Chapter 5
Digital Revolution and Sociocultural Change

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Abstract The title of this chapter refers to how current developments in technology are not just one further innovation of the industrial era, but will lead to decisive changes in production methods, markets, labour, consumption and, to a considerable extent, personal and social relationships. But these changes will be happening within the economic and political framework of the period prior to digitalisation and will persist in the globalisation of the economy. These pages will focus on what we believe to be key issues: changes to business and work, changes to the education and training of people in general and the active population in particular, and certain activities that will have a profound effect on the way we communicate and relate to each other.

No technological innovation, not even this one, exists and acts in isolation from the socio-political framework. Therefore, it is also important to analyse the policies and strategies that might lead the digital economy in one direction or another, towards an increase in inequality or in welfare. Going further, what our analysis does not cover is how the digital revolution could be of great help to curb the climate crisis, with changes in energy production, mobility, construction and protection of the environment, provided there is political will and consequent action.

Keywords Digital revolution · Lifelong learning · Work changes · Sociocultural changes · Technology

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P. López-Roldán, S. Fachelli (eds.), *Towards a Comparative Analysis of Social Inequalities between Europe and Latin America*,
https://doi.org/10.1007/978-3-030-48442-2_5

5.1 Introduction: The Role of the Digital Economy and Policies to Universalise Its Positive Effects

The digital economy, together with the digital revolution (the so-called fourth technological revolution), is here to stay. It is a process that began several decades ago and that shall continue for many more. This economy will coexist alongside the traditional economy, although the former will use increasingly more digital instruments. This has been the case with all technological changes ever since the first industrial revolution. By 'digital economy' we mean that which is mainly based on such instruments as the internet, robotics, big data and artificial intelligence, and which partly dematerialise the economy and partly base the production of goods and services on these digital skills and tools. It is so strong that to a greater or lesser degree it will eventually permeate most economic activities and many other aspects of everyday life.

Some research (Frey and Osborne 2013) has raised alarms by pointing out that in many countries more than 40% of jobs are at a high risk of disappearing in a few years due to the emergence of the digital revolution. A few years later, other studies (Arntz et al. 2016) reduced this destruction, for OECD countries, to percentages of no more than 12%. The differences have to do with the methodology used: the former analyse the basic tasks of professions while the latter refer to the basic tasks of jobs, which leads to the assumption that digital technologies transform jobs by replacing certain tasks with others. From further research (Deloitte 2015) it can be deduced that new fields are appearing in human activity and everyday life that are giving rise to new jobs and new occupations, mainly in the broad services sector. All of these will be affected to some degree by digitalisation, and it is difficult to make any accurate predictions in this respect.

The digital economy will have a major impact on business organisation and employment: it will eliminate some jobs and create others, and to a varying extent all kinds of jobs will be affected in some way. The conditions will not necessarily be better, and they may become worse. The reason is that technological innovation occurs, as it always has done, in a specific context of social-labour relations that may be more or less regulated, and which is both national and global. This conditioning of social relations is what leads us to believe that social and political action can somehow guide the technological revolution to ensure that it is beneficial, because it is not a blind force. However, globalisation will make socio-political intervention more complex at the level of each country. The digital revolution will also influence everyday life (leisure, consumption, lifestyle, education and training, mobility, homes), of course again not mechanically, but in a way that can be governed, if people are properly prepared, to ensure that it contributes to better rather than impoverished lives. This chapter therefore pursues two goals: to evaluate how, hypothetically, this economy, basically in the fields of employment and everyday life, will evolve in the ten countries of Europe and Latin America that we compare, and what political and social instruments can influence said evolution to ensure that welfare becomes more widespread.

Society and politics can influence the digital economy in two ways: on the one hand, by deciding on the use and distribution of the financial surplus generated by technological change and on the other by improving the labour market, both in terms of demand (companies and administrations) and offer (workers and people) and improving living conditions. In the former case, there is need to design tax reforms and welfare policies to redistribute the surplus and for administration to play a key role in modernising the country's productive structure: technology, energy, stimulation of small and medium enterprises, and the blurring of regional differences and digital divides (by gender, age, class and region). In the latter case, people need to be prepared for work and for life, with a different kind of education both initially and also in terms of lifelong training. Also with regard to the offer, issues that need to be addressed include working hours (reducing them if the general system is more productive), structural unemployment, which will be high, the guarantee of workers' rights, and the possibility of representation for workers in digital-based companies and administrations that will be organised in radically different ways. Digitisation will influence many other aspects of everyday life and social relationships, and society will therefore need to work hard to prevent exclusion.

One characteristic of the digital revolution, with respect to the past, is that asynchrony will increase, as it has done in previous revolutions. This refers to the differing rates at which the supply of and demand for work evolve, due to people living longer lives and the stage of those lives also being prolonged; on the one hand, schooling and training prior to or during access to employment, independence from the family, reproduction and care for dependent persons, active presence in the labour market, other life experiences; on the other, the speed of the changes that condition the demand for work (technologies, globalisation, organisation of production). In other words: the speed at which labour is reproduced is much slower than the changes to production and the distribution of goods and services (Vinokur 1998).

5.2 Methodology: Advantages and Limitations of a Comparison Between Countries

What we intend to do in this text is to address the issue of the digital revolution and socio-cultural change in a comparative manner between European and Latin American countries involved in the INCASI project, five from each continent (in Latin America: Argentina, Brazil, Chile, Mexico and Uruguay and in Europe: Spain, Finland, France, Italy and the United Kingdom). And from three angles of observation: (a) business, employment and everyday life, (b) the relationship between education and work and (c) consumption and social relations.

To do this we propose a dual strategy. On the one hand, to avoid speculative views of the future, we shall begin from the changes affecting the future that began years ago and are still happening today, for which we shall have to identify, for each of the topics, those aspects that we have already lived and that we know about, and that we believe foretell what might happen in the future, considering that the digital

revolution already began several years ago, but could get faster in the near future. On the other hand, the comparative nature of the text will require identification of the indicators of those anticipatory behaviours and events that we discussed in the previous section and that are available in a comparable manner. To do this, we must turn to publications of these indicators by international organisations where, albeit partially, European and Latin American countries are represented, i.e. OECD and ILO publications. The advantage of a comparative approach is that we are speaking of the countries involved in the INCASI project and aiming to capture their heterogeneity, while the main challenge is to reduce that heterogeneity to a small number of quantitative indicators for which, moreover, in some cases, we have no recent statistical information with which to compare.

Our goal is modest. We merely seek to collect some indicators on the set of countries considered. These indicators should allow us to make some progress with comparison of the digital revolution and socio-cultural change in different countries. In short, the work we present in this text has been conducted in three stages: (1) Identification of the phenomena that foresee future changes in the digital revolution and social change in the three aforesaid areas, (2) definition of the indicators we can use for comparison between countries and identification of the sources that could provide information on them and (3) a comparative assessment based on the aforesaid that can offer clues as to the diversity of processes in different countries, even though the comparison is based on a limited sample.

