Population Review
Volume 62, Number 2, 2023
Type: Article pp. 35-59

Teleworking: an approach to its measurement using official labor surveys in Latin America

Authors: Yanira Marcela Oviedo Gil[2]
Favio Ernesto Cala Vitery[3]

Corresponding author:
Yanira Marcela Oviedo Gil <yaniram.oviedogil@utadeo.edu.co>

Abstract
In this paper we propose a comparable measure of approximate teleworkers in Latin American countries using official labor surveys. To do this, we start from a review of the context and concept of teleworking that allows a better understanding of the matter. Then, we study the literature and propose a standard methodology, understanding teleworkers as homeworkers with occupations supported by Information and Communication Technologies (ICT). Finally, we apply our methodological proposal in Colombia, Brazil, and Argentina, finding that the conditions imposed by the pandemic seem to have increased levels of effective use of telework. However, the use of telework has not been "massive", even in the face of the severity of the pandemic. We close the paper by exploring the characteristics of the approximate teleworkers, obtaining that they tend to be more female, have university education, and work in small firms; they also are slightly older than other workers.

Keywords : teleworking; telecommuting; labor populations; measurement

[1] This paper is part of the doctoral thesis research "Teleworking: prevalence, determinants and its relationship with job quality" at the University of Bogotá Jorge Tadeo Lozano. Thesis Advisor: Professor Favio Cala. Version March 2022.

[2] Yanira is an economist (Universidad del Valle), master in economics (Universidad de Los Andes), master in direction and management of social security systems (Universidad de Alcalá-Henares) and a current PhD student in Modeling in Politics and Public Management in the University of Bogotá Jorge Tadeo Lozano. Yanira is a Project Director and Researcher in Econometría (a socioeconomic consulting firm) yanirovi@gmail.com, yaniram.oviedogil@utadeo.edu.co. Profile: https://www.linkedin.com/in/yanira-marcela-oviedo-gil-0692a11a6/?originalSubdomain=co

[3] Favio holds a doctorate in Philosophy from the Universidad Autónoma de Barcelona. He has a Master's in History of Sciences from the same university. He graduated as a Physicist from the Universidad Industrial de Santander. Favio is Director of the Modeling in Politics and Public Management PhD program, and the Master in Modeling and Simulation at University of Bogotá Jorge Tadeo Lozano. favio.cala@utadeo.edu.co Publications: https://www.researchgate.net/profile/Favio-Cala-Vitery
Profile: https://www.utadeo.edu.co/es/person/216/Ciencias-B%C3%A1sicas-y-Modelado

Introduction

Nowadays, the most widely adopted technology in the capitalist system has been the ordered and articulated interaction of inputs and labor in a physical space. This interaction and the proximity of the physical spatial location allows taking advantage of economies of scale, location, and positive externalities, among others (Marshall 1919, Ellison and Glaeser 1999, Feldman and Audretsch 1999). In this sense, techniques have been developed to manage interrelation, supervision and control in companies based on a group of people who work simultaneously and in a coordinated manner in the same place (Meyer III 1981, Cherns 1976, Greif 1991). The profits derived from these practices have created strong formal and informal institutions around them.

However, the rapid advances in Information and Communication Technologies (ICT) have generated innovative alternatives for individuals to interact without the requirement of being physically in the same place. That alternative breaks that restriction of the dominant production technology, expanding the production possibilities of societies in several economic sectors.

Currently, it is possible to work remotely supported by ICT. This option has been detected, at least, since the decade of the 50's; when a massive use of this work modality was foreseen (Baruch 2001)[4]. However, until 2020 it had not been substantially registered in the labor markets, as seems to be the case today, to face the need for isolation caused by the Covid-19 pandemic (ILO 2020). The economic activities whose workers can make their contribution remotely have achieved to continue operating, encountering challenges and gains in the process.

Therefore, it can be thought that teleworking is a topic of public policy that has become relevant on the world scene and suggests that we are facing a transformation of the world of work that needs to be measured, modeled, and monitored, since it could directly affect a diversity of socioeconomic issues, as the generation income, labor participation, economic growth, productivity, quality of life, and quality of employment, among others. In this sense, it is crucial to be clear about its concept and to have a measurement of its presence in the economies. That has been possible in developed countries[5], but not in most nations, as in Latin America where the household surveys do not ask directly about the matter (ILO 2020). Then, we present a proposal to measure approximate teleworking in a standard labor survey in Latin America, in a comparable way. We also show an application of the methodology in Colombia, Argentina, and Brazil, representative nations of the region with continuous and rapidly available information.

[4] Baruch (2001) found this in several studies: Jones (1957), Nilles, Carlson, Gray, and Hanneman (1976), Toffler (1980), Kelly (1985), Baruch and Nicholson (1997).

[5] European Survey on Working Conditions allows classifying and monitoring employees by their workplace (home, office or other location) and the intensity and frequency of ICT use outside the employer's premises (Eurofound and ILO 2019).

The paper is organized as follows. Following this introduction, we present a review of the context, the concept, and the measurement approaches to telework in the literature. Third, we expose our proposal for comparable measurement of approximate teleworkers based on official labor surveys, understanding teleworkers as homeworkers with occupations performed with the support of ICTs. Fourth, we apply the methodological proposal to Colombia, Brazil, and Argentina to identify the magnitude of teleworkers in these countries, as well as explore their main characteristics. Fifth and finally, the conclusions and recommendations derived from this research are outlined.

