

Inductive open data study on teleworking dissatisfaction

in Spain during the Covid-19 pandemic

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Abstract

Purpose – The research paper aims to study dissatisfaction of teleworking employees in Spain during the Covid-19 health pandemic in order to propose three models: sociodemographic profile of the teleworking dissatisfied employee; advantages and disadvantages for the teleworking dissatisfied employee and advantages for the teleworking dissatisfied employee.

Design/methodology/approach – This study uses official open data obtained from the Spanish National Statistical Institute (INE, 2022) through Decision Trees statistical multivariable models implementing Classification and Regression Trees and Recursive Partitioning and Regression Trees techniques to determine the variables that can influence the satisfaction or dissatisfaction of the subjects.

Findings – This investigation offers three models with two sociodemographic profiles of dissatisfied teleworking employee, who is a high/middle-level manager/employee around 45 years old, and she/he lives with the partner. Regarding the most important advantage of teleworking, employees consider “use/saving of time” and as disadvantage “worse organization and coordination of work”.

Originality/value – This research provides empirical evidence with inductive reasoning on understanding the challenges of teleworking dissatisfied employees in Spain not only in turbulent times but also in “normalcy” to improve overall teleworker well-being and accomplish company’s and organization’s long-term objectives for better productivity and effectivity. The study has high practical value due to the integral approach incorporating dissatisfaction as a driver that can trigger negative behaviours towards the organizations and that is seldom addressed in the literature. Additionally, this paper could provide some new ideas for accomplishing “Spain Digital 2025” and “Europe’s Digital Decade: 2030” plans on institutional level.

Keywords Teleworking, Job satisfaction/dissatisfaction, Advantages and disadvantages of teleworking, Covid-19 pandemic, Spain, Decision tree analysis

Paper type Research paper

Introduction

Institutions and companies all over the world have encouraged or mandated teleworking during the Covid-19 pandemic due to health reasons for minimizing physical presence at work. In this sense, many authors have analyzed the impacts experienced by staff who have undertaken working from home (WFH) during the pandemic in 2020 and onwards (Chow *et al.*, 2022). Extended research about the use of telework and its implications since the pandemic is required (Belzunegui-Eraso and Erro-Garcés, 2020; Bojovic *et al.*, 2020) in order to adapt teleworking on a massive scale as a new normal (Lim, 2021) in closest future independently of the impact of any pandemic. **The problem statement** studied in this

paper positions what is the sociodemographic profile of dissatisfied employees with teleworking (WHO?) and what are the critical factors of this dissatisfaction (WHY?) in Spain. Job satisfaction is one of the most commonly reported outcomes of telework (Pinsonneault and Boisvert, 2001). However, satisfaction is not always achieved and can even trigger the opposite result. This research attempts to provide answers to questions about telecommuting like: What are the types of dissatisfied employees in Spain during the Covid-19? What produces employee dissatisfaction? What can be done to recover dissatisfied employees?

During the last decade, the importance of technologies at the workplace has increased notably. Digital transformation of business companies and official institutions has encouraged this development. In particular, the rapid advancement of new digital technologies, such as smart technology, artificial intelligence and automation, robotics, cloud computing and the Internet of Things, is fundamentally changing the nature of work and business models (Trenerry *et al.*, 2021; Ciasullo and Lim, 2022). In spite of this, the reasons of dissatisfied employees have not caught the full attention of academics during the Covid-19 time and especially in Spain. Just some research on employee dissatisfaction have been conducted recently (Karácsony, 2021) assessing the adverse effects of telework on regular office workers and how it can influence future of work (Bamel *et al.*, 2022; Khor and Tan, 2022). The vast majority of research has been focused on satisfaction instead.

In the case of Spain, **the central argument and context framing** the question of this research refer to the response to the Covid-19 outbreak and subsequent lockdown, when the Spanish Government approved the Telework Legislation (Royal Decree Law 10/2021) in July 2021 to support teleworking (BOE, 2021) and regulating home working obliging institutions/companies to cover costs that not all are prepared to assume.

Before the Covid-19 pandemic, home working was not so common in Spain, where in 2019 only 8.3% of workers practiced teleworking, while the European average was 15% for this period (Joint Research Centre, 2020). However, the Covid-19 pandemic and the lockdown changed the landscape for teleworking, making it more prominent across most sectors. Teleworking became the working format of approximately 32% of the workforce in Spain (ONTSI, 2022).

To fill the **gap of insufficient information** in the research literature, this paper analyzes dissatisfied teleworkers in Spain during the Covid-19 pandemic as WFH is here to stay. It is fundamental that organizations/companies and policymakers figure out the challenges associated with this new culture of “teleworkability”. The originality of this research is based on analysis of **open official data** (latest available year) from a Survey on *Equipment and Use of Information and Communication Technologies in Households 2021* issued by the National Institute of Statistics (INE) in Spain, which treats households as basic units, by **applying inductive approach** on studying dissatisfied teleworking employees in Spain during the Covid-19 pandemic. The inductive approach is associated with pragmatism or behaviourism that involves deriving generalizations from specific observations in a large number of cases (Della Porta and Keating, 2008, p. 26). The objective of inductive approach is to gain a new view of what is relevant in the empirical area of study by seeing it from the perspective of the actors involved. Using diverse data sources, empirical regularities are carefully described (Heritier, 2008, p. 64)

Therefore, this research **contributes theoretical, empirical and methodological** aspects with an interdisciplinary perspective that extends previous literature that uses other approaches to explain reactions to dissatisfaction and leads to new answers for teleworking management literature. Identified factors and applied Decision Tree technique can help to provide companies/organizations and policymakers with improved decision-making and contextualization for their coordination and control of work in future (in times of pandemic or “normalcy”). Decision Tree analysis is a statistical technique that is commonly used in social science. It is a valuable method in predicting decisions based on the characteristics of WHF dissatisfaction, as well as determining the cause–effect relationship of this data. Results of Decision Tree analysis are presented in an easy-to-interpret format.