5.3 Changes to Businesses, Employment and Everyday Life

5.3.1 In Businesses and Employment

Faced with the challenge of the digital revolution, Spain obtains good results for internet connection and electronic administration, although with territorial differences, particularly between urban and rural area, with regard to the formers. But the country's position is weak in terms of qualified human capital in digital skills and in the use of digital technologies by small and medium enterprises, particularly in purchases and sales (*Índice de Economía y Sociedad Digital -DESI-* 2018; Ministerio de Industria, Energía y Turismo 2017; Ministerio de Hacienda y Administraciones Públicas 2016). Nor do small and medium-sized companies perform particularly well for training in ICT skills, which shows that they do not use them much in their activity. Here lies the great problem and the great challenge for the future, because these amount to more than 95% of the companies in the country, meaning that Spain appears weakly equipped to face the challenges of the digital revolution. Other EU countries that we analyse, like Finland and the United Kingdom, are in a better position, while Italy is in a worse situation and France is in a similar one. We do not have similar indicators for Latin American countries, although those used in Sect. 3.2 lead us to assume that these countries, perhaps with the exception of Chile in some aspects, are more poorly positioned than European countries.

This must be taken into account to understand the changes that are taking place in companies, partly as a result of technological innovation, partly due to changes in organisational methods. It is leading to smaller production and service centres, although large companies continue to increase in size, and to some extent there is a blurring of formerly clear boundaries between sectors and subsectors, leading to multi-sector companies. But, as far as employment is concerned, digitalisation is giving rise to two types of transformation (Lopez Sintas et al. 2018). The first is that routine jobs are replaceable by robots, which can work alone or do so in the company of humans. This routinisation is advancing from manual tasks to more intellectual ones. Lladós (2018) presents highly illustrative data in this regard, comparing Spain with the EU average to show how the former exceeds the European average in manual tasks and personal care and services, as well as in routine work, but is below average in intellectual, educational and coordination tasks, as well as in ICT, which represents a risk for medium-term employment. Latin American countries may well be closer to Spain than the European average, but we do not have comparable data. The second refers to the organisation of labour, i.e. the coordination of the work done within the company, and relations with suppliers and customers, who are being partly replaced by digital platforms, which in turn outsource to smaller companies, examples being Uber, Amazon, Glovo, Deliveroo and Airb&b. This is happening both in the European Union and in the global economy, although the differences have a lot to do with the technological might and strategies of small and medium enterprises in each country. The presented changes can influence employment in the ways mentioned in the introduction, i.e. destruction, creation and transformation, but there are notable differences by country, mainly related to the productive structure: if it is less technological, there may be a greater risk of human labour being replaced by robots or connections to online systems. But at the same time, we also need to take into account the strategies employed by companies, since in certain cases (e.g. Spain and Latin American countries), the low wages and high flexibility of labour (heightened in Latin America by informal work) in comparison to many other European countries may mean that robotisation is not profitable, at least not for the time being.

The risk of job loss, measured by various indicators (Table 5.1), differs among the countries that we are comparing because the digital revolution is advancing at different rates, although all of them are conditioned by their position in the global economy, since they are not only competing with technology, but also with other labour costs, tax regimes and other factors.

Only the last available year has been used in order to eliminate, as much as possible, the effect of the economic crisis on EU countries, since almost all of them (the exception is unemployment in Spain) are returning to the 2008 rates. However, two conclusions can be drawn from these indicators: that poor quality jobs (underemployment, informal employment) are the norm in many countries, with or without digitalisation, although the latter is much more frequent in Latin American countries; and that the risk of loss of the most routine jobs (unemployment, which is higher among people who perform low-skilled tasks and, in part, underemployment) is high in all Latin American countries, Spain and Italy, probably due to their

Table 5.1 Risk variables of job loss or precariousness, 2018

	Under-employed people	Unemployment rate			Informal employment[a]	
		Total	Men	Women		
Uruguay	20.4	8.0	6.5	9.7	Uruguay***	33.2
Chile	21.7	7.2	6.8	7.9	Chile***	28.3
Mexico	11.4	3.3	3.3	3.4	Mexico***	52.2
Argentina	19.2	9.5	8.5	10.8	Argentina***	48.1
Brazil	24.3	12.5	11.1	14.4	Brazil***	37.5
Spain	24.8	15.5	13.6	17.6	Latin America & Caribbean**	49.0
Italy	22.8	10.2	11.1	14.4		
France	19.5	9.2	9.1	9.2		
UK	11.5	4.0	4.0	3.9	European Union **	13.2
Finland	18.2	7.8	7.9	7.6		

Under-employed: working part-time or, working full-time, would like to increase their working hours

Sources: Unemployment rate, ILOSTAT (2018). Informal employment: ** Philipe Mercadent. The transition of the informal economy through an integrated approach, V Seminar on informal economy (data relative to 2016), Sept. 2017, ILO; *** ILOSTAT: (non-agricultural population) Chile 2017, Mexico 2017, Argentina 2018, Brazil 2013, Uruguay 2013

[a]Recent studies measure informal or submerged employment, in terms of GDP, not of employment. See the publications of Leandro Medina and Friedrich Schneider (2017), Shadow economies all over the world: new estimates for 162 countries from 1999–2007 Leandro Medina and Friedrich Schneider (2017). Shadow Economies Around the World: What Did We Learn Over the Last 20 Years? (special reference to European countries), IMF Working Papers, n° 18, 2017

Table 5.2 Robots per 10,000 employees in the manufacturing industry (2016)

Italy	185	Mexico	31
Spain	160	Argentina	18
Finland	138	Brazil	10
France	132	Germany	309
UK	71	South Korea	631

Source: International Federation of Robotics (2017)

productive structure as well as their subordinate position in the globalisation process, which increases the risk of routinisation. However, poor employment and unemployment are sources of low salary costs, and therefore entail a lower risk of effective robotisation.

Beyond the experts' predictions about the risk of job loss, we have a relative indicator of the possible risk, namely the number of robots (Table 5.2) in the different countries, and therefore of effective robotisation entailing the loss of real jobs.

The manufacturing industry, and in particular the automobile industry, represents only a small number of the jobs in most countries, which explains why the figures for Germany and South Korea (630 robots/10,000 workers) are so high in that subsector. The low number of robots in the UK is particularly striking, probably due to its decline in vehicle manufacturing. In Latin American countries, robotisation is

probably less profitable for the time being due to the low wage costs. We should also note that in countries like the UK and Finland, digitalisation is transforming jobs, especially in services, where robotisation is making fewer inroads. Another aspect to consider is digital platforms, which destroy stable employment inside and create unstable employment outside (in the same city, the same country or in another), so-called 'independent workers'. There is very little data on the topic. According to Cañigueral (2019), the number of professionals working independently in such companies has grown in Europe by 45% since 2005. In Spain, the growth is even greater, 51%.

Digitisation can improve certain jobs and make others worse. Among the latter we have 'riders', but this can also be the case of many other 'independent workers' who work for low pay due to the strong competition, which in some professions can be global, and perform a variety of different tasks, particularly in services and working remotely. However, employment in the ICT sector tends to be a solid indicator of job improvement in countries where the digital economy is making advances. According to recent OECD data, employment in the ICT sector in 2015 was 3% for all OECD countries, 1.8 in Spain and 0.5 in Mexico. Argentina and Chile are below that figure, the UK is above it (OCDE 2015). The qualification requirements for such work will increase in the coming years (CEDEFOP 2015), although they will not always lead to quality jobs (salary, contract, hours) as was verified by a recent study in Spain (Alós 2019).