We found that, following our methodology, the approximate teleworkers in Colombia, Brazil, and Argentina have increased their share of the national total of workers. The evolution is different among these countries. Argentina seems to have strongly assimilated the teleworking modality. Based on the results obtained, for the three countries, we also found that teleworkers tend to be more female, have university education, and work in small firms. They are also slightly older than other workers.

I. Teleworking: context, concept, and approaches

Context

Production technologies have marked economic eras. In the beginning of humanity, production occurred on a small scale through hunting, agriculture, livestock, and craft activities. With the arrival of the Renaissance, there was a boom in inventions and with them, new ways of doing things. This gave rise to the First Industrial Revolution, characterized by the technification of tasks, steam generation, market-scale production and, of course, the appearance of the factory. Then, with the creation of the Ford production line, the Second Industrial Revolution was introduced. In it, the use of electricity and the assembly line leveraged the creation of products (Comín 2011).

The Third Industrial Revolution occurred when the automation process was maximized, and electronics were implemented together with advances in ICT. Today humanity is immersed in the Fourth Industrial Revolution, in which intelligent products are created from cyber-physical systems, hyperconnectivity, the "internet of things" and big data (Requeijo 2021). It is necessary to highlight that, since the Third Industrial Revolution, humanity began a process of adoption of digital technologies, whose first stage was to generate digital skills in the population. Later, in a second stage was the digital use and, finally, the current stage of digital transformation (Laloux 2014; Berger 2016; Fernández and Díaz-Pérez 2018).

Then, in a world of constant evolution, work modalities have also been evolving (Cabrera 2020), (Beraud 2018). People who originally worked individually or in small groups outdoors, or in

small workshops, began to work in large groups inside a factory and, recently, to use alternatives such as working remotely by piece or teleworking.

Teleworking is a labor innovation of recent conception and use (Sánchez and Montenegro 2019; Castellano et al., 2017). This implies a considerable degree of lack of knowledge on the subject. Although the scientific community has recently been closing the gap in knowledge at a fast pace and there is some quantitative research (Gajendran, Harrison, and Delaney-Klinger 2015, Golden, Veiga, and Dino 2008, Greer and Payne 2014, Oviedo-Gil and Cala, 2023, Oviedo-Gil and Cala, 2023A), most studies have focused on descriptive exploratory qualitative approaches and case studies, as explained by Raghuram, Wiesenfeld, and Garud (2003), Baines (1999), Beraud, Villa-Enciso, and Valencia-Arias (2016), ILO 2020C, ILO 2021, and Las Heras and Barraza (2019).

So far, the evidence suggests a relationship between the use of teleworking with growth and economic well-being, productivity, job quality, quality of life and labor participation, among others. There is still a wide space for analysis, especially of a quantitative nature, that gives rise to a greater understanding of telework as a work modality and a possible instrument of public policy. This is why it is important to have a national measurement of teleworking to support that kind of studies.

Concept

From the etymology of the word “telework”, it comes from the Greek root "telou" which means "far" and from the Latin root "tripaliare" whose meaning is "work" (Gentilin 2021). So, it implies executing labor from a place far from the predetermined one.

In the academic literature, the first reference to teleworking or telecommuting[6] is found in a study about communications and organizational decentralization. In it, the use of new computer and telecommunications technologies is studied to maintain or increase the productivity of administrative and management functions with no commute required (Nilles 1975). The argument presented points that teleworking would have an impact on practices and policies in transportation, telecommunications, work, and land use. That would allow decentralization of organizations and a new level of development in the knowledge and information industries.

Later, at the 1996 world conference of the International Labor Organization (ILO) the concept of home work was established. That concept is broader than teleworking, but it has its hold on it. "Home work" was specified as:

> “*(…)the term home work means work carried out by a person, to be referred to as a homeworker, (i) in his or her home or in other premises of his or her choice,*

[6] These terms are equivalent. In American literature, "*telecommuting*" is more used, while in European literature the use of "*teleworking*" is more frequent.

> *other than the workplace of the employer; (ii) for remuneration; (iii) which results in a product or service as specified by the employer, irrespective of who provides the equipment, materials or other inputs used, unless this person has the degree of autonomy and of economic independence necessary to be considered an independent worker under national laws, regulations or court decisions*" Article 1 (Convention 177, 1996).

Due to the recent and increased interest in studying telework, the ILO has published documents proposing conceptual differences between "remote work", "telework", "work at home" and "home-based work" (ILO 2020; ILO 2020A). Based on this analysis, teleworking is recognized as a subcategory of home work that corresponds to those who use information and communication technologies (ICT) to work remotely.

In this sense, a concept of teleworking widely cited in the literature is "*the use of ICT – such as smartphones, tablets, laptops and desktop computers – for the purposes of work outside the employer's premises*" (Eurofound and ILO 2019, p. 5). Based on this, the authors even subdivide teleworkers as: (i) regular or occasional; (ii) high, medium, or low frequency of ICT use; and (iii) from home or other locations.

Additionally, it is relevant to review the national definitions of teleworking in some Latin American countries, especially, where we are applying our methodology. In Colombia, to legislate on teleworking, the following definition was adopted:

> *"Teleworking. It is a form of labor organization, which consists of the performance of paid activities or provision of services using information and communication technologies - ICT - for contact between the worker and the company, without requiring the physical presence of the worker in a specific job site"*[7] Article 2 (Law 1221 2008)

Based on this Law and its regulations in Decree 884 (2012), a Colombian study proposes to understand teleworking as a concept with three components: (i) employment relationship, (ii) spatial and temporal flexibility in the use of the modality and (iii) intensivity of ICT use (Tapasco 2021).