Considering the transformation triggered by the Covid-19 pandemic with the massive transition of employees and businesses to work from home, we analyze information from household individual being teleworking user in Spain for the **purpose of the study and the following research aim and objectives:**

Research aim. To propose models for studying dissatisfaction of teleworking employees in Spain during the Covid-19 health pandemic.

Research objectives (ROs).

RO1. To create a model for studying a sociodemographic profile of the teleworking dissatisfied employee in Spain during the Covid-19 health pandemic.

RO2. To suggest a model of advantages and disadvantages for the teleworking dissatisfied employee in Spain during the Covid-19 health pandemic.

RO3. To present a model of advantages for the teleworking dissatisfied employee in Spain during the Covid-19 health pandemic.

In this study, the socio-economic characteristics and dissatisfaction can help to explain the challenges of teleworking and organizational challenges from the Covid-19 pandemic in Spain. **The organization of the research** kicks off with this introduction, then [Section 2](#) presents the literature review that has been designed accordingly to the survey applied to this research. [Section 3](#) develops the methodology used in the research, while [Section 4](#) describes results on teleworking satisfaction and dissatisfaction and contextualizes the discussion by comparing it with similar studies. [Section 5](#) states final conclusions and implications. Finally, [Section 6](#) presents study limitations and future directions.

Literature review

Job satisfaction

It has passed decades since the employee in majority of times is considered as a human capital and not only as a human resource. Treating employee as a human capital includes knowing his/her needs and elements, and what are important for his/her satisfaction at working place.

In relation to this, the concept of job satisfaction is defined as satisfaction with the agreement between a person and their position. It can be internal or external. Internal refers to the nature of work tasks as well as people's perceptions of the work they do, where external satisfaction is related to external motivating factors such as pay, work environment, conditions, etc. ([Sun and Hwang, 2020](#)). On the other hand, [Halkos and Bousinakis \(2017\)](#) state that definitionally job satisfaction can be identified with the fulfilment of desires. The correlation between objectives (employees and organization) is the "balance point" of satisfaction. Authors such as [Kinicki and Kreitner \(2007\)](#) confirm that job satisfaction of workers can be commonly grouped into five distinct model categories: need fulfilment, discrepancies, value attainment, equity and dispositional/genetic components models. These are explained as (1) *the need fulfilment model* is based on the satisfaction determined by the extent to which a job, with its specified characteristics and duties, allows an individual worker to meet his/her personal needs. (2) *the discrepancy model* explains that satisfaction is a result of met, or sometimes unmet, expectations. (3) *the value attainment models* are based on the belief that satisfaction comes from the perception that one's job fulfils an individual's work values. (4) *the equity models* assert that satisfaction is based on the perception of how fairly an individual is treated at work. This is largely based on how one's own work outcomes, relative to his/her inputs and efforts, are compared to the input/output of others in the workplace and (5) *the dispositional/genetic components models* suggest that individual employee differences are just as important for determining job satisfaction and success as workplace-related factors ([Kinicki and Kreitner, 2007](#)).

But in relation to job satisfaction and teleworking, [Golden and Veiga \(2005\)](#) wrote that when the level of telecommuting is relatively low, job satisfaction increases. However, when the level of telecommuting is relatively high, the effects of losing interaction and feelings of isolation offset the benefits of telecommuting, with a negative impact on job satisfaction.

Job dissatisfaction

Although more and more employers are trying to apply different techniques in order to increase employee satisfaction, dissatisfaction is always there, because of human nature and other exogenous factors.

Thus, one of the first researchers Edwin A. Locke, who scientifically studied and published first articles on job satisfaction and dissatisfaction, wrote that satisfaction and dissatisfaction from work are associated with the person's value system. Where job satisfaction is seen as a positive emotional response to a project, the assessment of which is concerned with the importance of working conditions and attitudes of the person. Conversely, job dissatisfaction stems from the relaxation or even cancellation of these working conditions and attitudes of the person ([Locke, 1969](#)). [Faragher et al. \(2005\)](#) indicate that job dissatisfaction is strongly related to the negative emotions of employees. Manifestations of dissatisfaction include depression, anxiety and avoidance, withdrawal, bladder and indifferent feeling. If left untreated for any length of time, symptoms of this kind could eventually lead to depression or anxiety, particularly when employees are unable to prevent their feelings from spilling over into their home and social life ([Extremera et al., 2020](#)). However, [Halkos and Bousinakis \(2017\)](#) also say that work-related stress is a central factor in job satisfaction. When stress works as a motivator, then it results in creativity and satisfaction. When stress works as a negative factor, it produces aggression and dissatisfaction. But [Ingsih et al. \(2022\)](#) indicate that dissatisfaction is a critical factor in a business; it is an employee's attitude towards fulfilling certain desires and needs through work or work activities because job satisfaction is determined by how the company treats its employees.

But in relation to job dissatisfaction and teleworking during the Covid-19 pandemic, different authors write that employees may not have been well prepared for the unique challenges of home-based telework, considering that only 15% of employees in the European Union (EU) had any experience with telework prior to the pandemic. Furthermore, the closure of childcare and educational institutions provided additional challenges to the work-life balance, especially for women ([Rudolph et al., 2020](#); [Shockley et al., 2020](#)).

Teleworking/telecommuting

The concept of teleworking or telecommuting is not a consequence of the Covid-19 pandemic, but already in 1973, Jack Nilles in his book titled "The Telecommunications-Transportation Tradeoff" introduced the term telecommuting to discuss distance working as a solution to traffic congestion and pollution. A decade later, companies saw telework as a tool to reduce the expense for office space, but this has shifted again into telework as a strategy to attract and retain top personnel ([Kurland and Bailey, 1999](#); [Bjursell et al., 2021](#)). Some of the authors express that 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 ([Belzunegui-Eraso et al., 2013](#); [Belzunegui-Eraso and Erro-Garcés, 2020](#)). [Allen et al. \(2015\)](#) conducted a comprehensive review of a wide range of telecommuting studies and found that most definitions of telecommuting have two things in common: working from a location other than the traditional office and using technology to perform work-related tasks. Also, [Allen et al. \(2015\)](#) identified three areas in which the definitions differ: (1) the extent of telecommuting (e.g. once a month, once a week, full-time), (2) the type of employment relationship (e.g. staff member, independent contractor or consultant, self-employed) and (3) the location of remote work (e.g. home, satellite office,

coffee shop). Already in 1999, [Kurland and Bailey \(1999\)](#) defined four types of telework: (1) *Home-based telecommuting* refers to when employees on a regular basis work from home, but they are based at a central office belonging to an employer. (2) *Satellite offices* refer to work locations situated at a convenient location allowing employees to cut the time they spend commuting. This branch office is furnished and equipped by the employer. (3) *A neighbourhood work centre* is like a satellite office, with the exception that several employers share the lease of the building and it may have a site owner responsible for the location and (4) *Mobile workers* are employees who work in an assortment of locales, such as from home, from a car, from a plane or from a hotel. But [López-Igual and Rodríguez-Modroño \(2020\)](#) indicate that telework adoption is understood as an evolutionary process represented by “three generations of telework” – home office, mobile office and virtual office.