Many of the publications on employment in the digital revolution highlight the impending loss of current jobs, but they under-emphasise the creation of new jobs and the transformation of others. In any case, it is not enough to only refer to the possible future. We must also take into account what is already happening, because we are already in the digital revolution that destroys, creates and transforms jobs. We shall examine the evolution of employment in the last 15–20 years in three countries: the United Kingdom, the United States and Spain. Between 2000 and 2015, the United Kingdom (Deloitte 2015) gained more than two million jobs, with a decrease in low-skilled and a large increase in skilled ones, particularly in services. The United States (McKinsey 2019) is at all-time record employment levels. Jobs are particularly more numerous in education, health, trade, personal services and entertainment. Spain (*Encuesta de Población Activa*) created three million jobs between 2000 and 2007, lost four million with the crisis and since 2014 has regained three million. But these jobs are mainly being created in traditional sectors such as low-skilled services and construction, with little technological potential. It is in terms of productive structure that the three countries differ, and this is where modernisation needs to happen.

Poor jobs and unemployment will continue to be the real threats, even if robotisation is halted. The former may not disappear with digitalisation,[1] because competitiveness has become more and more global. Regarding the latter, there is a risk that

[1] Spain is the EU country with the most workers on digital platforms (Pablo G. Bejerano, El Pais 29 August 2019), mostly in highly unstable working conditions.

it will be high in periods of transition, but it could then drop due to the creation of so many jobs linked to education, health and social services, environmental care, leisure and culture. So, today, in developed countries, low wages would seem to be a greater threat than unemployment in the near future. We should also note that the requirements for qualified employment are not exclusively linked to ICT (Information and Communication Technologies) companies and high level digital skills. It could also be required in services like education, health, social services and other services that will clearly need a basic level of digital skills, but that will be substantially based on other ones (Alós 2019).

5.3.2 Everyday Life and Technologies (Internet, Mobile Phones, Digital Networks)

An analysis of the advance of information and communication technologies (hereinafter ICT) in the public arena means examining the effect on the modes of production that they have enabled, their consumption by people and households, and how they have affected their daily lives. This section will address the major social changes brought about by the digital and technological transformations that have occurred in the world by examining the penetration of internet, mobile telephones and social networks to verify the use or consumption of technologies by individuals and households, confirming the rapid, dynamic and large-scale dispersion of these in the countries analysed.

In the early 2000s, the development of digital technologies led to the technological convergence of the internet, smartphones and the emerging social networks (Rainie and Wellman 2012). To avoid semantic confusion, this chapter refers to the latter as 'digital networks' rather than 'social networks' as they are commonly known. The aforesaid technologies have produced countless changes to the lives of the people who carry them and to the homes that use them, as is so evident today.

The convergence of these technologies has meant that a sizeable proportion of interpersonal communication is now conducted via digital media due to the decreased restrictions in terms of time and space and an increase in interactivity (Wolton 2000). This means people can be in permanent communication due to the reduction of barriers to interpersonal communication in terms of both time and space, and this communication is both instantaneous and asynchronous.

The result was not only technological but also socio-technological, due to the mass adoption of technologies in relatively short periods that were designed for people to be able to access in everyday contexts. The internet has provided people with a greater capacity to communicate and access information because it has increased their ability to connect with other people and groups. Smartphones have given them the possibility of permanent communication, whereby they can access the information they need and make contact with people and groups of interest.

Table 5.3 Percentage of individuals using the internet in the following countries, 2000–2015

Countries	2000	2005	2010	2015
Argentina	7.04	17.72	45.00	68.04
Brazil	2.87	21.02	40.65	58.33
Chile	16.60	31.18	45.00	76.63
Mexico	5.08	17.21	31.05	57.43
Uruguay	10.54	20.09	46.40	64.60
France	14.31	42.87	77.28	78.01
Finland	37.25	74.48	86.89	86.42
Spain	13.62	47.88	65.80	78.69
Italy	23.11	35.00	53.68	58.14
United Kingdom	26.82	70.00	85.00	92.00

Source: https://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx

Table 5.4 Mobile phone subscriptions per 100 inhabitants, 2000–2015

Countries	2000	2005	2010	2015
Argentina	17.51	56.60	138.47	142.43
Brazil	13.23	46.12	100.07	125.18
Chile	22.29	65.46	116.82	130.65
Mexico	13.84	43.45	77.89	85.54
Uruguay	12.37	34.73	131.49	150.53
France	48.74	78.53	91.68	103.45
Finland	71.87	100.21	156.36	134.92
Spain	59.32	96.94	109.83	110.07
Italy	73.74	121.58	156.82	147.37
United Kingdom	73.71	108.60	121.20	121.18

Source: https://www.itu.int/en/IU-D/Statistics/Pages/stat/default.aspx

Via the digital network, which is basically a web-based service in which people can create a public or semi-public profile within a delimited system, they can also create lists of other users with whom they wish to share a connection, browse that list of connections, and see what other users are doing within the system (Boyd and Ellison 2007). *Facebook, Instagram, Twitter, WhatsApp, Flickr, Tumblr* and many other digital networks have provided people with a simple way to manage social ties and to move among larger and less compact groups, with access to a greater diversity of social relationships (Rainie and Wellman 2012). The data in Tables 5.3 and 5.4 shows how people adopted all three technologies in particular countries.

The internet spread rapidly in a relatively short time in all countries. Although it did not cover the entire population, the proportion of the population that had the service grew a little more than twofold in Finland and Italy, and grew fivefold in Brazil.

Mobile telephones underwent significant growth in the period. For all countries analysed, except Mexico, the entire population had coverage by 2010, and the

uptake continued to rise through to 2015. The significant penetration of mobile phones[2] fully expresses the relentless expansion of digital technology, while leapfrogging meant that not only was the technology attracting new users, but many who had never had landlines directly became mobile telephone users.

The evolution of digital networks in the analysed countries, as shown in Fig. 5.1, describes the presence of *Facebook* in the 2008–2019 period and *Twitter* between 2009 and 2019. The methodology used to capture data for the period is *Google Trends*, and we show the number of mentions of *Facebook* and *Twitter* in the search engine. The data in the tables is normalised to 100%, so the maximum value is one hundred, and the remaining values are adjusted proportionally.

The data on digital networks shows how *Facebook* emerged from 2008 and *Twitter* from 2009. The *Facebook* digital network was adopted in a similar way in all analysed countries. The cycle began with constant growth users until reaching a maximum proportion that at times exceeded 90% in some countries. In Chile, it is noted that the penetration began in March 2008, once the network had been made public and open all around the world that year. The characteristics of the development strategy allowed the import of technological goods with low tariffs, so a large number of digital items for personal use were made available for consumption by the population. Acquiring them meant having access to *modern goods, which are consumed in advanced countries* (Mayol and Ahumada 2014).[3] In Brazil, *Facebook* was incorporated in 2010, for that country had a very similar digital network of its own called Orkut[4] that was widely used, being replaced by *Facebook* in 2010 and 2011.

Twitter appeared in 2006. Its trajectory was similar to that of *Facebook,* but in much smaller proportions. In just a few years, it expanded rapidly to reach a maximum number of users, around 5% in Latin American countries, and between 10% and 12% in the set of European countries analysed.