In Argentina, the Ministry of Labor, Employment and Social Security defines teleworking as:

> *"(...) a form of remote work, in which the worker carries out his activity without the need to physically present himself at the specific company or workplace. (...) [teleworking] It is carried out using information and communication technologies*

[7] Own translation.

(ICT) and can be carried out at the worker's home or in other places or establishments outside the employer's home"[8]

In Brazil, the legislation defines teleworking as "*the provision of services predominantly outside the employer's premises, with the use of information and communication technologies that, by their nature, do not constitute external work*"[9] (Da Silva 2020, p. 2).

These national definitions are very close to each other, as well as to the Eurofound and ILO (2019) definition. Therefore, conceptually it is clear what should be measured. In any case, for a more comprehensive conceptualization some studies propose understanding teleworking as an evolving phenomenon. Three evolutionary stages are mentioned in the literature. A first stage, "Home Office", marked by the reduction of mobility and the use of technological equipment and fixed connectivity. A second stage, "Mobile Office", where the use of mobile devices disengaged work from home, but still depending on fixed connectivity to information networks. The third stage, "Virtual Office", has remote access through a variety of laptops and mobile connectivity (Messenger and Gschwind 2016; Gentilin 2021).

In addition, a study elaborated by Lamond, Standen, and Daniels (1998) urges to consider teleworking not only in terms of where it is done or what equipment is used, but to understand it as a set of labor practices associated with a wide variety of organizational, social, individual, and historical forces that impinge on it. Examples of this are the degree of knowledge required, ease of measurement of results and work autonomy, intra- and extra-organizational contact, the degree of use of telecommunications and technological equipment and the amount of time spent in different locations (traditional office, home, nomad, remote office, or telecentre). Along these lines, the characteristics that a teleworker should have been identified, such as results orientation, communication skills, little need for supervision, adaptability, organization, solid knowledge about their work, overseeing optimal work for the job and having a favorable home environment, among others (Baines and Gurvis 2009; Jaramillo and Restrepo 2011).

Approaches to the measurement of teleworking: A review of the literature

Until the beginning of the century, most of the literature on telework focused on its pros and cons from the point of view of employers and workers through qualitative descriptions and specific case studies (Raghuram, Wiesenfeld, and Garud 2003). Subsequently, some controlled experiments have been carried out in China and the United States and a variety of literature has been developed, closing the gap in knowledge about the phenomenon.

[8] https://www.argentina.gob.ar/trabajo/teletrabajo/que-es - Own translation. Teleworking in Argentina is regulated by Law 27.555 (2020) that stipulates the contractual conditions that must be met, working hours, rights and duties, training, benefits, among others.
[9] Own translation. The regulation of teleworking in Brazil is found mainly in the Law 13.467 (2017)

Only recently, specialists have attempted to quantify the number of homeworkers, concentrating primarily on potential workers, rather than actual ones. In the United States, Hensvik, Le Barbanchon, and Rathelot (2020) found that around 15% of working hours were performed at home in the US from 2011 to 2018. But the potential is higher. According to Bureau of Labour Statistics (2019), 29% of wage and salary workers could work from home.

Subsequently, Dingel and Neiman (2020) try to solve the question *How many jobs can be performed at home?* by classifying the feasibility of working at home for all occupations using two Occupational Information Network (O*NET) surveys and merging this classification with occupational employment counts. They found that 37% of jobs in the United States can be performed entirely at home. Based on Dingel and Neiman (2020) methodology, there are four interesting applications to specific countries. First, Albrieu (2020) and Foschiatti and Gasparini (2020) estimated between 26% and 29% of potential homeworkers in Argentina. Second, Guntin (2020) estimated between 20% to 34% potential homeworkers in Uruguay. Third, Saltiel (2020) makes this estimate for some developing countries using occupation surveys. He finds that 5% to 23% of work in low-income economies could be done from home. Fourth, Cárdenas, Motana, and Bosworth (2021) try to answer to the question *Which Workers are Most Exposed to covid-19 and Social Distancing Effects in a Dual Labour Market?* and using data between 2016 and 2019, found that one-fifth of occupations in Colombia can potentially be performed remotely. In fact, they infer that any worker in these occupations would be a potential teleworker, although they do not make a distinction with homeworkers.

In Brazil there is also a potential of homeworkers estimation. But this was done using households' surveys by the Institute of Applied Economic Research (IPEA). It was calculated that 20,8 million people could work from home (22.7%). That study finds that those who are more likely to work from home are science and intellectual professionals (65%), followed by directors and managers (61%), administrative support (41%) and technicians and mid-level professionals (30%) (Goés and Martins 2020; CNI 2020).

- In 2020, the ILO estimates that there were about 260 million homeworkers in the world in 2019, representing 7.9% of global employment. These estimates are based on data from 118 countries, representing 86% of global employment. The methodology implemented adapted elements of Dingel and Neiman (2020) and included a consultation by the Delphi method with dozens of experts around the world (ILO 2021). The study also found about homeworker (not only teleworkers) that (i) most of them were women (56%); (ii) more than half worked in services, while about a third worked in industry and the rest (16%) in agriculture; (iii) had lower income than the rest of the workers, evidencing a "penalty" for doing the work outside the employee's facilities; (iv) and had a gap in social protection coverage close to forty percentage points compared to those who work outside the home.