But regarding who is doing the telework, [Eldér \(2019\)](#) and [Thulin et al. \(2019\)](#) express that telework was previously deemed suitable only in high-status jobs that enjoy more desirable contracts, afford a high degree of autonomy, are result-oriented and are in little need of monitoring and control. Nowadays, jobs with lower status are also considered eligible to be performed remotely or under flexible work arrangements. Gradually, telework is expanding into new professions and employee categories, and more part-time and irregular work arrangements have been added, including new forms of occasional telework.

Advantages of teleworking

The recent Covid-19 pandemic has shown that how official institutions and business companies on a massive scale and in a very short time period have switched to the teleworking. Hence, it is vitally important to understand and study what are the advantages and disadvantages of it, in order to improve the employee overall job satisfaction and to create better work environment after the Covid-19 pandemic. In this context, many researchers indicate different kinds of advantages of teleworking for both employees and employers, besides saving money, include increased job satisfaction and productivity, greater flexibility, reduced office costs and requirements, increased staff retention, improved employee work–life balance, keeping older generations in the workforce and environmental benefits ([Savic, 2020](#)). Telework is recognized as an element favouring progress towards an effective balance between work, family and personal life ([Ballester, 2018](#)). It could also be said that it has the positive effect of opening great possibilities for sectors that have usually had barriers to access to work, such as people with disabilities or those who have people in their care (often women who care for the dependent population). In these cases, there is a benefit in the possibility of accessing the labour market, while continuing with their family activity ([Caamaño, 2010](#)). On the other hand, teleworking also represents an opportunity for men to start taking on more actively their parenting or caring for dependent older people, without moving away from their usual work activities already indicated ([Morilla-Luchena et al., 2021](#)). But researcher from Slovakia Peter [Karácsony \(2021\)](#) considers teleworking advantages for three groups that are the following: (1) *Society* – environmentally friendly and better for individuals with disabilities, (2) *Employer* – lower turnover, wider and more varied job offers, less absenteeism, reduced overheads and greater productivity and (3) *Worker* – reduced commuting time/costs, higher autonomy, higher job satisfaction, lower stress and better work–life balance.

Although teleworking presents many advantages, there are numerous disadvantages for employees, employer and society. Thus, this research paper also focuses on studying the challenges of teleworking in the context of the Covid-19 pandemic.

Disadvantages of teleworking

Despite the numerous advantages of teleworking, there are also many disadvantages or challenges of it. Thus, while for some employees, telework meant efficiency, for others it meant

destabilization, a difficult activity due to the lack of a clearly established program, the tools needed to carry out activities, lack of resources, reduced ability to concentrate and delays in meeting deadlines (Bălăcescu *et al.*, 2021). However, disadvantages also exist such as sociological and psychological challenges resulting from isolation, long work hours and lack of separation between work and home. Teleworking requires self-discipline and dependence on personal IT tools, communication and other resources. Some authors also mention the increased danger society faces by creating detached individuals (Vaganay *et al.*, 2016). In this line, Kurland and Bailey (1999) and Bjursell *et al.* (2021) talk about social isolation, but at the same time divides teleworking challenges into two big blocks: (1) *Individual*: social isolation, professional isolation, organizational culture, reduced office influence, work/family balance, informal interaction, conducive home environment, focusing on work, longer hours, access to resources and technological competence and (2) *Organizational*: performance monitoring and measurement, managerial control, mentoring, jealous colleagues, synergy, informal interaction, organization culture, virtual culture, organization loyalty, interpersonal skills, availability, schedule maintenance, work coordination, internal customers, communication, guidelines (e.g. expenses) and technology. Also, previously cited author Karácsony (2021) in relation to teleworking divides disadvantages impact into three groups: (1) *Society* – isolation from social institutions, (2) *Employer* – increased IT demands, security issues, not fit for every task, the challenge to the possibility of control and motivation of teleworkers, and loss of teamwork and (3) *Worker* – added family–work conflict, working on holidays, social and professional isolation and missed opportunities. Additionally, Karácsony (2021) indicates that innovation and long-term productivity gains can suffer from teleworking when workers do not physically meet each other.

Teleworking and the Covid-19 pandemic

Although the Covid-19 pandemic has not finished, the teleworking and its related issues have been integrated in the EU member countries and Spanish legislation in order to protect worker for future teleworking, but in general, the health pandemic pushed on the implementation of the teleworking in almost all levels. Since the beginning, various researchers all around the globe have studied Covid-19 impact on teleworking from the sociologic, economic, psychological, gender (inequality, etc. point of view.

In this context, Brussevich *et al.* (2020) express that teleworking has allowed some companies and their employees to better cope with the sudden shock caused by the coronavirus crisis (especially those who have used teleworking before), those who have not switched to teleworking quickly have faced difficulties (e.g. administrative work). However, teleworking is not accessible to everyone, especially in jobs where physical work is needed and where a physical presence is essential (Bjursell *et al.*, 2021).

