Article

Teleworking in the Context of the Covid-19 Crisis

Angel Belzunegui-Eraso [1],* and **Amaya Erro-Garcés [2]**

[1] Social & Business Research Laboratory, Rovira i Virgili University, 43002 Tarragona, Spain
[2] Department of Business Management, Public University of Navarra, 31006 Pamplona, Spain; amaya.erro@unavarra.es
*   Correspondence: angel.belzunegui@urv.cat

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Abstract: This article aims to analyze the implementation of teleworking as a security practice to face the crisis resulting from the Covid-19 disease. The present paper provides both theoretical and practical results. From a theoretical standpoint, the Baruch and Nicholson approach is extended with environmental, safety, and legal factors that explain telework. From a practical perspective, a database of companies that have introduced telework as a measure to face coronavirus in a crisis context has been obtained. In short, the Covid-19 crisis demonstrates how teleworking has been used by companies to ensure their employees' safety and to provide continuity to economic activity. Consequently, safety factors are relevant in the study of teleworking and should be considered in further research.

1. Introduction

Telework facilitates flexibility and a strong work–family balance while reducing the environmental impacts of mobility. Although it has benefits, the implementation of teleworking practices across Europe, and in particular, in the case of home-based telework, is moving more slowly than expected [1–4]. The economic crisis is considered a reason that justifies this delay, although teleworking was originally attributed to the oil crisis of the 1970s [5].

In this context, telework has suddenly experienced a rebound, as a result of the measures to protect citizens from the coronavirus disease (Covid-19). In the beginning of 2020, several governments recommended that companies facilitate teleworking to avoid employees gathering together in the same place. To quote an example, the Spanish Health Minister, Mr. Illa, asked companies to promote telework as a measure to face the coronavirus in Spain on March 2020, and several protocols were published to help companies in their implementation of telework.

Additionally, during this time, the number of searches of the term "teleworking" on Google in Spain has increased exponentially (Figure 1).

This article analyzes this situation and aims to promote the future use of teleworking, after the coronavirus crisis abates.

This paper contributes to previous literature by (a) providing new factors that affect the implementation of teleworking; (b) extending Baruch and Nicholson's framework, adding environmental factors; (c) developing a database of companies that have introduced telework as a measure to face coronavirus in a crisis context; and (d) testing the extended model on the database.

Baruch and Nicholson's framework is based on a semi-structured survey of sixty-two teleworkers in five UK organizations. Both public and private organizations were included in the study: an accountancy

firm (one of the Big Six), two large insurance companies (SunLife and Standard Life), British Telecom, and one local government agency. The empirical analysis focused on teleworkers who work from their home, i.e., home-based teleworkers. Respondents were asked to identify factors which they perceived provide support for effective teleworking.

To address these purposes, the article is structured as follows. Section 2 presents the theoretical framework. Sections 3 and 4 present the empirical work and its results. The article finishes with the discussion of the main results and conclusions.
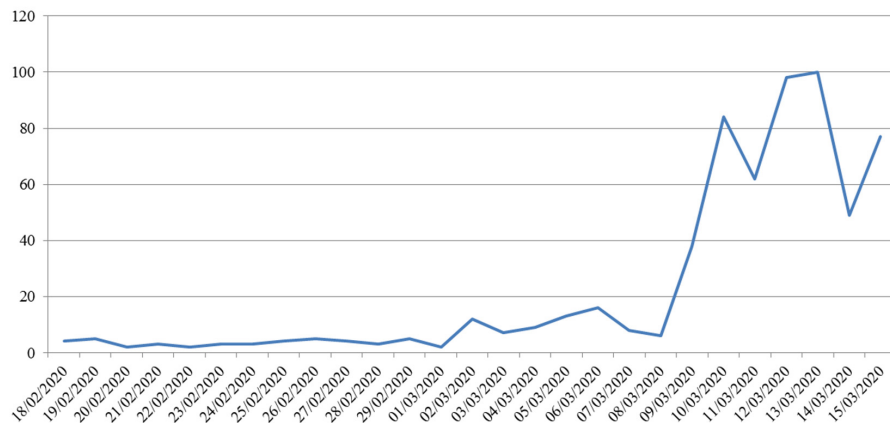

Figure 1. Evolution of searches for the term "teleworking" on Google in Spain. Notes: These data reflect the interest of the term "teleworking" in a location and a specific date. It is measured by an index value. The value 100 represents the maximum popularity of the term, whereas data above 100 indicate less interest. Source: Authors' own elaboration from Google Trends data.

2. Theoretical Framework

2.1. Definition of Telework

Telework or telecommuting (It can be also called telework/ICT-mobile work or T/ICTM.), hereafter telework, consists of a relatively new mode of alternative work arrangements [6]; however, it was first developed in the 1970s [7].

Although there is no universally accepted definition of telework, it can be described as a type of work and/or provision of services done remotely, at a distance, and online using computer and telematics technologies[8]. According to the International Labour Organization (ILO) [4], telework is defined as the use of information and communications technologies (ICTs), such as smartphones, tablets, laptops, and/or desktop computers, for work that is performed outside the employer's premises. In other words, telework implies work achieved with the help of ICTs and conducted outside the employer's locations.

Despite several authors focusing on the definition that links telework with the idea of working at home [6–10], telework just involves working outside of the employer's premises with the support of ICTs, and, therefore, it can occur from multiple locations (home, office, and other places) using different technologies (e.g., mobile teleworking) and with different frequency. As an example of these modalities, the Statistical Indicators Benchmarking the Information Society (SIBIS) in 2003 defined four different modalities of telework: telework from home, mobile telework, freelance telework in SOHOs (small office/home office), and telework done in shared facilities outside of organizations and the home.