In summary, the data shows that the process of adoption of the analysed digital technologies was relentless rather than gradual, involving a constant convergence of technologies, with specific differences between countries in the period. Digital networks appeared in waves and users were able to access a number of them and use them in complementary manners. In 1997, they arrived in people's everyday lives around the world when *Six Degrees* appeared on the internet. The following decade brought *Fotolog* in 2002; *Linkedin* and *MySpac*e in 2003, *Flickr* in 2004, *YouTube* in 2005, and *Twitte*r in 2006 (Boyd and Ellison 2007), all available on users' mobile phones. So, by 2010 the convergence of the aforesaid technologies had been consolidated, and they were part of people's everyday lives. Later in this chapter, we shall look in depth at the social consequences of these changes.

[2] Regarding mobile telephones, the 2018 Latinobarómetro report (p. 76) noted that "the possession of cell phones and Smartphones has broken the digital divide by delivering access to social networks".

[3] In Mayol and Ahumada (2014).

[4] This network existed between January 2004 and 30 September 2014.

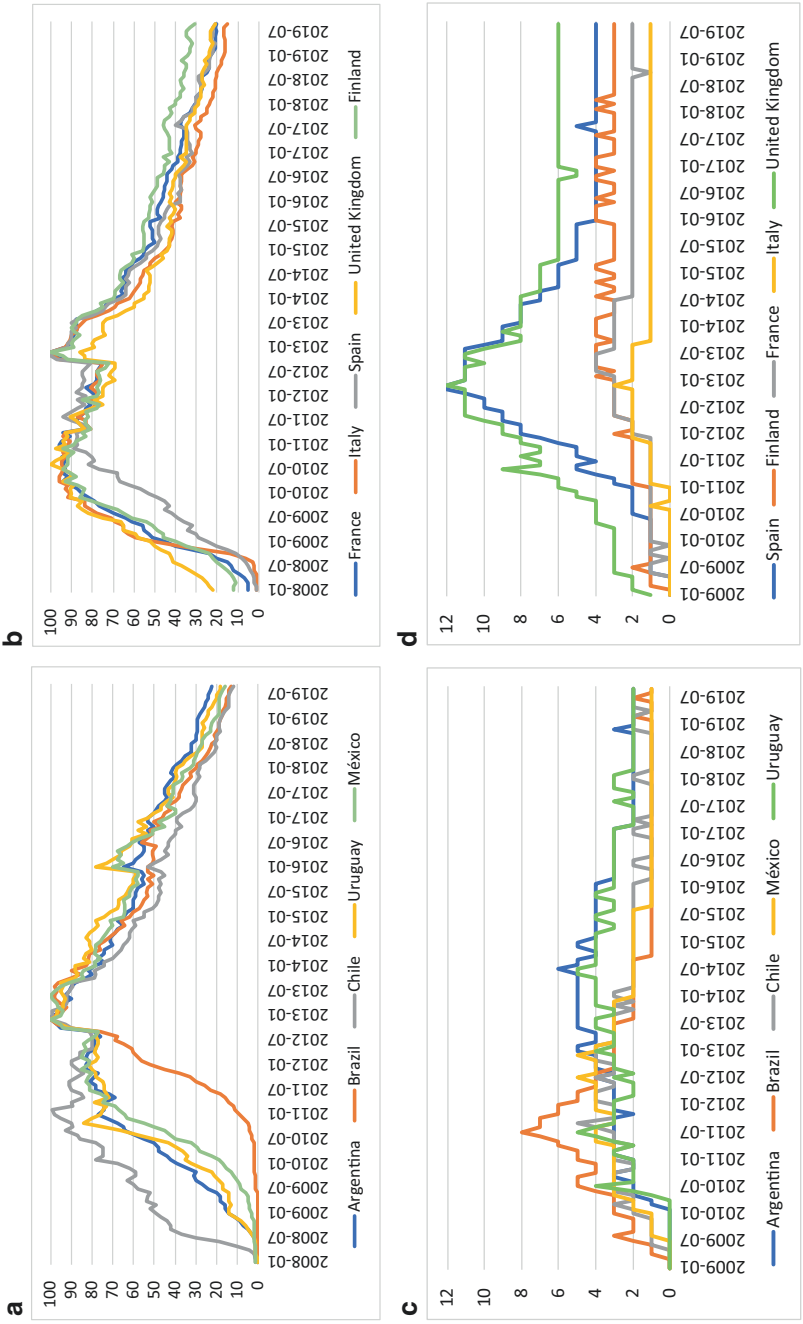

Fig. 5.1 Evolution of Facebook and Twitter 2008–2019. (**a**) Summary of the percentage of Facebook users in Latin American countries. (**b**) Summary of the percentage of the Facebook users in European countries. (**c**) Summary of the percentage of the Twitter users in Latin American countries. (**d**) Summary of the percentage of the Twitter users in European countries. Source: Own elaboration based in Google Trends (Choi and Varian 2011)

5.4 Society's Possible Response to the Fourth Technological Revolution

5.4.1 What Policies and Regulations Are Desirable in Relation to Employment?

The answer to the challenges of the digital revolution must come from companies and society as a whole; the former by creating adequate and quality jobs, the latter through political interventions and changes in lifestyles both in relation to the productive system and with respect to people's education, as well as reforms and regulations that continue to guarantee rights and achieve the inclusion of those at risk of exclusion. Two types of intervention are needed: those that can be carried out by administrations and those that come from the relationships between actors in the labour market (social dialogue, negotiation). Several kinds of action are required of administration: support for the modernisation of the productive structure by investing more in R&D&I, support for the digitalisation of small and medium enterprises, increasing energy transformation, promoting economic sectors with a future, and so on, all of which would help to create more skilled jobs. Public policies can also improve the quantity and quality of essential public services, whereby jobs would also be of better quality. It is also essential to invest in education and training and bring it more in line with the digital era.

Investment in R&D&I (Table 5.5) is essential in order to modernise the productive structure, adapting it to the new parameters of the digital revolution. The European Union stated in 2010 that it is crucial for investment in this area to reach 3% of GDP by 2020, when summing public and private investment. 2017 data shows (European Commission 2018) that the average such investment in the European Union is only slightly over 2%, with only Germany, Denmark and Sweden having reached 3%. Spain is still far behind, and has fallen back during the crisis period, and that is not a good sign. The Commission feels that one instrument to achieve this goal is the doubling of public investment, something that Spain has not done either. The compared Latin American countries, with the exception of Brazil, are far from that recommended percentage, and this will undoubtedly hinder the transformation of their productive and employment structures even more than in Spain (Table 5.5). Public policies are another key

Table 5.5 Investment in R&D&I/GDP in the countries studied (2017)

Uruguay	0.41	Spain	1.21
Chile	0.36	Italy	1.35
Mexico	0.49	France	2.25
Argentina	0.53	UK	1.79
Brazil	1.27	Finland	2.76

Sources: Europe EUROSTAT 2019, World Bank 2017 Eurostat updated March 2019: EU. World Bank: Mexico (2017), Argentina (2016), Chile (2016), Brazil (2016), Uruguay (2016)

factor in these countries. The State can play a clear role in this drive towards a new economy (Mazzucato 2015), with stronger action, especially with regard to small and medium enterprises (Miguélez et al. 2019).