Thus, the question of the gender inequality in relation to the teleworking during the Covid-19 should be mentioned. Gender inequality in many aspects of life is a well-documented reality (Aisa *et al.*, 2019). Paid and unpaid work are both heavily gender-segregated, reflecting deep-rooted social norms about gender roles of women as primary caregivers. These divides translate into gaps in the labour market, pay and well-being, including poverty and work–life conflict. The Covid-19 crisis has raised concerns about its potential to widen many gaps between women and men in the workplace and at home (Eurofound, 2022b). In many ways, teleworking has been a double-edged sword for workers who have worked from home while also caring for and educating their children (Purwandini *et al.*, 2022). Alon *et al.* (2020) suggest that – especially in countries with a high rate of teleworkable jobs – gaps in unpaid work between men and women may have widened if teleworking women have taken on more of these additional tasks than men (Eurofound, 2022b).

Some authors talk about the effectiveness of teleworking from the economic point of view, during the Covid-19 pandemic, teleworking has been regarded as the most effective and cost-

efficient approach to preserve and restore the functioning of the entire economy (ILO, 2021, 2022; Capecchi and Orientale, 2022). But Karácsony (2021) states that teleworking was crucial to sustaining production at the time of the crisis, but its impact on productivity is unclear. There are authors like Mello and Tomei (2021) and Sahoo *et al.* (2022), who even studied the teleworking work–life challenges among expatriates during the pandemic, where results indicate that host country national support significantly influences expatriate performance indirectly through expatriate engagement. Several investigations have pointed out the impacts of the pandemic and their adaptation of teleworking in the digital transformation of business companies and organizations (Lim, 2021; Trenerry *et al.*, 2021; Ciasullo and Lim, 2022). However, until now, none of this research has analyzed the extent to which teleworking dissatisfaction during the Covid-19 time could be predicted by sociodemographic variables, advantages and disadvantages of the subjects' environment and experience.

Teleworking in the EU and Spain in the context of the Covid-19 pandemic

Teleworking or WFH has been gaining momentum worldwide for a decade and countries in the EU are not an exception (Brindusa *et al.*, 2020). Teleworking has increased in most European countries in the last ten years. On average, the percentage of remote workers increased by 3% between 2009 and 2018. In 2018, 13.5% of persons employed, aged between 15 and 64, worked remotely in EU-28 (Brindusa *et al.*, 2020). But the Covid-19 pandemic has resulted in a massive expansion of teleworking across the EU. Among EU-27 respondents, the share of those who started to work from home was 36.5% in the wake of the pandemic, compared to only 15.8% who declared WFH at least several times a week before the pandemic. Those who started WFH because of Covid-19 were in part employees who were already regularly teleworking before (54%), although 46% were “new” teleworkers, with no previous experience of remote working (Sostero *et al.*, 2020).

During the Covid-19 in the EU, technically, 84% of clerical support workers and over 70% of managers and professionals could work from home. While less than 55 and 30% of technicians and service and sales workers, respectively, could telework, at the other end of the spectrum, less than 3% of workers employed in manual occupations could technically telework. Therefore, teleworkability is highest in financial services (93%) and in the information and communications technology sector (79%), as well as in real estate, professional, scientific and technical activities, public administration and in the education sector (between 60 and 70%) (Milasi *et al.*, 2020).

Thus, since the pandemic outbreak, many Member States have updated or adopted new legislation on telework. At company and sectoral levels, a considerable number of agreements on telework have been developed, particularly in those sectors that already had agreements before the pandemic: financial services, manufacturing, and information and communications. In addition, during the pandemic, new agreements were developed in the public services and administration, education, and health and social work activities sectors (Eurofound, 2022a). The changes and updates to the regulations have mainly concerned the telework regime, access to telework, working time organization, the right to disconnect and compensation for telework-related expenses (Eurofound, 2022a).

In relation to Spain, it should mention that agreeing to the Spanish Labour Force Survey, the percentage of the employed who, at least occasionally, work from home amounted to 8.3% in 2019, up 2.4% points from 2009. By occupation type, remote working is more frequent among the self-employed, small companies and skilled occupations (Brindusa *et al.*, 2020). But according to the Spanish National Statistical Institute during the pandemic, teleworking was able to work only 32%. It is the 10% lowest in the EU (ONTSI, 2022). Other important point is that teleworking has increased in all age groups compared to 2019, but now it is higher in people between 35 and 44 years of age. Before the pandemic, it was more common among

employed people aged 45 and over. Thus, of the total number of professionals who had the option of teleworking in Spain, 49.8% corresponded to technicians and scientific and intellectual professionals, followed by accountants, administrators and other office employees, who total 20% of all professionals with access to telework (INE, 2020; EPDATA, 2022). In summary, in response to the Covid-19 outbreak and subsequent lockdown, the Spanish Government introduced the Telework Legislation (Royal Decree Law 28/2020) in October 2020 to support teleworking in Spain (European Platform, 2021), but it was approved in July 2021 as Royal Decree Law 10/2021 (BOE, 2021).

Methodology

Data collection

Study design. For this research paper in order to accomplish ROs, open data have been collected from the survey on *Equipment and Use of Information and Communication Technologies in Households 2021*. It is a panel-type statistical operation, carried out by INE (2022) following the methodological recommendations of the Statistical Office of the European Union (EUROSTAT). The general objective of this survey is to obtain data on the development and evolution of what has been called the Information Society.

This study survey consists of 75 questions and 11 thematic blocks: equipment of the main house in household composition, Information and Communications Technology products, home Internet access, use of computer and Internet by children (6–15 years old), use of mobile phone and Internet by the selected person, electronic administration, electronic commerce, computer knowledge, privacy and protection of personal information, teleworking and socio-economic characteristics of the selected person (INE, 2022).

In this research, it has been focused on the block 10 related to teleworking due to the health pandemic. Different aspects are studied and used as reference in the literature review part, such as percentage of working hours in the modality of teleworking, assessment of teleworking, and advantages and disadvantages of it. If they have not teleworked even though their main job would allow it, the reasons are included for those who have not worked, and in any case, the percentage of working hours that would like to currently have and overcome the Covid-19.

Participants and technical data. Participants are interviewed within nearly 15,027 randomly selected households in the whole territory of Spain, who collaborate to fill out the questionnaire from 25 May to 23 August 2021. The data has been collected by CAWI (by Internet: 7,607 subjects) or CATI (by telephone: 7,420 subjects) procedures (INE, 2022).