In fact, telework allows workers to work at home, from shared facilities, at customer sites, or via any platform that has the required technologies. Consequently, the facilities used (technology) and the location determine the measurement and the telework concept. Additionally, and was previously mentioned, frequency also impacts on the modality of telework considered.

To use this concept properly and to draw conclusions about its usage, we sought to explore the modalities of the teleworking analyzed, and, therefore, the measurement under consideration. For that

purpose, the present paper refers to the previously mentioned ILO report [11], which differentiates between several places of work and levels of frequency in teleworking, grouping workers in relation to both the place of work (home, office, and other locations) and the intensity or frequency of working with ICTs outside the employer's premises.

Accordingly, and to ensure a systemic perspective of the situation of teleworking, the ILO [11] considers different modalities of teleworking: regular home-based telework (refers to employees working from home regularly, using ICT); high mobile telework (employees working in several places regularly, with a high level of mobility and using ICT); and occasional telework (consists of employees working in one or more places outside the employer's premises only occasionally and with a much lower degree of mobility than the high mobile group) [12]. Table 1 presents the definitions for these types of telework.

Table 1. Types of telework.

Modality	Use of Technology	Location
Regular home-based telework	Always or almost all the time	From home at least several times a month and in other locations less often than several times a month.
High mobile telework	Always or almost all the time	At least several times a week in at least two locations other than the employer's premises or working daily in at least one other location.
Occasional telework	Always or almost all the time	Less frequently and/or fewer locations than high T/ICTM

Source: Eurofound and the International Labour Organization (ILO) [4].

This research refers to regular home-based telework (hereafter, home-based telework), as it is the modality used in the prevention of the coronavirus disease.

2.2. Factors that Affect Telework

As stated by Baruch and Nicholson [1], there are four factors that influence telework: individual factors, job factors, organizational factors, and family/home factors (Figure 2). They highlighted that these four factors need to be fulfilled for telework to become feasible and effective.
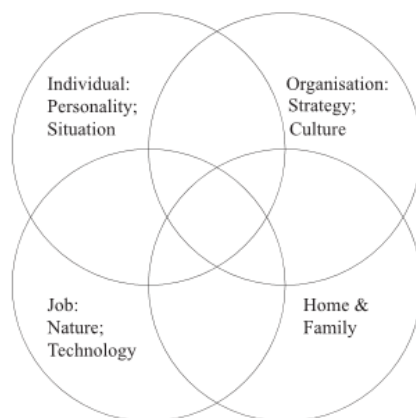

Figure 2. The Four factors of telework; Source: Baruch and Nicholson [1].

2.2.1. Technological Factors

In addition to the four mentioned factors, technology displays an important role in the development of telework, as technological infrastructure is required while teleworking.

Previous research on the effects of ICT on telework concluded that there is a positive relationship between technologies and the possibility of working outside of the employer's buildings. ICT-based practices have given rise to flexible work arrangements, such as flextime and telecommuting, which increase the amount of autonomy that employees have in their work [13]. On the other hand, as mentioned previously, Baruch and Nicholson [1] included technology as a key factor for teleworking. They analyzed the fit of technology for the specific work-role. In this context, IT intensity is taken into account in teleworking processes. The increase in the use of ICTs and technological improvements enabled the development of telework [14,15]. Moreover, the widespread and continuous use of technologies, and, in particular, the use of computers and microelectronics, accelerated the expansion of telework. The use of virtual platforms, telematics, and computer procedures enable working without physical presence in an organization.

2.2.2. Individual, Organization, and Home-Family Factors

Baruch and Nicholson's framework includes individual, organizational, and home or family factors to explain the use of telework [1].

Regarding the individual factors, previous research addressed the question related to who could become a teleworker, concentrating in the identification of traits of teleworkers and factors that predict who will telework [9].

In this context, one can identify [16] three categories of studies: (a) qualitative studies, based on stated preference surveys; (b) quantitative studies using stated-preference survey data; and (c) quantitative studies using revealed-preference survey data. In the second category, some research [9] can be highlighted while studies from the third type focused on the teleworker's profile. In this first group, the present article mainly focuses on research based on qualitative data.

In the latter group, for instance, Walls, Safirova, and Jiang [17] analyzed a survey of 5028 Southern California residents to evaluate the relative importance of factors that affect workers' propensity to telecommute and their telecommuting frequency. They concluded that education, age, and race were all statistically significant in explaining telecommuting behavior. Nevertheless, concerning family factors, neither gender nor having children were included in the study. However, they concluded that where an individual works and what kind of job he or she holds is quite important in explaining the likelihood that he or she telecommutes.

Sener and Bhat [16] worked on data from the 2007/2008 Chicago Regional Household Travel Inventory (CRHTI) that provided a sample of more than 1500 telecommuters. They indicated the important effects of several demographic and work related variables in telework. Addressing the gap found in the other research [17], variables like gender, presence of children in the household, work-related schedules that are fully flexible, and jobs in the real estate, rental, or leasing occupations were much more likely to telecommute. They also found that several factors related to the commute trip and work location influenced telecommuting choice and frequency. The analyzed factors can be considered as examples of individual, organizational, and family/home factors.