Another aspect of capital importance, in terms of productive structure, is the change of energy model, which is shifting quickly from fossil and nuclear energy to renewable energy. This is essential in the face of an even greater challenge than that of technology, the climate crisis, and this is an issue that digital technology itself could actually help to prevent. There are notable differences between countries in terms of the use of renewable energies, as can be deduced from the data for 2015 in the following Table 5.6 (World Bank 2016). More Latin American countries than Europeans, except Finland, are close to reaching a level at which alternative energy is more widespread than fossil and nuclear forms. This could be an advantage for the former and should be an incentive for the latter.

The proportion of employed managers, professionals and technicians in a country may be an approximate indicator of job quality in the upper primary segment, derived from both a technologically consistent productive structure that is open to digitalisation and quality public services (Table 5.7). Once again, the data suggests differences in quality between the countries of the European Union, led by the

Table 5.6 Renewable energy consumption/total, 2015

France	13.50	Argentina	10.04
Italy	16.52	Brazil	43.80
Spain	16.25	Mexico	9.22
United Kingdom	8.71	Uruguay	58.02
Finland	43.24	Chile	24.88

Source: World Bank (2016)

Table 5.7 High educational levels and quality of employment

Employed with advanced educational level 2018	**Percentage**	**Employed with advanced educational level 2018**	**Percentage**
Uruguay	12.5	Spain	42.9
Chile	18.7	Italy	21.7
Mexico	23.42	France	40.7
Argentina	22.56	UK	43.7
Brazil	21.90	Finland	44.0
Employed: Managers, Professionals, Technicians 2018	**Percentage**	**Employed: Managers, Professionals, Technicians 2018**	**Percentage**
Uruguay	22.4	Spain	33.9
Chile	26.2	Italy	36.8
Mexico	19.8	France	45.9
Argentina (2017)	24.7	UK	49.0
Brazil	23.8	Finland	47.9

Source: ILOSTAT (2018)

United Kingdom, and Latin America, where Chile is slightly above the rest. Spain and Italy are in intermediate position between the two continents. There is also a highly notable difference between the countries of both continents as a whole for the higher education indicator, with Uruguay in a particularly weak position. Italy is on a similar level to Latin America. There is a notable deficit in education in these countries in the face of the challenges of the digital revolution. However, the high educational level of Spain, where universities have boomed in the last two decades, has not led to a higher percentage of quality jobs than the European Union average, due to a more traditional productive structure and an abundance of low-skilled and poorly paid jobs in public services (Alós 2019; Banyuls and Recio 2012). This is another indication that technological innovation and high education levels depend on the socio-economic context and government policies.

It is worth asking whether administrations are obliged to implement new regulations to deal with the appearance of many jobs that lack guarantees in terms of hours, contracts, pay and bargaining, an area where social dialogue and bargaining can complement the ways in which problems are tackled and resolved. Although there has been little empirical research in this regard, there was a recent study in Spain (Miguélez et al. 2019), in which experts and social actors almost unanimously defend the need to regulate these new types of job, often held by 'independent workers' (digital nomadism, whereby people can use computers to work from anywhere in the world; on-call, with no set number of hours or wages; collective work, crowdworking). Two different kinds of proposal are suggested, namely social dialogue and modification by Parliament of the Workers' Statute. Not only trade unionists, but also most experts and most significantly business owners, are in favour of new 'independent workers' continuing to have the right to negotiate their working conditions.

The new economy will pose other challenges, in which policies must play a role, such as the possibility of reducing the working day that, apart from social and personal benefits, could have a positive influence on the economy by increasing the time that people have for engaging in other activities, such as culture, leisure, learning new skills, and so on, which would boost employment. It is also likely that the pace of technological change will increase structural unemployment. Dealing with this may require, as many experts believe and as many experiences are showing, the guarantee of a minimum income to certain groups, and this income could be unconditional or conditional to training or activities useful to the community. The latter was especially predominant in the answers to the questionnaire used in the aforesaid study (Miguélez et al. 2019).

All these policies will ultimately need funding, which will mean reviewing tax systems. Should robots pay taxes on the profits generated by digitalisation, and on the profits generated by multinational companies in any country in which they are present and not only where they are registered for tax purposes, which may be a semi-tax haven? Traditional tax systems are mostly based on the income of people employed in the country and the profits of companies based in the same. The digital economy could change this framework, and political debate can be expected to shift in the direction of certain changes that have already been made by the European

Parliament, albeit without, for now, the Commission's proposed taxation on robots having achieved its objective. There is also on-going debate on the issue of green taxes, which are essential in order to halt the climate crisis.

5.4.2 A New Concept of School and Education Is Required

The asynchrony of people living longer and the rapid technological and social changes described in the introduction to this text already requires today, and will do even more in the future, a new kind of school and education system. In order to deal with the changes in the relationship between education and work that this asynchrony entails, we need to create a new concept of schooling and training, along with changes to the functions and organisation of the institutions that support it. There are two main changes: (a) the concept of education as a lifelong process and (b) a focus on "initial schooling" to lay the foundations and provide the instruments in an irreversible manner to ensure that lifelong education is viable for all.

One of the first phenomena that require attention is that in order to keep up with the many changes to work and life that people are going to encounter throughout their lives, education must be viewed as a life-long process. This will be a complex process and the result of non-linear educational experiences, with people entering and leaving School, or learning while working, and doing so flexibly throughout their whole lives. Within this complex process, digital technologies will play a greater role as ways to learn and will penetrate the other forms of education based on virtual learning, such as MOOC (Massive Online Open Courses). Both the face-to-face and strictly virtual forms of schooling will be fully affected by technological change and will generate 'micro-learning' supported by internet access and the educational use of that access.

Both the speed of the change in what we must learn and of the way we will learn it will imply that, in terms of management, both school and other forms of education will need to forego the pretension of 'anticipating' what the labour market is going to require in the medium and long term, as we have been trying to do so very ineffectively for decades (Planas 2014). Given the uncertainty of the precise requirements of the labour market, we must flexibly manage school and training systems by combining a solid initial education with refresher mechanisms to meet whatever labour demands might arise in the future, throughout people's active lives. We are faced by the phenomenon of 'myopia', the farther ahead we look to understand the requirements of the labour market, the hazier our view becomes. And to continue with the analogy, because of the speed of technological change we will need increasingly more powerful diopters and we simply do not seem to have strong enough lenses for the purpose. This phenomenon of 'myopia' means we can only anticipate the needs of the labour market in the short term or, at most, in some fields, in the medium term.

As Hampt and Woessmann (2017) note, based on the results of the PIAAC survey, education focused on specialisation to meet the demands of a given time is

"bread for today, but hunger for tomorrow." In the abstract to their paper they write: "It has been argued that vocational education facilitates the school-to-work transition but reduces later adaptability to changing environments. Using the recent international PIAAC data, we confirm such a trade-off over the life-cycle in a difference-in-differences model that compares employment rates across education type and age. An initial employment advantage of individuals with vocational compared to general education turns into a disadvantage later in life. Results are strongest in apprenticeship countries that provide the highest intensity of industry-based vocational education".