The census section is taken as the primary sampling unit and the main family dwelling that belongs to selected section. Thus, one of the people residing in selected households aged 16 or over is interviewed by random procedure, for a more exhaustive investigation of Internet use (definition by INE, 2022). In particular, the selection of the first stage units in each stratum was carried out with probability proportional to the size of each section. In the second stage, the dwellings have been selected with equal probability, by means of a systematic sampling with random start among the dwellings of the section, a procedure that leads us to obtain self-weighted samples of dwellings in each stratum. In the third stage and within each dwelling, a person aged 16 and over is chosen with equal probability and those who have teleworked the last week before the survey collection (from 25 May to 23 August 2021) are considered informants of this study. Accordingly, teleworking is considered as a remote work that is carried out in the last week through the exclusive use of computer, telematic and telecommunication systems. The job is done remotely outside the offices and can be done from home, in coworking centres or outdoors where there is an Internet connection. A person is considered teleworker if he/she self-perceives and declares it. In order to achieve greater comparability between this INE survey and the data published by similar surveys of EUROSTAT (the statistical office of the European Union, responsible for publishing high-

quality Europe-wide statistics and indicators), a common, homogeneous and comparable methodology and questionnaire is established among the member countries for all the countries of the EU.

The sample N of this study is 726, corresponding to the total of subjects who have teleworked during the last week of the interview and have reported 100% of the information with no missing values. The total national sample error of the study for teleworking is 3.55% with 95% of confidence level.

Data analysis procedure. The main variable to be studied is the general evaluation of the telework experience. To carry out the analyses, the satisfaction of the subjects has been considered based on those ratings equal to or higher than six (scale from 0 – lowest to 10 – highest).

For this purpose, three statistical models will be used: the sociodemographic profile, the reasons for dissatisfaction and the advantages. The statistical program used is RStudio version 2022.07.1.

The analysis procedure has been carried out using the Decision Trees (DTs) technique with classifier type (Chen *et al.*, 2022). The algorithm uses a part of the data to separate the sample into non-overlapping sections for the value of each node with the most common response. The analysis starts from a large node (the entire data set), and it is partitioned into smaller sections successively until reaching the final node. When the segmentation is done, each of the resulting groups diverges in a statistically significant way from each other. Within each group, the intra-group variability is small, and the subjects are very similar to each other.

In all cases, classification-type DTs obtained through Classification and Regression Trees (CART) and the implementation of Recursive Partitioning and Regression Trees (RPART) have been used to determine the variables that can influence the satisfaction or dissatisfaction of the subjects. CART and RPART seem appropriate and common algorithms for processing a larger corpus of information using data science techniques in the so-called fourth era of survey research (Buskirk and Kirchner, 2020). Taken as reference the theoretical model of Romeo *et al.* (2021), “CART as a form of binary recursive partitioning, enables investigators to identify the segments of a diverse population that are most related to a dependent variable (affective states, in this case, dissatisfied teleworkers) based on numerous shared characteristics. Then, CART as a statistical approach is preferable to other parametric approaches for identifying homogenous subgroups”.

CART gives a graphic description of the model of impact of input variables on the output, which is expressed in a form of trees, classes and categories (Simeunović and Preradović, 2014) in order to determine sociodemographic profiles (connected with Research Objective ROI of this paper). The statistical analysis of trees has been done by RPART that is a machine learning software in R used for building CARTs. Mankar and Bhoite (2022) state that “recursive partitioning is easy to use and reflects prediction located at the leaf nodes in a tree. This recursive partitioning prediction selects GINI index (Classification) and sum of squared residuals (Regression) that support a larger number of splits (connected with Research Objectives 2 and 3 of this study to forecast advantages and disadvantages of dissatisfied teleworkers). By adding parameters to a model many times reduces its ability to predict future unrevealed data.” CART identifies which variables, when considered simultaneously, better predicted the respondents’ level of satisfaction and dissatisfaction towards teleworking. The data downloaded from the INE are used as inputs to carry out the models and analyze the obtained results. The aim is to create a model that in the future can predict employee dissatisfaction with teleworking.

The reliability and validity of the results have been evaluated using the accuracy parameter (Romeo *et al.*, 2021). This parameter is obtained as $Accuracy = (TP + TN) / (TP + TN + FP + FN)$. TP are the true positives, TN the true negatives, FP the false positives and FN the false negatives.

Findings and discussion

Multivariate analysis (satisfied and dissatisfied)

Sociodemographic profile. Figure 1 presents the first model and corresponds to the ROI, where the satisfaction with telework is evaluated according to the respondent's sex, age, country of birth, nationality, citizenship, marital status, cohabitation of couples, level of studies, type of contract, activity of the organization, occupation according to ISCO 08 (International Standard Classification of Occupations), household monthly net income, and if the main job allows him/her teleworking and if respondent was working during the last week before the survey was conducted.

Of all these variables, occupation is the main variable that plays the most important role in subject's satisfaction. Subjects who do not present an occupation of executive directors; senior staff of the public administration and members of the executive branch and legislative bodies; administrative and commercial directors; directors and managers of production and operations; hotel, restaurant, store and other services managers, as well as health and teaching professionals; professionals in law, social and cultural sciences; medium-level professionals in science and engineering; and clerks and other administrative support staff represent 58% and are satisfied with teleworking. The interviewed subjects who do belong to these occupation groups and whose main job allows teleworking on a partial basis are satisfied and represent 24% of the surveyed subjects. Also, the study results on teleworking in OECD countries under Covid-19 conditions show that business and administration professionals (77%), information and communications technology professionals (75%) and administrative and commercial managers (74%) are best positioned to WFH. While 28% of workers with a low skill level in literacy are able to telework across the OECD on average, the share stands at almost 57% for those with a higher skill level (Espinoza and Reznikova, 2020). On the other hand, other research presents that satisfaction and working quality are among