It has also been demonstrated that home-based telework was a limited practice in terms of use, essentially practiced by a few intellectual professions characterized by a considerable amount of job autonomy and with limited potential for development [3]. They analyzed a database of 20,200 French households, a representative sample of 1294 companies, and 2000 residents of a region of Brittany.

Further research at the European level can be underlined. Sarbu [18] studied variables that affect telecommuting in a sample of 10,844 German employees. He stated that men had a higher likelihood of working at home, but women were more likely to work at home intensively. Other variables that increased the probability of working at home were higher education levels, tenure, and the use of computers. Having children less than six years old, overtime, and work time had a positive impact on both working at home and on working at home intensively. This research considers both individual and family/home factors.

The authors from the SIBIS database (which stems from population surveys undertaken in 2002/2003 in EU-25 plus the remaining candidate countries Bulgaria and Romania, as well as Switzerland and the United States) found that women were less likely to telework from home or a mobile location than men [19]. No such relationship could be found with regard to tele-cooperating from a traditional office workplace. This suggests that the increased flexibility offered by ICTs regarding the working location are unequally distributed between male and female workers. Women made significantly less use of eWork to be locationally flexible. This was surprising given that telework was initially promoted as an attractive way for women to combine family and work obligations. There was also some evidence that telework (multi-locational eWork) has been taken up by segments of the labor force that are otherwise threatened to be excluded from the knowledge economy, such as elderly workers, employees in rural areas, or workers in small and micro enterprises. Finally, and after controlling for the major factors that describe the structure of the labor force and the economic environment, a number of EU Member States still demonstrate a significant negative country effect with regard to the implementation of eWork.

In fact, empirical research indicated different results than expected in cases when the teleworker's profile was previously defined, and objectives and advantages were identified. In this respect, in many instances, when scholars and companies refer to teleworking, they seek to develop a new way of organizing work to support work-life balance or to further improve the integration of several collectives of employees, or just to increase flexibility by facilitating the move from home to work and, consequently, develop measures against pollution.

From this research, a teleworker's profile is identified as usually female workers who have been provided by the employer with a computer workplace in their home and who spend more or less all of their working time there [19]. However, empirical studies focused more on the profile of male workers who are highly skilled and hold positions of responsibility in the company.

In short, several experiences in the implementation of teleworking show the use of telework as a new way of organizing work that improves conciliation and flexibility, and consequently, refer to individual and family/home factors.

Finally, regarding the organizational factors, several scholars identified the operations that can be conducted remotely and sectors where telework is a successful alternative to organize work [20]. Thus, "white-collar" workers and knowledge-oriented sectors are more likely to use teleworking practices [21]. Along with this line, some authors affirm that telework results in a dilution of the hierarchical structure of an organization [22]. At a social level, telework could generate sustainable effects targeting the long-term management of the work force and providing solutions to potential problems at local community levels [23]. However, there are studies that show that people who regularly engage in telework outside ordinary working hours are more pressed for time than are other groups, and women are pressed for time to a greater extent than men [24].

Before proceeding to the next section, we should note that previous research has also confirmed the negative consequences of teleworking that affect both employees and companies. Examples of the negative effects on employees are limited social interaction and isolation, which can lower productivity and even damage their health [25]. Other negative effects are an increase in work pressure and the unlimited working time when there is a lack of planning [26]. On the other hand, excess leisure time may also cause employees to reduce their productivity, thus resulting in a negative balance for the company [27]. Studies also suggest that employees find difficult to organize their working time and encounter problems related to confidentiality of information [28].

2.2.3. Environmental, Safety, and Legal Factors

The model proposed by Baruch and Nicholson [1] can be complemented with further factors that support the development of teleworking. Among these additional factors, environmental, safety, and legal aspects should be considered in this new way of organizing work. Figure 3 presents this extended model.
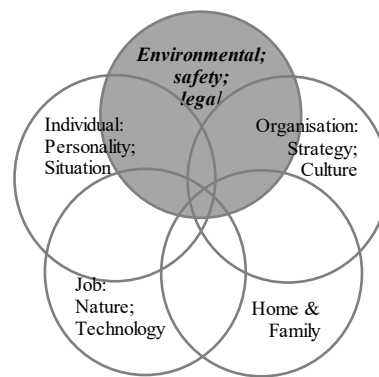
Figure 3. Extension of the Baruch and Nicholson framework; Source: Authors' own elaboration.

Environmental factors are at the foundation of the emergence of teleworking, together with the cost reduction of working hours for companies. In the 1970s, characterized by a context of an increasing urbanization and agglomeration of production activities, new forms of organizing work to reduce the environmental impact of the travel to the workplace were introduced. These initiatives aimed to reduce pollution and the carbon footprint resulting from mobility. In short, during that decade, the focus was the minimization of the environmental impact of the economic activity, and telecommuting practices, in part, contributed to limiting the effects of reduced travel to the workplace [29–31].

With regard to the legal or regulatory factor and its effects on telework, it should be stressed that previous literature agrees on the lack of specific regulations on this matter. The European Framework Agreement on telework has been unequally interpreted across European countries [32]. They suggest it has been adapted by political interests given the correlation of forces of social partners in each country. Along with this line, a factor that has decisively contributed to the slow diffusion of teleworking practices is the absence of an established regulatory framework of teleworking [33]. The lack of regulation is also considered as one of the most pressing issues in the implementation of teleworking practices at a transnational level [34].

Nevertheless, to the best of our knowledge, very few studies have attempted to analyze the relationship between telework and the safety problems of employees and/or citizens emanating from natural disasters, terrorist attacks, or health alert alarms.

