of compatibility between its product and products that complement it (policies of compatibility within a platform) and with products that are its potential rivals (policies of compatibility between platforms).

### 2.7.1. Policies of compatibility and standardisation within a platform

Within a platform, a broader range of applications can make the platform more valuable in two ways: customers get more out of the platform – and are thus willing to pay more – and the application creators in turn will see

more business opportunities (as there will be a larger potential customer base). As a result, they will make applications to run on this platform, which will attract more clients, etc., creating a virtuous circle that will encourage the dissemination of this product.

Thus, more applications complement the platform and make it more valuable. In theory, the platform sponsor should be interested in opening it up to application developers – indeed, Microsoft often argues that it has an open policy because it shows the parts of the Windows software code (APIs) that application developers need to know for their products to work with Windows.

However, the founder will have conflicting interests:

1) If it also has applications offering good performance, it will want to weaken the performance of competing products and – in the worst case scenario – even make them incompatible with its platform.

2) It may also be concerned that some applications may subsequently become new platforms around which the other applications will develop without depending on the platform that it controls.

**Microsoft and Java**

This is what happened to the Netscape browser and Java programming language: Microsoft carried out anti-competitive policies against this software because of concerns that it could develop and replace Windows as the software platform for PCs.

To some extent, this gives us an indication of the behaviour that we could expect of the owner of a platform established as the de facto standard when faced with other products that could steal away its privileged position, as we will now discuss.

### 2.7.2. Policies of compatibility and standardisation between platforms

We have seen above that, due to switching costs, the share of customers accessible by the company that controls the platform can be a barrier to entry for rivals, when there are network effects, if the company does not make its product compatible with those of its rivals. Naturally, it is not only the rival companies that lose out with these anti-competitive tactics but society as a whole, since the options from which to choose are instantly reduced, and ultimately, so too is the quality of products available, because fewer companies are prepared to spend resources on innovation and product improvement.

**Incompatible products, anti-competitive tactics**

The best-known example of this kind of behaviour is that of Microsoft with its two flagship products: the **Microsoft Windows operating system** and the **Microsoft Office office automation package.** Microsoft clearly does all it can to avoid compatibility with other platforms (particularly with the GNU/Linux operating system, for example). In the same vein, Microsoft has systematically pursued a policy of non-compliance with various standards established by the computer industry by developing its own version of the standard and failing to document the changes it introduces adequately. Very often, when programs and applications apparently do not work properly, it is because the platform does not meet the standards adopted by the industry.

The conflict between the various authorities representing the interests of society (both in the United States and the European Union) and Microsoft basically concerns this purposeful manipulation of the process of standardising a technology, altering the capacity for communication and interoperation between different information platforms.

### 2.7.3. Public software policies

We will now briefly discuss some public policies that can promote the proper functioning of software markets, particularly those that allow free software to compete with proprietary software on equal terms and as a valid and viable alternative in cases where the proprietary software boasts the advantage of already having an established mass of users.

**Defence of competition**

First and foremost, governments must guarantee fair **competition** in the software market.

The chief action of the competition authorities should be to ensure that no artificial incompatibilities are created (i.e. ones that do not have a technical explanation) between different technology platforms.

The current conflict between the European Commission and Microsoft boils down to the latter's manipulation of the degree of compatibility between different products by altering the capacity for communication and interoperability across different software platforms, in this case, communication between the operating systems managed by servers and those managed by personal computers.

The European Commission is asking Microsoft to make the information protocols of the Windows operating system available to everybody (particularly computer server manufacturers and programmers) so that the other operating systems can be made compatible with this system, i.e. so that all other operating systems can communicate and interoperate with servers running this operating system.

Naturally, Microsoft's aim is to exploit the fact that the Windows operating system is already widely implemented by artificially raising the costs of switching to another software for its customers.

**Policies for the adoption and support of free software. Enforcing compliance with the standards**

We have seen the importance of network effects in ICTs and the need for software to have a critical mass of users in order to be viable. Through these network effects, large companies can exert their leadership over the implementation of free software. If the government and major corporations (in their own interests or as a service to society) promoted free software in their organisations, they could create a sufficient critical mass for the population to consider the use of free software more accessible.

Much of the proprietary software used today in these organisations could easily be replaced by free software with similar or improved benefits. The only obstacle is the switching cost for individual users because of the lack a sufficient critical mass.

The network effect of this policy in these organisations would be significant, particularly the indirect network effects that would be generated: if these large organisations were to acquire free software, this would create an important source of business for IT companies whose business model is based on free software and the provision of IT services to complement its implementation.

In all events, these organisations must first undergo a process of software acquisition requiring compliance with certain protocols and compatibility standards. If the government, for example, were to establish procedures for the acquisition of software and appropriate computer services, this would probably require the creation of a public agency to advise the various government departments. These agencies could implement different mechanisms to promote the use of free software in government bodies.

## Summary

The information and communication technologies business has specific features that affect the economic model of the business and, hence, the market.

Beyond the creation of value in products and management to gain a competitive advantage over competitors on the market, a company can adopt a particular strategic policy to generate an impact on the economic effects of the market:

- Although production costs are high, the costs of copying are minimal.
- Exploitation of ideas and safeguarding of intellectual property.
- Exploitation of the product's complementarities.
- The net effect of the product, whether by linking its worth to widespread use or as an indirect promoter of complements.
- Compatibility between rival products.
- Control of switching costs in the face of product evolution and customer captivity.
- Introduction of policies on compatibility and standardisation within and across platforms.

Consequently, the particular features of free software allow it to establish a new business format that breaks the mould of the typical policies of a very traditional technology market in terms of the positioning of the competition.

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