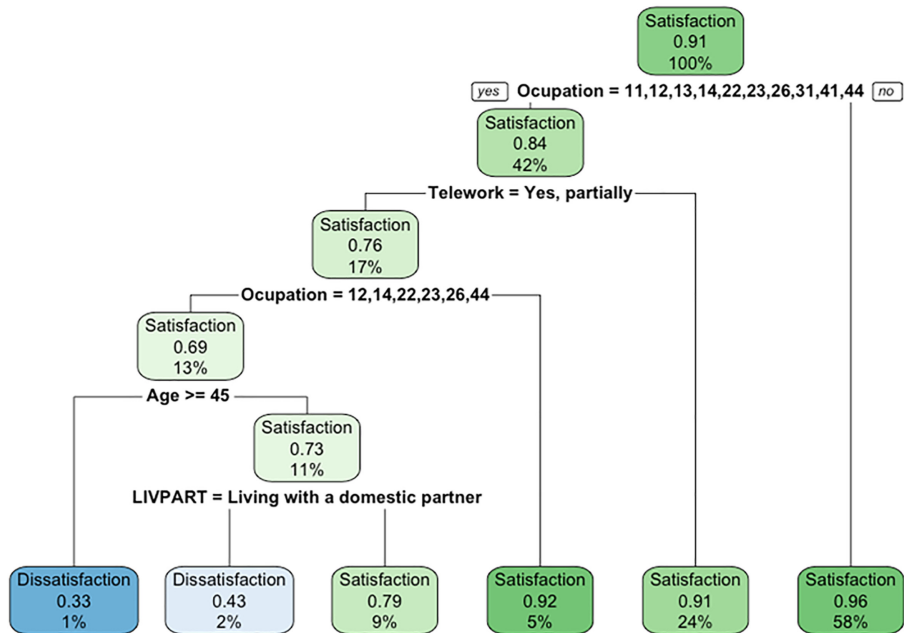


Figure 1. Classification and regression trees (CART) for dissatisfied teleworkers based on “sociodemographic” variables

Source(s): Own elaboration (2022)

high-level professionals, managers and mid-level occupations, but in general there is heterogeneity among the professions in relation to the level of satisfaction (Rodríguez-Modroño and López-Igual, 2021). Thus, our study confirms previously mentioned theory expressed by Eildér (2019) and Thulin *et al.* (2019) in relation to partiality of the teleworking. Previously teleworking deemed suitable only in high-status jobs that enjoy more desirable contracts, afford a high degree of autonomy and are result-oriented. Gradually, telework is expanding into new professions and employee categories, and more part-time.

Subjects who do not belong to the occupation groups of administrative and commercial directors; hotel, restaurant, store and other services managers; health and teaching professionals; professionals in law, social and cultural sciences and other administrative support staff are satisfied and represent 5% of the subjects. Those who belong to this group are under 45 years old and do not live with a partner, are satisfied and represent 9% of the data.

On the other hand, people who live with a partner are dissatisfied and represent 2% of the subjects. Likewise, those who are 45 years old and older are dissatisfied and represent 1% of the cases. Interestingly, studies done in the USA during the first month of the Covid-19 indicate that the telework satisfaction was higher for middle-aged individuals compared to younger and older individuals, those living alone or with the presence of at least one child attending online school from home (Tahlyan *et al.*, 2022). Also, investigation presented by Scheibe *et al.* (2022) found that relatively older employees who are forced to telework showed higher satisfaction than younger employees. In this context, the data from 29 EU countries at the beginning of 2020 revealed that teleworking was experienced predominantly as positive for most of the respondents (Ipsen *et al.*, 2021).

In Table 1 are summarized newly found two sociodemographic profiles of dissatisfied teleworkers and it accomplishes the RO1. Also, this table includes specific comparative studies discussed previously and theoretical background authors.

Regarding the quality of the model, the accuracy has a value of 92.11% and it indicates that there is a correct fit of data. The used precision formula is the following: Accuracy = $(TP + TN)/(TP + TN + FP + FN)$. TP are the true positives, TN the true negatives, FP the false positives and FN the false negatives.

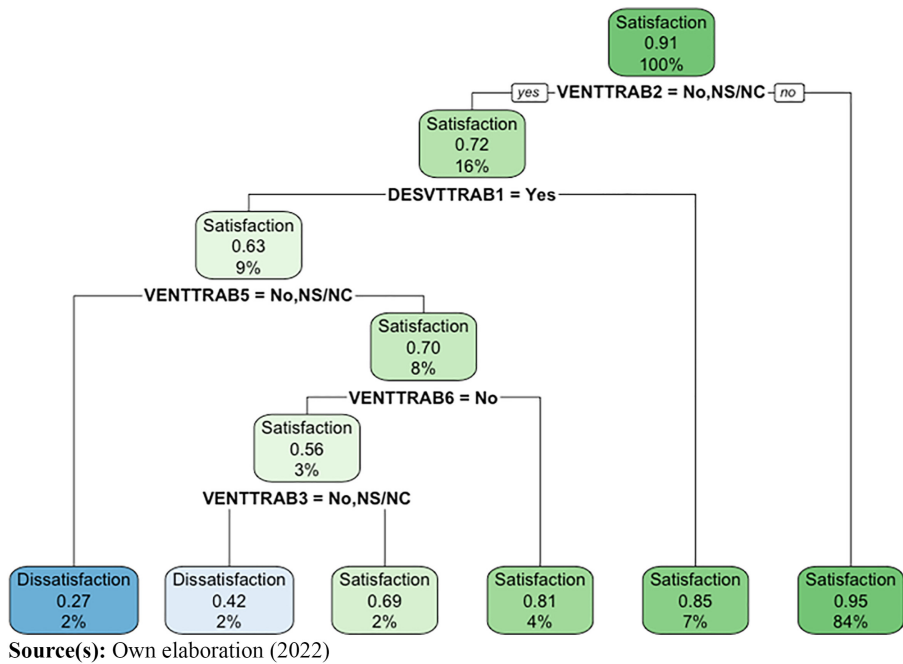
Dissatisfaction reasons, advantages and disadvantages. Figure 2 displays the second model and corresponds to the RO2, where are evaluated the reasons for not teleworking (the