Donnelly and Proctor-Thomson [35] evaluated the organizational experiences of 240 public servants after an emergency situation caused by a series of earthquakes in New Zealand and concluded that telework facilitates the effective readiness to return to work as it reduces the impact of the natural disaster on the inaccessible physical workplaces and ensures the reallocation of labor tasks during the recovering periods.

Concerning the situations caused by terrorist attacks, and considering the 2001 New York Twin Towers attack as a reference, the telework is critical for the survival of the organization as it mobilizes the workforce while public services and infrastructure are restored [36].

The expansion of Covid-19 has caused a crisis in both a health level (characterized as a pandemic by the WHO) and an economic level because of the economic contraction expected in most countries affected by this virus.

So far, there have not been significant cases of the implementation of telework as a result of a health crisis, and, therefore, this is an unprecedented situation where most organizations (both companies and public organizations; see Table 2) have asked their employees to work remotely from home as teleworkers. Health measures of forced confinement of citizens have spurred the extension of teleworking in a high number of organizations. Due to the exceptional circumstances from the spread of Covid-19, it can be considered that the call for teleworking is forced by the circumstances. If the Covid-19 related health fears did not exist, most of these companies would not have implemented teleworking practices in a massive way.

Table 2. Telework experiences to protect from the coronavirus (from 1 March 2020 to 16 March 2020).

Company	Sector	Date	Employees Affected	Individual	Organisation	Job	Home & Family	Environmental, Safety & Legal
PeopleMatters	Human Resources consultancy	09/03/2020	All employees		✓		✓	✓
Twitter	Social networks	10/03/2020	Voluntary (all employees)		✓			✓
Bankia	Banking services	06/03/2020	Employees from a plant of the company	✓				✓
Indra	Technological Company	05/03/2020	Two plants in Barcelona					✓
EY	Consultancy	05/03/2020	3300 employees in Madrid		✓		✓	✓
Cellnex	Telecommuting	04/03/2020	Employees located in the North of Italy				✓	✓
Uniteco	Insurance services	10/03/2020	Employees with children in Madrid				✓	✓
Iberdrola	Energy Company	12/03/2020	N/A					✓
Endesa	Energy Company	03/03/2020	N/A					✓
BBVA	Banking services	11/03/2020	N/A	✓			✓	✓
Ericsson	Technological Company	08/03/2020	Employees located in Croatia				✓	✓
Google	Technological Company	08/03/2020	8000 employees in Ireland		✓		✓	✓
Repsol	Energy Company	10/03/2020	Employees located in Madrid	✓	✓	✓	✓	✓
Gamesa	Renewable energy	11/03/2020	400 employees located in Navarra					✓
Banco Santander	Banking services	12/03/2020	N/A				✓	✓
Vodafone	Telecommunications Company	04/03/2020	2200 employees located in Spain		✓	✓	✓	✓
Orange	Telecommunications Company	11/03/2020	1400 employees located in Madrid	✓	✓			✓
LG Electronics	Technological Company	14/03/2020	Employees located in Korea, Iran, USA, Italy, and Spain		✓	✓		✓
Microsoft	Technological Company	14/03/2020	N/A	✓	✓	✓	✓	✓
Axa	Insurance services	14/03/2020	N/A	✓		✓	✓	✓
Ence	Cellulose manufacturing	14/03/2020	N/A				✓	✓
Banco de España	Institution	14/03/2020	N/A					✓
Comisión Nacional del Mercado de Valores	Institution	14/03/2020	N/A				✓	✓
El Corte Inglés	Retail Company	03/03/2020	N/A				✓	✓
Caixabank	Banking services	12/03/2020	N/A					✓
Ferrovial	Infrastructures	11/03/2020	N/A					✓
Mapfre	Insurance services	11/03/2020	N/A	✓	✓	✓	✓	✓

N = 27 organizations. Source: Authors' own elaboration. See Supplementary Document: manuscript-supplementary.pdf.

In any case, this situation increases to become a future broader topic for reflection and will need to be addressed based on the experiences of this specific circumstance.

The fact is that global attacks, related to environmental issues (e.g., climate change) or risks from new illnesses (because of the unbalanced equilibrium among species), can be considered drivers of teleworking. Additionally, on the one hand, telework allows the continuity of the organizational activities, and on the other, telecommuting guarantees the workers' collective health. Beck [37] warned of the consequences of the global risks of different phenomenon and the possible worldwide impact. These risks require new trends of thinking about global threats. Nevertheless, and even though it may seem paradoxical, the management of these risks should also be considered from a local or regional perspective. As a result, these risks and its management have a "glocal' impact. Accordingly, companies have assumed that home-based telework can contribute to the management of the impact of the health crisis on production activities.

3. Materials and Methods

3.1. Data Collection

The empirical analysis is based on qualitative information published in the period of maximum risk because of the coronavirus disease. A search of companies that implemented teleworking as a measure to face the crisis generated by Covid-19 has been gathered. The search strategy was defined by: (a) the period of the search, from the 1st to 16th March; and (b) companies that introduced teleworking massively as a response to the coronavirus crisis.

It is important to highlight that during the search, several companies that had implemented telecommuting practices before this situation were identified. Nevertheless, during the coronavirus crisis, telework has been implemented in a generalized modality for nearly all the employees, and this situation introduced relevant challenges in the company.