Also based on the Dingel and Neiman (2020) methodology, the International Monetary Fund (IMF) created an index of teleworking capacity. That index matches the characteristics of individual workers with their ability to telework. The study found that accommodation and food services, construction, transportation, and wholesale and retail trade sectors are less tele-workable, so the loss of jobs under isolation conditions would be concentrated in them (Brussevich, Dabla-Norris, and Khalid 2020).

It is also relevant to note that in July 2021, a technical note makes a first analysis of post-pandemic homeworkers in some Latin American countries (Maurizio 2021). It is found, for the countries considered[10], that between 20% and 30% of wage earners were working from home during confinement, compared to less than 3% in 2019. Additionally, it was identified that in the exceptional context imposed by the pandemic, formal workers with higher levels of qualification, working in professional, technical, and administrative occupations, have exhibited the greatest possibilities of continuing to carry out their work tasks from their homes.

Regarding specifically teleworking, we found that in Argentina a survey of 250 large firms was conducted, finding that 93% had adopted teleworking as a policy in response to the COVID-19 pandemic, and only 48% was able to continue normal operations (PNUD 2020). In Colombia, teleworking has been studied since 2012 for the Government. This was done through a telephone and online survey of formal companies in 12 large cities. Main findings in 2020 were: (i) 2 out of 10 companies have formally implemented teleworking; (ii) 56% of the (formal) companies were in the process of adopting telework; (iii) 91% do so because it was the only option during the health emergency; and (iv) 40% of companies are willing to migrate to teleworking once the health emergency is over (MinTIC 2020).

II. Proposal for measuring teleworking and its application in some Latin American countries

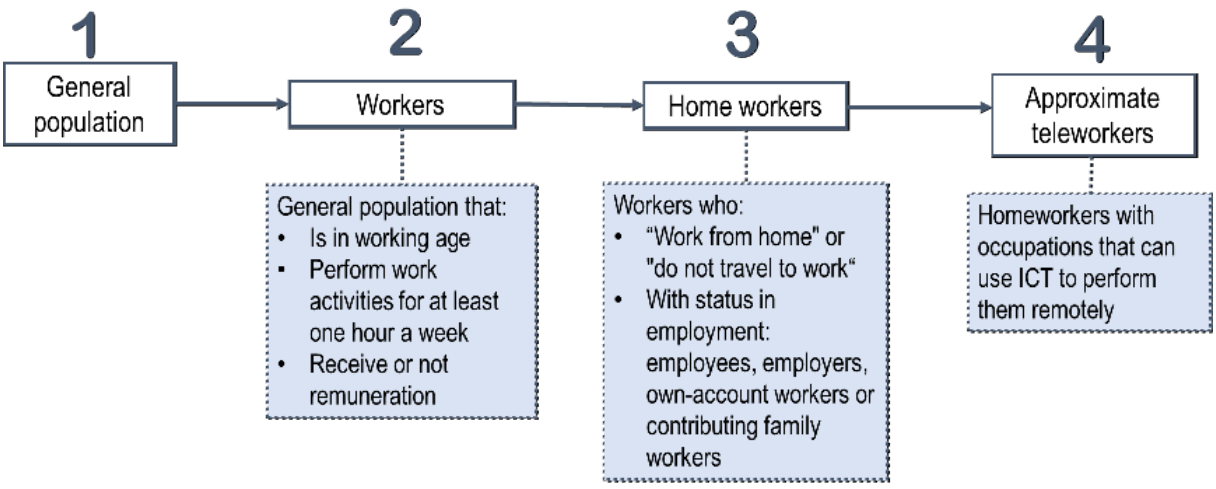
In this section the proposal for measuring teleworking and its application in some Latin American countries is presented. Before doing so, it is convenient to notice the main characteristics of the labor market in the reference countries studied. Latin America has historically suffered from a deficit regarding the quantity and quality of the jobs, as is mentioned by ILO (2021A). The pandemic increased the problems of the labor markets since some formal workers lost their jobs and were forced to work informally to acquire some income[11]. Any case, unemployment and informality are continuously present in Latin American Countries.

[10] Brazil, Uruguay, Costa Rica, Perú, Argentina, and Chile.

[11] For the interested reader, the effects of the pandemic on the economies and labor markets of Latin America are widely covered by detailed ILO reports (ILO 2020) (ILO 2020B) (ILO 2020C) (ILO 2021) (ILO 2021A).

In that context, this research seeks to measure teleworking. European specialists measure teleworking considering the place and use of technologies employing the definition "*the use of information and communication technologies – such as smartphones, tablets, laptops and desktops – to work outside the facilities of the employer*" (Eurofound and ILO 2019, p. 5). However, there is no information available to directly calculate this concept in most countries in the world, so there is a barrier to study it. Therefore, trying to approach that definition, in this research we propose to use the information that is usually collected, making a comparable application for Colombia, Argentina and Brazil. The identification process proposed in this document is shown in Illustration 1. This is an approach in four stages, that goes from the general population to the population of interest, applying filters according to the conditions that characterize each subpopulation. Then, the total number of inhabitants of the country is estimated by the official household surveys; later, the number of workers is determined; after that, the homeworkers are identified; and finally, the approximate teleworkers are estimated. The process is detailed below.