Given this phenomenon, we must distinguish between two types of learning: basic, which is preferably acquired in the early stage of people's lives (childhood and youth) and in which, at least until today, general schooling has played a decisive role, and continuous training, which is based on that basic education. The main goal of the former is the long-term objective of learning the basics, the skills and the knowledge that will serve us to learn the new skills and knowledge that the technological and social change will require of us in the short term, throughout our adult lives. These changes will also require the school system to allow people to come in and out of school during their active lives, with their school learning overlapping or coinciding with other jobs, or while exercising domestic and care duties. This will imply that schools, especially at their higher levels, will need to make their institutional structures more flexible to allow for this (Conseil National du Numérique 2016).

Today, neither schools nor companies, nor the ways in which reproductive tasks are organised, are flexible enough for such an approach to be viable for people. School and training itineraries are too complex. Very few countries have addressed this issue in their legislation, even fewer schools allow for it and although numbers are growing, few companies encourage it.

Regarding the kinds, contents and functions of education, the current panorama is characterised by the need to understand that education is, already today, but even more so tomorrow, the result of the co-production of a multitude of educational spaces in a wide variety of moments in people's lives: school (of various types, including virtual schools), work (paid and unpaid), the many spaces of non-formal education, internet ... And in combinations that cannot, a priori, be predicted or standardised.

With the experience of recent decades one thing seems clear, the capacity to access lifelong education depends largely on the education (of all kinds) received during the compulsory education period. Lifelong learning was sometimes viewed as a way to make up for deficits in initial education and to compensate for the inequalities in early schooling, but the reality today very clearly shows that the phenomenon actually works the other way round. The people who most access lifelong education are those who had more and better initial education. So rather than compensating for differences in initial education, lifelong learning increases them, as the people who more easily and more frequently access it are those that received more and better initial education.

It also seems reasonable to imagine that, as occurred with the surplus of previous technological revolutions that was used, among other things, to develop and

implement compulsory schooling for everyone, a large part of the economic surplus that is generated and will be generated by technological change should be used to sustain early education and lifelong learning policies. That is provided there is the political will to do so, as there was when implementing education for all in the last century.

Getting early schooling and education to really be a sufficient starting point to guarantee lifelong learning is a priority challenge today if we are to prevent deficits in the former from leading to social exclusion.

Responsibility for this new type of lifelong schooling will require the intervention of many actors, at least, the State, in its multiple forms and levels, companies, families and individuals. There are three basic questions that must be answered in order to organise the different kinds of lifelong learning: Who decides the purpose of education other than that in the initial stage? Who pays? Who puts in the time? Policies and the available public resources will have to help find the answers to these questions.

As for who decides the purpose of additional learning, there are clearly three key decision makers: (a) companies according to their needs, (b) people who need to refresh their knowledge, or refocus their careers by changing companies or even sectors and (c) the state to support its policies of all kinds.

The experience of recent decades tells us that whoever decides on the training that workers need (the actual worker, his/her company or the State) will influence (albeit not decisively) the answer to the other two questions: Who pays? Who puts in the time?

As a general trend, we might suppose that whoever decides would have greater responsibility for assuming the costs, both of the education and of the time. But in practice whoever assumes the costs both in money and in time is decided politically through public policies that offer support when it is companies or individuals who decide (noting here the role of the European Social Fund in Europe). In a fair number of European countries there is an individual right to lifelong education, part of the costs of which are borne by the people. But the individual right to lifelong education also receives support from businesses in many countries through the agreements reached via ‘collective bargaining’ at the sector or company level. Examples in this field are manifold and sometimes very old (such as ‘150 Hours’ in Italy in the 1970s, half a century ago).

The previous paragraphs imply that the central function of initial education, in a period of uncertainty, is to provide the instruments to access lifelong learning. It should be, as it has been, the basis for access to further educational activities. Focusing this basic function on initial education will imply making changes to the contents, methods and forms of this education.

We shall now make a comparison between the countries included in this study. As available indicators for comparability we propose the following.

Level of Education of the Adult Population (25–64 Years) Broken Down by Sex

Although initial school education still needs to be improved, the function of basic education has been and still is largely assumed, de facto, by the school system.

Table 5.8 Educational attainment population from 25 to 65 years old. 2010

	ES	FI	FR	IT	GB	AR	BR	CL	MX	UY
Total population										
Primary	30.1	28.7	19.2	19.9	15.9	41.9	37.0	22.0	34.4	48.9
Secondary	41.7	39.3	54.8	61.7	55.6	45.2	39.3	57.0	38.7	40.1
Tertiary	25.7	31.6	24.4	12.1	28.3	12.5	11.3	18.1	17.7	9.4
Female population										
Primary	32.5	28.8	22.0	22.5	17.1	42.3	35.8	23.3	35.3	47.6
Secondary	39.0	36.3	51.8	56.7	54.6	43.4	39.5	55.6	37.6	39.5
Tertiary	25.2	34.4	24.7	12.5	28.1	13.0	12.5	17.9	16.5	11.2
Male population										
Primary	27.6	28.6	16.2	17.5	17.1	41.6	38.1	18.7	32.8	50.1
Secondary	44.6	42.6	58.0	66.8	55.3	47.2	39.4	60.0	40.4	41.1
Tertiary	26.2	28.7	24.3	11.7	27.5	10.4	10.0	18.8	19.1	7.5

Source: Barro and Lee (2013)

We observe that a population's level of schooling is a good indicator of: (a) the danger of robotisation of jobs, which is inversely proportional to the level of education of the workers who do them (Arntz et al. 2016); (b) people's ability to learn new things through access to continuing education in any of its forms; (c) a higher educational quality of the jobs they do and (d) a greater capacity to incorporate technological change into their work (Lladós 2018). For these reasons, a country's level of initial schooling is, albeit a simplification, one of the comparable indicators of its ability to assume the changes in the school-education system that new technologies will require.

With respect to the countries in the INCASI project, the comparable information on their level of schooling for 2010 is the following Table 5.8.

We can take this data as an indicator of the capacity or not of countries to adapt to technological change (the greater the schooling, the greater the capacity to adapt) and it reveals that overall, European countries are better placed than Latin American ones to deal with the technological changes we are experiencing and that are on the way. But among Europeans, the data suggests that Italy has lower figures for higher education and that out of the population as a whole, men are better positioned than women.

Percentage of Young People Who Do Not Reach the Level of Compulsory Education

Following the analysis by Arntz et al. (2016) a particularly relevant figure for comparison is the percentage of the population that does not reach secondary education, which is currently the minimum considered compulsory in all countries. Those who do not reach this level are those who are at the most extreme risk of doing automatable work and who will have the greatest difficulties readjusting to fill the new jobs that will appear, and hence face a significant risk of technological changes leading them to social exclusion.

Percentage of the Active Population that Performs Continuing Education Activities in One Year by Age and by Previous Level of Schooling[5]

Taking into account the statement made in the OECD report "*Adult learning can play an important role in helping adults to develop and maintain key information-processing skills, and acquire other knowledge and skills, throughout their lives. It is crucial to provide, and ensure access to organised learning opportunities for adults beyond initial formal education, especially for workers who need to adapt to changes throughout their careers*", another indicator of a country's capacity to adapt to the impending technological and social changes is their population's ability to access continuing education. The first thing we notice here is the lack of information on access to continuing education in most Latin American countries. The 2013 PIAAC survey only included Chile and the 2017 survey only featured Mexico, but the results of the latter are not yet available.