The companies presented in Table 2 represent organizations that have introduced teleworking on a massive scale as a response to the Covid-19 crisis. Several companies implemented teleworking practices some time ago, but the current situation had led to them expanding telework to include a higher number of employees and business processes.

The database cannot be considered a comprehensive list of companies because it just contains information about larger businesses and organizations with a major impact. Thus, a self-selection bias could be observed since small and medium-sized companies that have implemented teleworking in the Covid-19 crisis are not included. As a result, a major impact of teleworking during the coronavirus could be expected. The selection of the companies comes from their public declarations about the implementation of teleworking from the 1st to 16th March.

On the other hand, according to King, Keohane and Verba [38], when the dependent variable presents the same values and does not vary, apart from the independent variables, causality cannot be established; in fact, it is an example of zero causal effect. In empirical research with small *n*, it is not possible to distinguish between an estimated effect of zero and a small effect. Increasing the number of observations would solve this problem. Additionally, selecting observations of the independent variables based on extreme values can facilitate the recognition of small causal effects. Finally, if the proposed measures are not enough, a selection from the independent variables and the dependent variable can improve the design of the research". In this sense, our empirical research can be described as a zero-variability study regarding the dependent variable (teleworking strategy). Following King, Keohane and Verba [38], the more we know about the object of study (previous literature on the adoption of teleworking before the pandemic crisis, and the situation of the healthcare crisis as a fundamental independent variable), the smaller the volume of observations that will be needed. If we select observations that show the variability of concrete classificatory variables (e.g., sector), the need for more observations can be reduced.

3.2. Methodology

Firstly, and in order to select the companies presented in Table 1, secondary sources of information were gathered: companies' websites, specialized economic journals and economic press, among others. Additionally, Eurostat [39] and OECD [40] information was also analyzed. All this information was used to identify the companies mentioned, their sector of activity, their business size, their international activity, or even if these companies had previously implemented teleworking. Information related to the number of teleworkers, its location, the date of the publication, and the source of the information was also collected (see the metadata file).

With regard to Eurostat [39], we focused on the report "Internet activities in the European Union", which provides information about the introduction of Internet by companies. More than 89% of European enterprises in the Member States had Internet access and were using it in 2004. Denmark and Finland (97%), Belgium and Sweden (96%) and Germany (94%) had the highest proportion of enterprises with Internet access, whereas Lithuania (80%), Portugal and Hungary (77%) had the lowest. The evolution of Internet access and the introduction of better devices offered new possibilities for telework. Accordingly, Denmark, Germany and Luxembourg show the highest participation of employees who use the Internet for work-related activities conducted outside their company's premises. The most common reasons for connecting were, first, to find work-related information (except in Poland) and, second, to communicate (e-mail). Remote access to employers' IT servers requires a more advanced IT infrastructure.

The OECD report [40] indicates that teleworking enables people to save time and combine their occupational and personal lives. "For European countries, the share of workers having teleworked is calculated as the share of workers who use ICT's at work at least 75% of the time and who report having worked outside the employer's premises at least once. For the United States, the figure is based on a survey question that asks workers if they have ever worked from their home using a computer to communicate for their job".

Secondly, a compilation was made of a range of collective agreements at the company level, and, in some cases, at the branch level. In both the European context and in the case of the United States, there is no specific regulation about the implementation of teleworking. Traditionally, teleworking regulation depends on negotiations between employers and Social Partners, or employers and employees. The lack of a specific legislation implies that teleworking agreements are included in collective agreements, but they do not always feature in them. From this analysis, companies that implemented teleworking before the Covid-19 crisis could be distinguished from organizations that started teleworking in March 2020. As a result, the Baruch and Nicholson factors [1] and environmental, safety, and legal factors could be identified for each implementation.

In short, collective agreements at company level or at branch level (just in the case there is not a specific collective agreement at company level) were studied to understand the motives for the implementation of teleworking before and during the Covid-19 crisis. These motives were analyzed under both the Baruch and Nicholson framework and the extended model. Table 2 comprises the categories that reflect this information (individual, personality situation; organization, strategy culture; job and technology; and home and family). A new factor was also included: the environmental, safety and legal motives.

The analysis of information was carried out under a configurational approach based on an asymmetric hypothesis [41]. The novelty in companies' decisions about a non-programmed contingent situation (the pandemic) justifies this approach. The asymmetry concerns factors or motives (the pandemic) that are needed to explain a consequence (teleworking). In other words, if the factor is not present, the consequence may occur or not, but if there is a lack of the factor, the consequence will not occur. The configurational approach allows the definition of a hypothesis where causality is not configured as a result of the interactions between conditions. Considering this approach, the analysis of the information takes place in the interaction between the conditions that lead to a result (teleworking implementation), structuring a narrative about the decisions of companies.

4. Results

Table 2 summarizes the main results from the empirical analysis. As can be observed, several companies implemented the use of teleworking as a response to the coronavirus crisis between the 1st and the 16th of March 2020 (Table 2).

Regarding the profile of these companies, most of them are large or multinational companies. It can be assumed that small companies have also conducted these practices, but they are not frequently published in mass media. However, this situation agrees with the previous literature that stated that large companies have more facilities in the introduction of teleworking [21].

Previous literature has shown that large companies implement teleworking to a higher degree than small and medium companies. In addition to companies whose activities are based on presentiality (e.g., direct sales, catering, transport services, etc.), numerous firms have not introduced teleworking due to an organizational dynamic that prioritizes presence in the workplace. Other firms, most of which are small and medium companies, have not done so due to a lack of technological innovation. By way of example, 61% of European small companies had incorporated a website by 2004, whereas roughly 90% of large companies had [40]. Nevertheless, a large number of small companies have implemented teleworking practices during the current crisis. However, these small companies are also affected by a lack of contingency plans because they have adopted teleworking forced by the circumstances.