Illustration 1. Proposed process of identification of approximate teleworkers



Source: own elaboration

First stage: general population

The first stage consists of estimating the general population using official household surveys. In Colombia, the National Department of Statistics (DANE) collects the Great Integrated Household Survey (GEIH). In Argentina, the National Institute of Statistics and Censuses (INDEC) conducts the Permanent Household Survey (EPH). And, in Brazil, the Brazilian Institute of Geography and Statistics (IBGE) produces the National Survey by Household Sample (PNAD). The surveys of Colombia and Brazil have national coverage, while the

Argentine survey only has urban coverage[12] (INDEC 2003). Considering this and based on the most recent microdata available from the surveys, the general populations are calculated. These magnitudes were corroborated with the official statistics of the countries.

It is relevant to mention that household surveys in Latin America, and in general in the world, had to change their collection operations during 2020 due to the pandemic. In Brazil, Colombia, and Argentina, the collection methodology changed from a face-to-face method to a telephone one. Likewise, the number of questions in the questionnaires was reduced, prioritizing key variables for comparable monitoring. The statistical teams in these countries indicates that the sample and the structure of the questions were maintained to avoid bias and facilitate comparability. In any case, all of them comment that in the telephone operations non-response rates were higher than for the designed sample, which may not have selection bias since the households that did not respond were always replaced randomly using the selection procedure, following the international recommendations of statisticians around the world who faced the same situation. Anyway, when there was evidence of bias, the statistical institutes in the countries of reference adjusted their expansion factors, as explained in the technical documentation ((IBGE 2020), (DANE 2020), (INDEC 2020)). This situation also occurred in other Latin American countries, as reported by ECLAC (ECLAC 2022). This article uses the official expansion factors, then includes the adjustments made in each country.

Second stage: workers

The condition of worker is achieved when a person is of working age and executes activities for at least one hour in the reference week of the survey, with or without remuneration. Such a definition arises from the agreement on international labor statistics of the ILO and allows international comparability. So, the definition is maintained, and the official national estimate of the working population is replicated.

Third stage: homeworkers

The next stage of the methodology is to calculate the number of homeworkers adopting the indications of the ILO:

> *"In order to be identified as a home-based worker and homeworker, the individual must first self-identify as an active member of the labour force ("working"). Then, two additional questions are combined: the first question identifies persons who usually work at home ("place of work") and the second question identifies whether they are employees, employers, own account workers or contributing family workers ("status in employment")"* (ILO 2021, p. 36).

[12] Specifically, the coverage of the EPH is 31 urban agglomerations and one urban-rural area.

Then, it is necessary to refer to the official survey questionnaires to find information about the place of work and employment status, both are standard variables, at least in Latin American surveys.

Place of work

To identify the workplace, it is necessary to find a question about it, and/or about the way to get to the workplace in the questionnaire of each survey. The questions are:

Colombia: *Where do you primarily do your work?*[13] And *What kind of transportation do you primarily use to get to your job site?*[14] (DANE 2021)

Argentina: *Where do you mainly perform your tasks?*[15] (INDEC 2021)

Brazil: *So where do you normally exercise this job?*[16] (IBGE 2021)

Once the variables that correspond to these questions are identified in each database, the workers estimated in the previous stage are filtered, keeping only those who answered that they work "in this dwelling" or “at the domicile of residence”. In addition, when information on how to get to the workplace is available, those workers who say they do not travel are added.

“Status in employment” or occupational position

To complete the calculation of homeworkers it is required to select valid status in employment. That condition is usually included in Latin American surveys because in 1993 the ICLS created the International Classification of Status in Employment, known as ICSE-93. Which classifies jobs using the criteria of economic risk, solidity of the link with the job and type of authority held. In the status of employment it is normally possible to identify who are employees, employers, self-employed workers, auxiliary family workers, domestic employees, day laborers, members of producer cooperatives, among others.

[13] The response options are in this dwelling; in other dwellings; in a kiosk – booth; in a vehicle; from door to door; open space on the street (mobile and stationary); fixed premises-office-factory-etc.; in the countryside or rural area; sea or river; on a construction site; in a mine or quarry; other.
[14] The response options are intermunicipal bus; urban bus; on foot; metro; articulated transport; taxi; company transport; car for private use; boat-canoe; horse; motorcycle; moto taxi; bicycle; does not travel; other.
[15] The response options are in a local, office, establishment, business, workshop, or farm; at a fixed street stand or kiosk; in vehicles: bicycle, motorcycle, car, boat; in a vehicle for transporting people and goods; in construction, infrastructure, mining, or similar works; in this dwelling.
[16] The response options are in establishment of another business/company; in a place designated by the employer; client or customer; in the domicile of employer, employer, partner or customer; at the domicile of residence, in an exclusive place for the performance of the activity; at the domicile of residence, without an exclusive place for the performance of the activity; in a motor vehicle (taxi, bus, truck, car, boat, etc.); on a public road or area (street, river, mangrove, public forest, square, beach, etc.).

Colombia captures the information for the mentioned classification by the question "*In this job you are…?*", meanwhile Argentina uses "*occupational category?"*, and Brazil asks, "*In that job, …?*" Response options are similar due to ICLS standardization. According to ILO instructions every option is accepted for being a homeworker except domestic employees or day laborers/peons. Then, it is necessary to discard workers who answered those occupational categories.