Profile	Profile sociodemographic description	Study comparative authors
Profile 1	<ul style="list-style-type: none"> - Workers whose main job allows teleworking partially - They are administrative and commercial directors; hotel, restaurant, store and other services managers; health and teaching professionals; professionals in law, social and cultural sciences and other administrative support staff - The age is 45 years and older 	Eildér (2019) Thulin <i>et al.</i> (2019) Espinoza and Reznikova (2020) Rodríguez-Modroño and López-Igual (2021) Tahlyan <i>et al.</i> (2022) Scheibe <i>et al.</i> (2022)
Profile 2	<ul style="list-style-type: none"> - Workers whose main job allows teleworking partially - They are administrative and commercial directors; hotel, restaurant, store and other services managers; health and teaching professionals; professionals in law, social and cultural sciences and other administrative support staff - They are younger than 45 - They live with a partner 	Eildér (2019) Thulin <i>et al.</i> (2019) Espinoza and Reznikova (2020) Rodríguez-Modroño and López-Igual (2021) Tahlyan <i>et al.</i> (2022)

Source(s): Own elaboration, 2023

Table 1.
Profiles of dissatisfied teleworkers in Spain

Figure 2. Classification and regression trees (CART) for dissatisfied teleworkers based on “advantages and disadvantages” variables



company does not have the means; the company does not have willingness to implement teleworking; the employee is not able to telework, because his/her home is not adapted for teleworking), the advantages of teleworking (own management of working time; use/saving of time; personal and professional life balance; saving money; avoiding commuting and the convenience of WFH), and the disadvantages associated with teleworking (worse organization and coordination of teleworking; work overload; not disconnecting from work; lack of social contact with the family; lack of social contact with the company), and advantages (saving money; avoiding commuting and the convenience of WFH).

Of these studied variables, the use/saving of time is the most relevant for teleworking and subjects who answered positively to this question are satisfied and represent 84%.

People who answered negatively and as teleworking disadvantage consider worse organization and coordination of work, representing 7% of the subjects. [Kurland and Bailey \(1999\)](#) and [Bjursell et al. \(2021\)](#) talk about teleworking challenges in relation to organizational culture, work/family balance, conducive home environment, failure of performance monitoring and measurement, managerial control, mentoring and work coordination, and time management.

On the other hand, people who consider worst organization and coordination as a disadvantage of teleworking and who do think that the avoidance of commuting and the convenience of WFH as an advantage of teleworking are satisfied and represent 4% of analyzed subjects. In contrast, subjects who do not consider the convenience of WFH as an advantage but do consider the reconciliation with family/personal life as an advantage are satisfied and represent 2% of the subjects. Also, [Saragih et al's \(2021\)](#) and [Karácsony's \(2021\)](#) investigations confirm that one of the benefits of teleworking is conciliation of family life. Those who do not consider work–life balance an advantage are dissatisfied and represent 2% of the subjects. In the same line but also looking from the gender viewpoint, [Scheibe et al. \(2022\)](#)

discovered that teleworking females were less satisfied with family life consolidation compared to male employees, because the teleworking presents traditional gender roles and boosts the inequality in the household.

Finally, the results show that people who do not consider the avoidance of commuting as an advantage of teleworking are dissatisfied and represent another 2% of the subjects. Other studies on the Covid-19 teleworking in Japan and Sweden confirm that reduction in commuting time increased satisfaction level of teleworking employees (Kazekami, 2020; Ellder, 2020).

Thus, achieving the RO2, Table 2 presents reasons, advantages and disadvantages for the teleworking dissatisfied employees (newly discovered two profiles). Similarly, this table incorporates specific comparative studies discussed previously and theoretical background authors.

The quality and accuracy of the model has a value of 93.09%. It indicates that there is a correct fit of data (same formula applied in 4.1.1).

Advantages of teleworking. Figure 3 relates to the RO3 and there are considered only the advantages of teleworking: self-management of working time; use/saving of time; reconciliation with family/personal life; saving money; avoiding commuting and the convenience of WFH.

The most important variable of this model is the use/saving of time. The subjects who rate this variable positively are satisfied and represent 84%. Also, studies done by Ipsen *et al.* (2021) and Saragih *et al.* (2021) confirm that teleworkers appreciate time-saving/time management. On the other hand, those who say “No”, but indicate that they consider the avoidance of commuting as an advantage, also are satisfied with teleworking and represent 13% of studied subjects. Similarly, Saragih *et al.* (2021) and Tremblay and Thomsin (2012) indicated in their research papers that time-saving for commuting is considered as advantage for teleworking employees.

People who do not consider the avoidance of commuting as an advantage of teleworking and do not consider their own time management as an advantage are satisfied and represent 2% of data. Those who do consider their own time management as an advantage are dissatisfied and represent 1% of data.

In summary, accomplishing the last RO3, Table 3 demonstrates advantages for the teleworking dissatisfied employees (found only one profile). Similarly, this table contains specific comparative studies discussed previously and theoretical background authors.

The quality and accuracy of the model has a value of 92.76%, which indicates that there is a correct fit of data (same formula applied in 4.1.1).

Profile	Advantages/disadvantages of the teleworking	Study comparative authors
Profile 1	<ul style="list-style-type: none"> - Consider as a disadvantage the use/saving of time - Consider as a disadvantage a worse organization and coordination of teleworking 	<ul style="list-style-type: none"> Kurland and Bailey (1999) Bjursell <i>et al.</i> (2021) Kazekami (2020)
Profile 2	<ul style="list-style-type: none"> - Consider as a disadvantage the avoidance of commuting - Consider as a disadvantage the use/saving of time - Consider as a disadvantage a worse organization and coordination of teleworking - Consider as an advantage the avoidance of commuting and the convenience of WFH - Consider as a disadvantage the reconciliation of family/personal life 	<ul style="list-style-type: none"> Ellder (2020) Kurland and Bailey (1999) Bjursell <i>et al.</i> (2021) Kazekami (2020) Ellder (2020) Saragih <i>et al.</i> (2021), Karácsony (2021) Scheibe <i>et al.</i> (2022)

Source(s): Own elaboration, 2023

Table 2.
Summary of advantages and disadvantages for the teleworking dissatisfied employees in Spain during the Covid-19 pandemic