As teleworking has been implemented because of security reasons, all companies introduced teleworking in a massive way, to all employees or more than 1000 employees. In addition, teleworking has been implemented for employees located in a specific region that is severely suffering from the coronavirus crisis (e.g., the case of Madrid).

The publication of news regarding telework in financial and economic mass media evidences the interest of employers toward teleworking practices in a risk context.

Considering the Spanish context related to working practices, teleworking has grown very slowly in Spain in recent decades, and it was mainly implemented by telephone operator companies. However, these companies have delocalized many jobs, and consequently, there is a lot of confusion about whether these companies have really implemented teleworking practices.

According to the National Statistics Institute, 27% of Spanish companies have introduced teleworking in 2017, whereas 7.4% of employees (around 1,430,000) were teleworking in Spain in 2018 [42]. More than half of these teleworkers could be classified as occasional teleworkers, as just 4% of the Spanish employees worked regularly from home before the coronavirus crisis [43]. These figures reflect a slower development of telework in Spain compared to the expectations estimated in the 1990s to occur in the 21st century. Moreover, the implementation of teleworking practices in Spain is among the lowest in Europe. The percentage of Spanish companies that opt for teleworking is clearly smaller than the European average of 35% of companies, according to Eurostat data [39].

Nonetheless, several companies from the selected sample (Table 2) implemented telecommuting practices before the Covid-19 risk context. Obviously, these companies were in a better situation to manage a massive implementation of telework during the coronavirus crisis. Nevertheless, they had to address important challenges to prepare nearly all their employees to work remotely.

Extant experience related to the management of the Covid-19 situation in firms across European and Asian countries indicate that companies from the service sector, and, in particular, telematics leisure businesses, energy companies, insurance businesses, banking services, and technological companies are the industries that present higher rates of telework implementation. This practice is introduced as a measure to ensure the continuity of the business activity. In this vein, a selective implementation of teleworking can be identified. There has not been a uniform implementation of teleworking practices across occupations and business processes around the world. Accordingly, several scholars underline the high use of teleworking in e-commerce or consulting firms [44], online services businesses [45] and companies based on innovative activities or facilitators of technological services to other organizations [46]. In parallel with the extension of the social use of ICTs, the public sector has also incorporated teleworking practices in relation to specific public services [47–49].

The Spanish situation is similar to the previous one described. Concerning the jobs and sectors that implement telework, results from Table 2 show that most companies come from the knowledge sector (e.g., banking companies, institutions, technological companies, etc.) or are related to health services (e.g., insurance companies). Most jobs conducted remotely refer to "white-collar" workers (e.g., Microsoft, Twitter, etc.). These results also coincide with previous literature [20,21].

In fact, most of these companies had previously adopted teleworking practices but limited teleworking to only a portion of their employees and only used telework, for instance, once per week. The current crisis caused by the pandemic expanded these projects to all the employees (in the case that all personnel are able to work under this modality). As a result, companies have to provide their employees with technological material to work from home (not just hardware, but mainly specific software, such as remote applications). To give an example of this situation, universities have offered telematics tools to professors to facilitate the possibility of teaching from home, in addition to the previously available ordinary software used to connect teachers and students (e.g., VPN (virtual private network) connections were multiplied by a factor of five at the Autonomous University of Madrid to guarantee communications). These technological tools have become essential for teaching activity, although they were just supporting materials several weeks ago. For example, the Conect@dos platform has just been launched to support online teaching. This platform supports Spanish universities in the switch from face-to-face to online teaching and it has been developed by the Universitat Oberta de Catalunya (UOC) and the National Distance Education University (UNED). Furthermore, as recommended by the European Framework Agreement on telework, organizations should provide their employees with the technological and physical resources needed to conduct the activity remotely. This measure is also contained in several collective agreements created during the expansion of telework, during the first years of the 21st century [50].

The adoption of telework by these companies was surely a result of a force majeure event, given the exceptional circumstances that have surrounded the coronavirus crisis. The confinement of the population is the circumstance that has had a major impact together with the limitation in the mobility of citizens. Nevertheless, this type of measure is based, theoretically, on two principles that can positively affect the future of telework: the responsibility and trust in citizens, and the economic level of the employees. In this regard, it can be assumed that both public institutions and companies that implemented teleworking rely on citizens/employees' co-responsibility to ensure the continuity of business production and reduce the impact of economic inactivity. Even more, the European Framework Agreement on Telework includes measures related to the relevance of ensuring a climate of confidence between employers and employees as a recommendation in the implementation of teleworking practices.

The management of the crisis has relied on these principles that are necessary for the development of telework. A lack of one of these principles leads to a barrier to teleworking. Furthermore, it should be highlighted that by adopting telecommuting, companies are preserving employees' health, and they are minimizing the labor risks of employees. In the current crisis resulting from Covid-19, physical contact and presentiality have been considered as high risk activities for the health status of the employees, and, therefore, telework has solved the problem of continuity of the business activity under a mix of heterogeneous national norms that regulate professional activity in terms of health and labor security. Following the recommendations of the European Framework Agreement on telework, companies have introduced teleworkers into their prevention plans, taking advantage of the fact that, under the perspective of prevention of labor risks, the employees' home is considered to be the work center.