Fourth stage: approximate teleworkers

To this point, it has been possible to identify "homeworkers" according to international standards. However, to identify teleworkers, it is also necessary to identify the use of ICTs in their work, which is not available in household surveys in Latin America. For this reason, we propose to make an approximation based on the occupation declared by people, bearing in mind the following considerations.

First, to estimate the potential of homeworkers, an approach based on occupations is widely used (Dingel and Neiman 2020; Leibovici, Santacreu, and Famiglietti 2020; Albrieu 2020; Foschiatti and Gasparini 2020; Cárdenas, Motana, and Bosworth 2021), as mentioned before those authors employ occupational information to calculate the potential, not the actual number of homeworkers. So, there is evidence of a link between occupations and home work.

Second, the Inter-American Center for the Development of Knowledge in Vocational Training (CINTERFOR) estimated in 2020 the potential proportion of workers who could carry out their activities from home in the world. This was done by adapting the Dingel and Neiman (2020) methodology and asking experts around the world about the probability that each occupation would be performed from home. According to the authors: "*The differences between the estimates (countries) reflect to a small extent subjective differences between experts, but to a larger extent they reflect differences in the underlying social, economic and infrastructure conditions between groups of countries*" (ILO 2020B, p. 2).

Third, for Latin America it was found that: *"(…) Formal workers, with higher levels of qualification, working in professional, technical, and administrative occupations, have exhibited the greatest possibilities of continuing to carry out their tasks work from their homes*" (Maurizio 2021, p. 1)[17]. The author's inference suggests that such occupations correspond to teleworkers, although she makes a more general reference to homeworkers. In addition, that study states: "*Formal wage earners, with a higher educational level, adults, and performing professional, technical, managerial and administrative tasks, have been able to make more intensive use of this work modality*" (Maurizio 2021, p. 3)

[17] Own translation

Fourth, in 2006, a paper was carried out regarding occupations in ICT. This document provided elements to update the international classification of occupations considering the new ICT skills that some occupations require. The author states that the dominant use of those skill levels in International Standard Classification of Occupations (ISCO) can be found in several major groups, which include Managers, Professionals, and Technicians and associate professionals and Craft and related trades workers (ILO 2006).

Fifth, A study about preparatory qualifications for occupations in Industry 4.0 or Fourth Industrial Revolution states that the news in this era are based on technological innovations in digitalization which change the interfaces between human labour and computer-controlled processes. Thus, certain technological capabilities are the focus of attention, specially, the exchange of information and data as well as communication. There are important professional or academic qualification requirements for becoming an expert in a digitalized work activity, as well as the chances to further develop personal qualifications in the work activity itself (Kuper 2020). Therefore, it could be inferred that occupations that require personnel with tertiary education are the most susceptible to the use of ICT.

Sixth, in that sense, looking to solve "Who are the best positioned workers to work from home?", an analysis for OECD countries finds that 30% of workers could telework, but the likelihood decreases for workers without tertiary education and with lower levels of numeracy and literacy skills. This research also estimates the average feasibility of teleworking by occupation. They found that business and administration professionals, information and communications technology professionals, and administrative and commercial managers are best positioned to work from home, with a feasibility of teleworking above 70%. But they also discovered that a wide range of professional, technical, and managerial occupations are more than 30% likely to use telework (Espinoza and Reznikova 2020).

Therefore, it is found in the literature a recurring link among types of occupations, home work and use of ICT skills. All of them are the key components of teleworking, according to the definition. For this reason, we propose to have a measure of approximate or potential teleworkers by filtering homeworkers according to their occupations, as described below. This is relevant because not all homeworkers are teleworkers, for example, part-time jobs in maquila industries can be performed as homeworkers, but they clearly do not belong to the category of teleworkers.

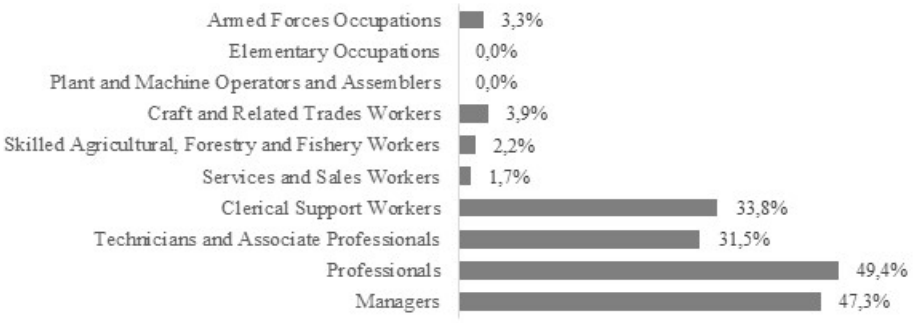
The information on the occupation performed by the workers is collected as usual practice in the labor surveys of each country. This variable is generally an open question that is subsequently coded by using a standardized classification possibly the ISCO or a national classification. In Colombia, DANE collects information about the job by asking the employed "*What do you do in this job?*" and coding with the National Classification of Occupations of the National Apprenticeship Service (SENA) of 1970 (DANE 2021)[18]. The Argentine questionnaire asks

[18] Cárdenas, Motana, and Bosworth (2021) use an artificial intelligence algorithm on the open variable to classify occupations, which refines the analysis within the country. In this paper, we refrain from modifying the

about occupation at work and the resulting variable is coded using the National Occupational Classifier (INDEC 2021). In the Brazilian case, the form asks for the occupation and the IBGE uses the Classification of Occupations for Household Surveys to codify the answers (IBGE 2021). This would be the last stage of approach to teleworkers, which we hope would be an educated estimation of teleworking.