The overall data of the 2013 PIAAC survey indicates that 17% of the population of the OECD countries that participated in the survey aged between 25 and 64 received either formal or non-formal education in the 12 months prior to the survey, although a larger proportion, 24%, would have liked to have done so. The educational activities that they had done in this period, despite being from the same source, were both formal and non-formal. Most of these were non-formal but 11% were formal, both combined with non-formal education and not. This data shows that adult education is gaining ground in huge proportions, albeit very differently between countries. From 70% in Finland, the figure drops to 25% in Italy, with 50% of people aged 25–65 years in countries like Spain and Chile having done educational activities. Respondents give two reasons for not having received more continuing education: (a) time (working hours and time dedicated to the family) and (b) cost of continuing education activities. Both factors are subject to public policies and funding that could facilitate access to continuing education, as is currently the case with the European Social Fund, although it is manifestly improvable.

As stated previously, we do not have data for most Latin American countries so we are unable to assess the possible differences between the INCASI project countries.

Educational Premium of Higher Levels

The 'educational premium', i.e. the increase in income depending on whether one reached higher education or not, is reflected in Table 5.9 in which there is no data for Argentina or Uruguay because they are not included in the OECD 2017 report.

This data, in addition to showing the already noted polarisation of income in Latin America, indicates that one of the factors of that polarisation is level of schooling, and more acutely than we observed in Europe. When combining the polarisation of income with that of school, we can foresee that the effects of the digital revolution on social exclusion are likely to be much greater in Latin American countries.

[5] We do not have 'finer' comparable information on continuing education, such as the number of hours or the type of training.

Table 5.9 Relative earnings of workers, by educational attainment (2015) (25–64 years-old with income from employment; upper secondary education = 100)

	ES	FI	FR	IT	GB	AR	BR	CL	MX	UY
Below upper secondary	71	99	80	77	76	nd	62	68	61	nd
Post-second non-terciary	114	115	nd	nd	Nd	nd	nd	nd	nd	nd
Short-cycle tertiary	nd	120	131	nd	124	nd	nd	142	130	nd
Bachelor's or equiv.	nd	122	138	nd	151	nd	235	264	196	nd
Master's, doctoral or equiv.	nd	164	205	141	181	nd	449	472	371	nd
Total terciary	153	137	154	141	153	nd	249	237	202	nd

OECD Education at a glance 2017. *nd* no data

This data leads us to consider that the promotion of both initial and continuing education and both formal, non-formal and informal education should be a priority objective for countries in both continents, but most intensely in Latin America in order to exploit the benefits of technological change and avoid its negative effects.

5.4.3 Elements for Understanding the Sociocultural Change that Will Come with the Technological Revolution

It was previously found that the convergence of internet, mobile phones and digital networks was consolidated at the beginning of the decade in all the countries analysed. Would this technological convergence lead to sociocultural change? And if so, how? And what is its scope? Indeed, the convergence of technologies did lead to sociocultural change, as the analysed data reported. People adopted these technologies en masse and in doing so interpersonal ties have become digitally mediated. Technology users generated, it could be said, a 'digital copy' of their social relationships on digital networks, which has led to alterations to the informal structure of society, corresponding to the web of social networks formed between the individuals that make up a society.

The alteration of the informal structure of society includes: (a) a *small world* structure[6] (Milgram 1967; Watts 2006), i.e. a network with a high degree of grouping and the need for few random links to cover any network, no matter how large; (b) a reduction in the barriers of time and space, which means information is transmitted much more rapidly; and (c) increased interactivity (Wolton 2000). This entailed a large number of social phenomena being enhanced and/or acquiring new force due to the alteration of that structure of society, including the reconstitution of

[6] This is an important aspect because not all networks are the same. It would be wrong to claim that all personal nodes are interrelated in the web, and that they therefore all communicate with each other. The differences in structures are associated with the phenomena that generate them. For example, networks with preferential links to financial phenomena. There are also regular or ordered network structures, disordered or random networks, small world networks, and others.

social ties in the family, school and other settings due to these technologies (Winocur 2010). Because people were able to recompose their social networks, either by re-forging social ties that had been lost over their lives, and/or by adding new ties associated with their personal interests, this process involved the creation of new social ties, or simply expanding those that people already had (Diani 2011). When digital networks made it possible to maintain a greater amount of ties, and communicate with them faster, it also became feasible to establish and maintain new social ties in the digital space.

The union of the technological and the social occurred through the digital mediation of interpersonal ties, referring to how all or part of the relationship between two individuals is made digitally via those technologies, offering users new capabilities but also producing new risks, for digital networks have been questioned due to the spread of intentionally false news. Likewise, digital network providers are criticised for the difficulty keeping data private and the filtering of information. They increasingly violate so-called net neutrality, according to which all content must circulate freely on the internet, at the same speed and under the same conditions (Martel 2015: 401). Similarly, people today receive a greater amount of information than in previous times, and so network providers have turned to algorithms, i.e. organising information by filtering it, such that the relative importance of information can be guided. To this we can add network monitoring by national governments for purposes of control and repression.

At this point in the decade, this alteration means that the physical-virtual dichotomy no longer holds (Wellman 2001; Rheingold 2004; Pleyers 2018). As the physical network, or social network, is digitally 'copied' in the virtual network, people can use direct interaction with the physical world and/or the interactive capacity of the digital world as it suits them. So today, homes and workplaces are more intertwined than in previous times, and the link between the private and public spheres in which people live is also much tighter (further background in Rainie and Wellman 2012). The local (i.e. national) sphere has been strengthened, despite what is being said about the consolidation of predominantly homogenised and global social relations, typical of the first wave of digital networks in the last decade. This is because even though the possibility of creating global links in the digital space has arisen, communication is mainly made with local contacts. People's basis of collective action is still the communities (netdom) in which their personal lives unfold (White 2009). Thus, "Digital issues are territorialised phenomena, the Internet does not abolish traditional geographic limits, does not dissolve cultural identities, nor does it smooth out linguistic differences: it consecrates them" (Martel 2015: 21).

As Voss and Williams (2009) noted, the decrease in state intervention in countries' economies that reduced the protection of the population's interests paradoxically happened at the time as an increase in civil society's potential for organisation, which was reflected by the increase in social movements around the world.

In consideration that technologies link their users with a broader context, in which their users draw on a personal and social history that constitutes the basis for their use of technology (Proulx 2001: 1), it is observed that in different national

contexts, with very different idiosyncrasies and governments, collective actions, movements and social mobilisations of similar characteristics emerged, involving mass protests and demonstrations, and messages that spread rapidly.

2011 witnessed numerous collective protest actions in different countries, examples being Egypt, Tunisia, the United States (Occupy Wall Street), the *15M Indignados* in Spain, and the protests by Chilean university students. Authors have particularly highlighted the mass gatherings of protesters, the vast repertoire, horizontality, the spread of messages across digital networks (*Twitter*, *Facebook* and *blogs*) and smartphones used by protesters, whereby they have been dubbed the *2.0 Revolution* or the *Facebook Revolution* (Fuchs 2012). Castells (2015) claims that the horizontality of these networks favoured cooperation and eroded the need for formal leadership. Fuchs (2012) questions the idea of a social movement without a leader, and argues that the movements that year used ICT to direct protesters' actions through suggestions and instructions. Popovic (2016), writing on the events in Tahrir Square in 2011, stresses the importance of the work that Egyptian revolutionaries had been doing for years. Numerous authors include the use of ICT by protesters and their groups in their explanations. They have even suggested that they played a key role in strengthening democracy. But this is a controversial relationship, as was made clear by the discussion between Clay Shirky and Malcom Gladwell on the demonstrations in Iran in 2011 (Shirky 2011). Shirky claimed that ICT dramatically improved the ability to share, cooperate and act together, which leads to a change of era. Gladwell argued that the use of ICTs involves a high risk because they are built on weak ties, while it is strong ties that support digital activism. This debate proposed the main perspectives on the matter, and they are still valid today.