In this context, Spanish entrepreneurial organizations and the majority of labor unions have jointly elaborated a document signed in March 2020, where they stated that it is essential to facilitate telework because of extraordinary reasons of public health in the sectors and companies where it was not previously implemented or planned. For that purpose, it will be considered as accomplished, the requirement of companies of evaluate risks with the auto-evaluation made by the own employee [51].

The use of telework as a response to the crisis and for business continuity depends on the activity of the organization, and it is heterogeneous among activities. For example, Twitter sent a circular to all its employees around the work (around 5000 workers) describing how to conduct their activities. Conversely, banking entities have been the least prepared companies for teleworking because of the sensitivity of the information managed by the employees and the level of confidentiality demanded. In this sense, the culture of these organizations is based on presentiality, not because of the direct service offered to customers—which is reduced daily following a strategy of cost reduction—but due to the measures of security needed to work remotely. Other companies have adopted mixed models, based on the so-called easy-working that allows professionals to work remotely several days per week. However, this easy-working modality has been questioned for health reasons as it does not solve the potential transmission of the coronavirus disease because it implies mobility to the workplace and intermittent presentiality.

Several companies have been adapting their measures as the spread of Covid-19 increases and following the health authorities' recommendations from each country. As a result, they have increased the number of teleworkers as the illness advanced, from considering employees with minor children that should stay at home as the schools were closed to introducing a generalized measure to all employees that are able to work remotely with the support of technology.

As side-effects, first estimations of the environmental impact of the crisis are being published. A reduction in the world GDP has been produced to a decrease in the amount of carbon dioxide emissions, as highlighted by the Global Carbon Project. The reductions in coal and crude oil use indicate a reduction in CO_2 emissions of 25% or more, compared with the same two-week period following the Chinese New Year holiday in 2019. This amounts to approximately 100 $MtCO_2$—or 6% of global emissions over the same period [52]. However, it will be necessary to await the final analysis of this situation regarding the impact on emissions once production returns to normal. Experts are aware of a rebound effect, and they expect that the recuperation of economic activity and mobility, including freight transport and mobility with a high impact on contamination, will result in similar levels of emissions to the pre-crisis situation or even higher to the pre-coronavirus context.

Concerning the analysis of collective agreements, mismatches between the clauses included in collective agreements and the situation derived from the massive implementation of teleworking can be highlighted. Table 3 summarizes the main problems in the implementation of teleworking related to these mismatches.

Most collective agreements include specific clauses about teleworking. These clauses consider teleworking to be a voluntary and revocable practice for the worker and the employer concerned.

However, the situation derived from the massive implementation of teleworking as a response to the Covid-19 crisis prevents employees from exercising their rights and complicates makes it difficult for the company to end teleworking. In this context, the company forces employees to adopt teleworking as a way to continue their work relationship.

It is therefore important to analyze whether employees' rights have been respected during the state of alarm. Collective agreements refer to the following rights of teleworkers: rest periods, work pressure and other working conditions.

The decision to implement teleworking at home on a massive scale implies the impossibility of facilitating and installing equipment for workers to work remotely. In this vein, the European Framework Agreement on Telework recommends that companies facilitate equipment for teleworking.

An additional problem related to this massive implementation is that teleworking protocols have not been applied. Data confidentiality and information control are some of the issues included in these protocols.

Regarding health and safety, companies are not set up to check the regulations remotely. Companies are not allowed to send technicians to check health conditions in the teleworkers' homes during the Covid-19 crisis.

On the other hand, when this exceptional situation ends, employees will keep their economic rights. Monitoring this return to the previous pre-crisis situation will be interesting in terms of observing if these rights are maintained or if, given the exceptionality and if the pandemic results in a chronic situation or reappears in the short-term, these rights are reduced. In the latter scenario, teleworking could become an ad hoc strategy to develop part of the activity of the companies.

Table 3. Telework requirements before and during the Covid-19 crisis.

Collective Agreements Considerations	Before the Covid-19 Crisis	During the Covid-19 Crisis
Voluntary character	Yes	No
Individual agreement	Yes	No
Reversibility	Yes	No
Equality of rights between teleworkers and workers at the employers' premises	Yes	Yes
Work equipment facilitation and installation	Yes	Software only
Ergonomic elements	Yes	No
Technical support	Yes	Yes
Costs of telework	If required	If required
Health, social security and job security	Yes	No
Right to union representation	Yes	Yes
In-company training	Yes	Yes
Preservation of economic conditions	Yes	Yes
Modifications in the statute of rights for workers	No	No

Source: authors' own elaboration.

From the analysis of collective agreements and the response given by companies, it can be deduced that no company had contingency plans specifically designed to solve emergency situations such as the present coronavirus pandemic. There are examples of companies that had planned and approved teleworking protocols, most of them linked to home-family factors and reorganizational needs (jobs restructuring or technological innovation). Most companies that had previously implemented teleworking included this practice in their collective agreements. Nevertheless, the Covid-19 crisis made these companies implement teleworking on a massive scale. This massive implementation implies a challenge for the company; the goal of reorganizing business activity around teleworking.