At this stage, it is necessary to consult the classification of each country and exclude occupations that are not suitable or viable through teleworking[19]. We propose to exclude occupations following the findings of ILO (2020B). In that study, the research team asks about it to experts all around the globe[20]. The authors calculated the likelihood of being able to work from home by occupation (See Graph 1). They find that working from home is likely in managers, professionals, technicians and associate professionals, and clerical support workers, which is consistent with other studies referenced above. Note that these occupations correspond mainly to white collar or office jobs, which require to be supported by ICTs, as ILO (2006) and Espinoza and Reznikova (2020) found. Therefore, we propose discarding from the estimate of teleworkers those who perform other kinds of occupations.

Graph 1. Estimated global probability of being able to work from home by occupation.



Source: Estimates extracted from (ILO 2020B)[21]

classifications made by the countries in order to (i) have maximum comparability between countries and (ii) make direct calculations so that they are easily replicable for new data or other countries.

[19] The National Classification of Occupations is not available on the web, but you can write down to DANE to access it. While the classifications used in Argentina and Brazil can be found on the INDEC and IBGE websites, respectively (INDEC 2001) (IBGE 2021B).

[20] In Latin America they received a response from experts in Argentina, Brazil, and Chile.

[21] We are very grateful to the ILO team, specially to Florence Bonnet, for sharing details of their work in ILO (2020B) with us.

Estimation of approximate teleworkers in Colombia, Argentina, and Brazil

When the proposed methodology is applied, the results in the first and second stages correspond to replicating the official calculations of the national population and population of workers. Next, we present the results for the third and fourth stages. Remember that the Argentine survey corresponds to urban conglomerates, while the Colombian and Brazilian surveys have total national coverage. Then, the results are presented for urban areas in each country and national total only for Brazil and Colombia.

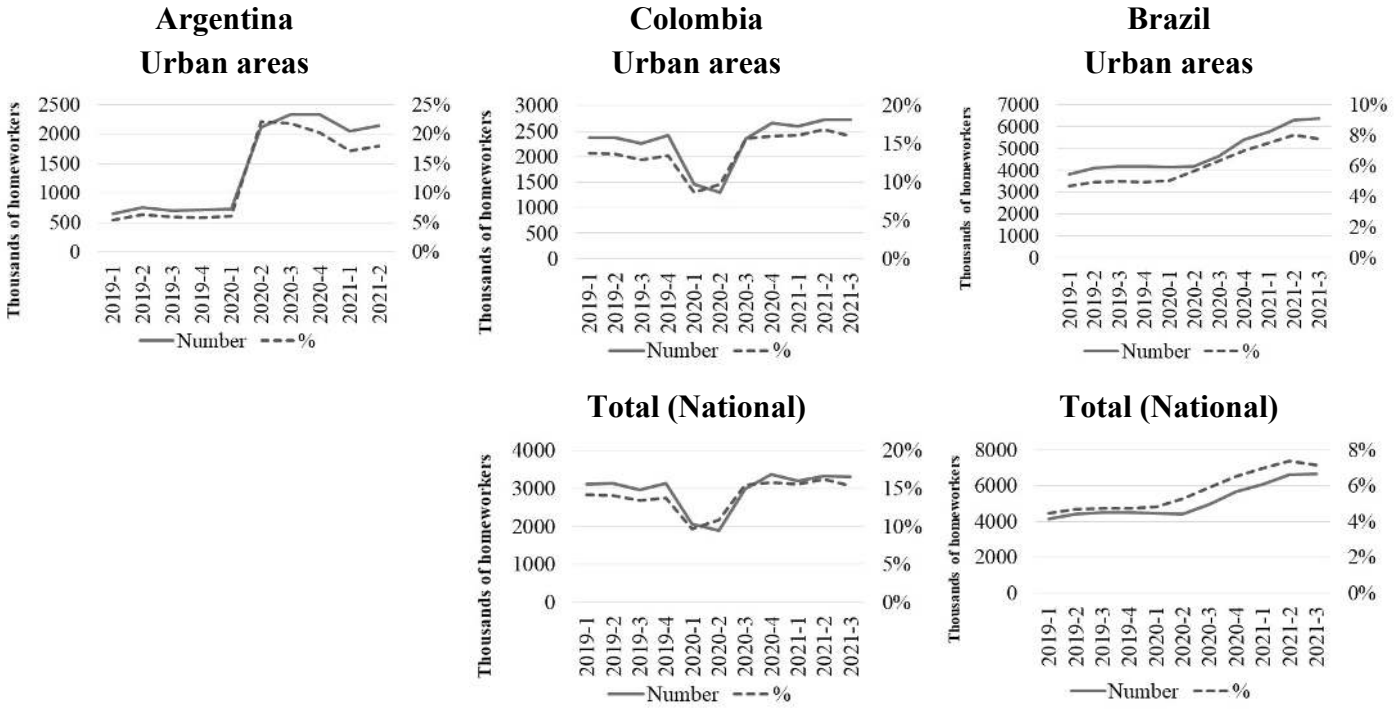
Estimate of homeworkers

In the third stage of the implementation of the methodology, an estimate of homeworkers is obtained. Our estimates for Argentina, Colombia, and Brazil are presented in Graph 2. The period of time studied is of particular importance because they represent the behavior of the variable before the Covid-19 pandemic (2019), just in the appearance of the pandemic (2020) and recently (2021). As can be seen, Argentina initially registered around 6% of its workers in home work. But this country dramatically increased the use of this modality, just as the restrictions associated with the pandemic appeared. In the second quarter of 2020, 22.2% of workers carried out their tasks from home. Since then, in Argentina this fraction has been maintained, with a slight downward trend. 17.9% is the latest data available for the second quarter of 2021, which is equivalent to 2.15 million Argentine workers.