In the following years, in different national contexts and with different social demands, new actors were mobilised. The *Yo soy 123* student movement broke out in Mexico in 2012, in Brazil in 2013. More recently in Argentina in 2015, the *Ni una menos* movement in opposition to violence against women broke out, followed in 2018 by the social movement around the proposed voluntary interruption of pregnancy bill. In the same year, France had its 'yellow vests movement' (*mouvement des gilets jaunes*). And in 2019 there were other social movements[7] in Ecuador over oil and in Peru over corruption, while Spain had the Catalan independence 'process'. As we write this chapter, there are mass protests in Chile[8] against the increased cost of public transport in the capital city. This example includes all the illustrative characteristics of digital mediation in interpersonal ties, whereby it is mainly self-convened, involves massive social participation; and demonstrations in many different places at the same time. It is decentralised, yet it is presented to the public in a coordinated manner, even though it may sometimes appear to be out of control. And

[7] https://elpais.com/internacional/2019/10/26/america/1572112346_368643.html

[8] https://www.elmostrador.cl/noticias/2019/10/26/sin-escenarios-ni-locutor-ni-discursos-el-pueblo-le-dio-un-mandato-a-la-politica/

all this is happening in the face of perplexity among public authorities, and is putting traditional social intermediaries in a very difficult situation.

In sum, the implications of the ongoing changes mean that technological convergence has led to major socio-technological change as people adopt the internet, smartphones and digital networks en masse. In doing so, they digitally mediate interpersonal ties, thereby altering the informal structure of a society that acts as a support for various social phenomena by introducing new elements and new dynamics that require something other than traditional social intermediaries (political parties, unions, neighbourhood organisations, student bodies, etc.) who have usually only viewed these technologies as a means of communication. But they actually constitute the most efficient, most robust and fastest means to disseminate information, ideas and influence by digital word of mouth, and grant the possibility to generate 'bottom-up' collective actions due to the preponderance of the local within the web through which messages are transmitted and retransmitted, i.e. information is transferred from one individual to another inside the network. How does this happen? In order for a message to be retransmitted, it must mean something to the person who transmits it, and also to their 'friends' in the network who receive it. If this happens to 'friends' and to 'friends of friends' then the message will soon be passed all around the network due to the structural characteristics of the 'small world'.

5.5 Conclusions

In the society that has been emerging over the last 10–15 years, the digital economy has become increasingly more hegemonic in terms of business activities and organisation, jobs and, little by little, people's everyday lives. It will not advance at the same rate in all countries and the whole of society will not be covered. That is why comparisons between countries make sense, as we have done in this chapter, as well as examining differences between men and women, educational differences and others. But digital technologies are developed in a specific social context, so interests, strategies, associations, and cultural, social and political traditions will play a role in their evolution. We have sought to summarise all these possible conditions for the advance of new technologies and their consequences for the people in terms of what we have called policies (regulations, public resources, government actions, strategies of social actors, as well as the role of both formal and informal education). But we have also examined some of the real everyday practices of the people.

The Advancement of Technological Innovation and Its Consequences

We first looked at companies and employment. The data indicates that internet connection has grown very substantially in all countries. However, small and medium enterprises still make less use of its possibilities for purchases, sales, accountancy and organisation, and many workers have limited STEM (Science, Technology,

Engineering and Mathematics) skills. The issue of STEM, which is viewed as a need for everyone and as an indicator of the skills that everyone will need in the future, is not at all clear for non-technological occupations, which will be the majority of those that will be created using the economic surplus. This certainly raises the risk of routine jobs that are substitutable by technology, if the cost of the substitute technology is lower than the cost of human labour. In addition, technological innovation is not synonymous with good salaries and conditions, the case of 'riders' being a good example. The history of technological innovations, especially in the most recent years, does not suggest that we need to fear an ostensible loss of jobs, but there may well be a sharp downturn in their quality, even in the most developed countries, and they will undergo remarkable transformation. Digitalisation will be responsible for the latter aspect, and globalisation for the former, as it involves competing with the whole planet and very different working conditions. And this is what is going to happen unless there are regional, national and even global policies to prevent it.

As for everyday life, increased use of the internet and smartphones means big changes in communications, relationships, leisure, shopping habits and so on, and spectacular growth has been recorded in all countries from 2005 onwards. However, there are differences between Latin American and European countries, with the latter at an advantage with two exceptions, namely Chile, which is considerably ahead of other Latin American countries, and Italy, which is below the European average. There has also been a spectacular increase in the use of social networks, again with differences between the two blocks of countries, especially for Twitter. But it should be noted that progress here is ambivalent, for although the radius of relationships can dramatically increase, these can be highly superficial. People are able to communicate their thoughts to many more other people, but we are also being exposed to fake news, deception and identity theft.

In the field of education and training, we should highlight the importance of a high level of education in the face of advances in digital technologies. The differences between countries are notable, not only between the two analysed blocks, but also within each block. It is also beyond doubt that lifelong learning will become more and more important in the coming years, due to changes to employment.

Society's Possible and Desirable Responses

Improved labour conditions in the digital economy will at least depend on the following factors: modernisation of the productive structure, which requires investment in R&D&I; a shift towards renewable energies, which will help to face another huge challenge, the climate crisis; and new regulations on employment, taxation and support for unemployment. The State must play a key role here. Experts say that, and so do the European Commission and the OECD. Latin American countries are trailing behind Europe in R&D&I, but not always in renewable energy. Difficulties with regulation (see the informal employment indicator) are a traditional barrier among Latin American countries.

New demands for training will require negotiation between stakeholders, and also for the state to foster the right for everyone to be properly trained from

childhood to retirement. This is an essential issue in order to keep pace with technological change without serious problems being caused in the workplace. The digital revolution is a risk to jobs, both in terms of quantity and quality, but this risk can become an opportunity if society is able to foster the modernisation of the productive structure and training, and especially the continuing education of the workforce.

As for the new panorama for everyday life, the digital revolution opens up many opportunities in terms of communication, relationships, collective action, leisure, consumption, culture, etc. Society must prevent the digital divide from affecting social groups or regions. But beyond this, the public authorities must regulate, monitor and guarantee the privacy of people's data and ensure that nobody suffers abuse or is manipulated by the superpower platforms.

The digital revolution may increase and consolidate the biggest social inequalities in the world. But there is also a very real possibility that they can be reduced with the right tax, labour and investment policies, which should necessarily be global, and here lies one of the problems. Finally, the digital revolution also raises the hope of curbing the climate crisis, our most important challenge of all right now. But it might also make the crisis worse. Whatever the result, it will depend on social movements, social organisations and the people's attitudes, as well as real political will on the part of every country in the world.

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