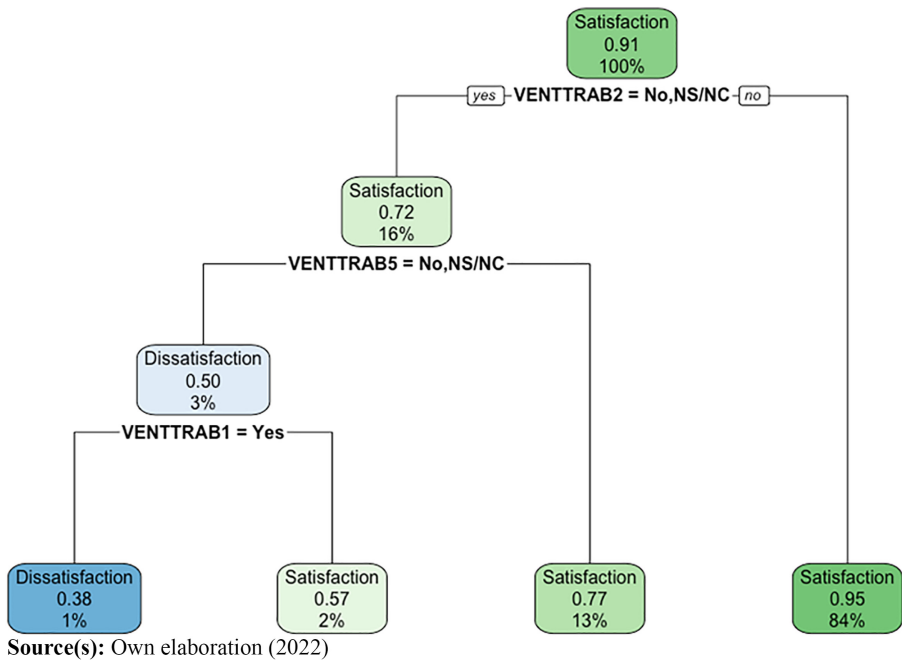


Figure 3. Classification and regression trees (CART) for dissatisfied teleworkers based on “advantages” variables

Table 3. Summary of advantages for the teleworking dissatisfied employee in Spain during the Covid-19 health pandemic

Profile	Advantages of the teleworking	Study comparative authors
Profile 1	<ul style="list-style-type: none"> - Consider as an advantage the use/saving of time - Consider as an advantage the avoidance of commuting 	Ipsen et al. (2021) Saragih et al. (2021) Tremblay and Thomsin (2012)

Source(s): Own elaboration, 2023

Conclusions

This research explores the profiles of dissatisfied teleworking employees in Spain during the Covid-19 pandemic, and they are classified into two types. This kind of distinction enables us in realizing the eligibility of teleworking and the possible extinction of it. The obtained results provide us with the information on advantages and disadvantages of teleworking dissatisfied employees. Understanding the basis of the advantage and disadvantage elements for teleworking satisfaction and dissatisfaction during the Covid-19 pandemic helps to make improvements of teleworker’s working conditions on organizational, social and individual levels in times of normalcy and any other turbulency.

Also, this research permits to offer some *implications on theoretical and managerial levels*. Concerning the *theoretical implications*, there could be mentioned the following: the proposed study models use open official data from the National Statistics Institute, with the focus on using inductive approach and applying a multi-level data filtering for later analyzing it with the Decision Tree technique in order to find specific target population (like dissatisfied teleworkers in Spain). The use of open official data is supported by the FAIR principles (Wilkinson et al., 2016) which aim to enhance the Findability, Accessibility, Interoperability and Reuse of scholarly data. Indeed, data is easy to find on the INE website as public body in Spain. Access is done remotely and free of

charge. Interoperability is ensured by the interpretation and discoverability of researchers. And reusability of data sets is described in the methodology section of this paper for anyone to replicate and contrast the study. Applied methodological steps could serve for other researchers to discover and study different target population and research phenomenon. Similarly, the study results verify the pre-pandemic and during the Covid-19 pandemic theoretical literature on advantages and disadvantages for teleworking dissatisfied employees. Thus, the study proposed models complement already existing literature with the new data findings.

Regarding the *managerial implications* of this research and considering that studied official data collection was limited to the Covid-19 pandemic teleworking circumstances, the authors could suggest that all level companies and organizations should implement regular training of use of latest communication and other kinds of software tools needed for teleworking in any conditions. Companies and organizations should provide employees with working tools which permit them to work in a face-to-face mood and from a distance. Therefore, they should pay more attention for integrating permanent internal marketing techniques and tools, as a basis for the future managerial strategy in order to improve internal communication between employees who work in different modes (online/offline) and time shifts. One of the future tools to improve the teleworking experience could be metaverse. The metaverse can be a niche for business opportunities, new jobs are being created and, along with offices and face-to-face offices, those who settle in the metaverse are becoming more and more common (Sánchez, 2022). On the other hand, there should be made specific rules and rights for teleworking conditions, like connection/disconnection time, possibility for flexible/rotation day/hour switches for face-to-face and teleworking modes depending on personal conditions (family status, disabled, etc.) and/or sociodemographic profile. Also, middle-level managers should have trainings on how to manage smoothly face-to-face and teleworking teams to avoid isolated group members. All these practical implementations could be employed following the plans and fundings of Spain Digital 2025 (Vicepresidencia del Gobierno, 2022) and Europe's Digital Decade: 2030 (European Commission, 2021).

Study limitations and future directions

Despite the several contributions, this research paper includes some limitations that should be considered. Firstly, used data for this study, from the Spanish National Statistics Institute, was collected in very particular circumstances and also should take into account that the Covid-19 had several infection waves, which from one moment to other presented different movement and gathering restrictions. Thus, future studies could be replicated in normal working conditions. Secondly, the proposed models are based on the predefined and strictly structured questions created by the National Statistics Institute and not proposed by the authors *ad hoc* for this study. The future investigations could be based on the authors' *ad hoc* questions including opinion and sentiment variables. Finally, this study is applied to the Spanish teleworkers in general, further research could include comparative studies on the European level taking as a basis EUROSTAT open data.

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