To sum up, the Covid-19 crisis has demonstrated the lack of contingency plans in companies to respond to external factors (e.g., a pandemic) that imply a reorganization of work. In parallel, this crisis has made teleworking and its potential more visible. In this regard, teleworking can be considered a response to the Covid-19 crisis because it satisfies the contingency needs of companies. In the current state of alarm and its reduced presentiality (several countries have limited both mobility and face-to-face work), forms of telework other than home-based telework (such as high mobile telework) have not been implemented. Despite of this restriction, home-based teleworking has been considered as an urgent solution with relatively low costs of implementation. Although final data about the scope of teleworking in the current coronavirus pandemic are not available, we estimate that, at least, the 441 firms that had included teleworking in their company collective agreements between 2009 and 2010 have implemented teleworking in the Covid-19 crisis, at least for part of their production activity.

5. Discussion and Conclusions

Regarding the H1N1 pandemic crisis, it can be concluded that many businesses in the United States lack adequate pandemic plans [53]. According to these authors, the continuity of operations, in the context of a biological event, depends on the business size (where larger businesses are more prepared to face these events), the type of business (it has been proven that health care organizations are more prepared), having human resource professionals within the company disaster planning committee, and the risk perception of a pandemic in the short term.

It can be considered that European companies, and, in particular, Spanish companies, also lack contingency plans to face threats derived from biological risk situations [53]. Most companies and organizations—with the exception of the health care sector—have never planned their response to an emergency resulting from a pandemic because of its rare probability of occurrence. Nonetheless, during the last 15 years, there have been international situations of alarm with health emergencies arising from biological infectious pathogens, such as the crises involving SARS (2003), H1N1, and the Ebola virus (2014–2016). These crises should have been a milestone to make companies and organizations prevent future scenarios and develop their contingency plans, where teleworking is included as a measure to continue the business activity, and, furthermore, to ensure employees' health. This is particularly relevant for small and medium companies that represent the main number of productivity units [54].

Innovative organization of work through teleworking, if the job allows for working remotely, has been adopted by organizations in response to the Covid-19 threat.

An increasing number of firms have been adopting teleworking including specific clauses in their companies' collective agreements and plans. Nonetheless, these clauses considered telework a solution to home and family needs or organizational needs. There is no collective agreement that anticipates a situation of mass teleworking or the implementation of teleworking in a context of security or health crisis. This situation has been observed in all companies regardless of their size.

To guarantee business viability during a health crisis, small and medium firms should have integrated continuity plans implemented in advance. However, findings from Rebmann et al. [53], based on experiences of companies located in Toronto and their responses to the outbreak of SARS in 2003, indicate that there are still workplace cultures that encourage sick staff to continue working, resulting in higher rates of occupationally related disease transmission. In addition, the current crisis of the coronavirus has not just tested the lack of contingency plans to face biological threats but also the inexistence of minimum measures to solve a health problem created by an infectious disease in workplaces, such as the existence of materials like masks, hydro-alcoholic disinfectant gels, the purchase and stock of antiviral medicines for employees, or the prevision of organizing the workplace to ensure the distances of security (the research underscores that just 13% of US companies reported having an anti-infective therapy stockpile for use during a disaster).

With regard to those plans, the American College of Occupational and Environmental Medicine established a series of recommendations on prevention and how to act in the case of a health emergency. The mentioned recommendations are included in the document "*Pandemic Influenza Guidance for Corporations. ACOEM Emergency Preparedness Task Force*," where the modality of teleworking is also introduced [55].

Other authors have contributed to the debate of teleworking in pandemic situations, warning of the breaches of security associated with remote jobs that can be an obstacle to its implementation or about working outside regular work hours, resulting in an increase of the total work hours that are not considered in the working contract [56,57]. Our research shows the limitations of a non-planned implementation of teleworking. Although employees' rights and work duties should not be affected, there are several elements that justify the need for contingency plans that include teleworking. As presented in the Results Section, the facilitation and installation of work equipment or health standards result in difficulties for the employees that work remotely.

The extension of the modality of home-based telework in the very worst pandemic scenarios, such as the Covid-19 crisis, can be considered as an exceptional situation to limit the effects of the reduced production activity, as a consequence of the measures proposed by the health authorities in every country. To quote an example of this exceptionality, multinational companies have called for teleworking for their employees located in countries that are at risk, where there has been a confinement of their population, whereas in other countries where there is a strategy that differs from confinement, they have been operating under the principle of a traditional presence at the workplace. A similar behavior has been observed in the public sector.

The call for telework underscores that for a high volume of concrete jobs, the work can be developed remotely at the employee's home, just by including small adaptations. This circumstance is evident for most activities related to certain areas of production in the companies (e.g., customer support, human resources management, or marketing tasks). At the same time, this situation has allowed companies to increase their knowledge about which of their production processes and activities can be supplied at a distance, by teleworking. The last question that comes up with the adoption of telework is the role of intermediate managers; most likely, telework will evidence the existence of processes that can be redesigned to facilitate a more direct relation between the top of the organizational pyramid and the operators. This analysis about processes and jobs could lead to an unexpected effect of the Covid-19 crisis. The situation may lead to a major planning of teleworking not just as an occasional measure derived from environmental or health catastrophes, but also as a strategy of infrastructure cost reduction, to reduce contamination related to mobility or to generate a favorable climate for combining work and family life.

An evaluation of the companies that have implemented telework as a response to the Covid-19 situation is required. Once the pandemic risks have reduced and the exceptionality disappears, companies may offer their employees the possibility to continue teleworking, or, conversely, their presence may be required at the workplace.

Further research should focus on the situation of teleworking in companies after the coronavirus crisis to learn if the crisis has acted as a driver for future teleworking or if it was just a temporary measure that has no long-term effects.

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