In contrast, in Colombia it is observed that home work was on average 14.0%, prior to the pandemic. In the first quarter of 2020, the indicator suffered a shock and began to grow from the third quarter, reaching a level marginally above the pre-pandemic level of around 16.0%. In percentage terms, the behavior of home work is very similar between urban areas and the national total. The difference is the number of homeworkers. Thus, for example, for the third quarter of 2021, there were, approximately, 2.7 million in urban areas and 3.3 million for the national total.

For Brazil we found that the proportion of homeworkers before the pandemic was very stable, around 5.0%. However, since the pandemic, this indicator shows a smooth sustained growing trend, reaching 7.2% in national estimation, and 7.8% in urban areas for the third quarter of 2021 (6.7 and 6.4 million of workers, respectively). As in Colombia, national and urban trends in Brazil are very similar.

Graph 2. Estimates of homeworkers in Argentina, Colombia, and Brazil



Source: Own calculations based on EPH-INDEC, GEIH-DANE, and PNAD-IBGE

Estimate of approximate teleworkers

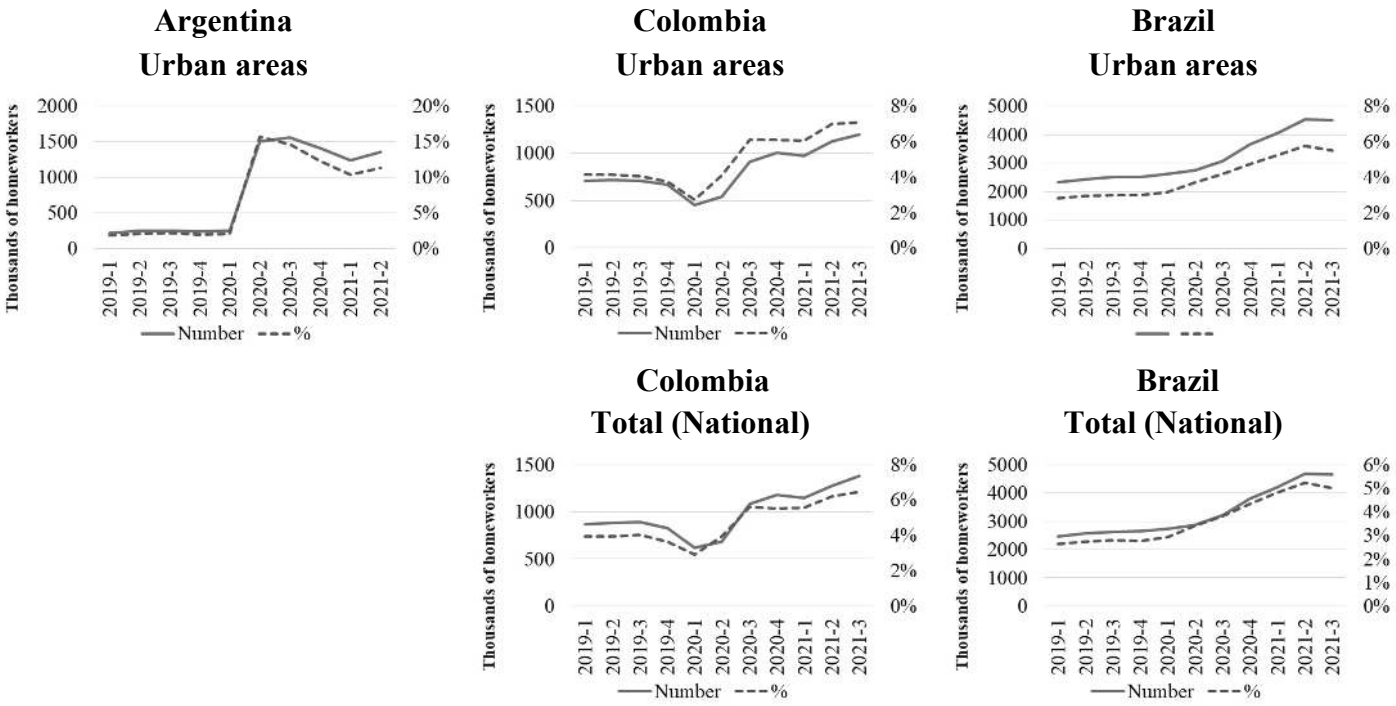
The number and proportion of teleworkers with respect to the total of workers for Brazil, Colombia, and Argentina are shown in Graph 2. It is interesting that, both in proportion and in number, approximate teleworkers have stable levels during 2019 in every country.

In Brazil, telework estimates show a similar pattern to those of home work. Starting from the standard pre-pandemic levels, a stable gradual increase is identified until reaching 5.0% of teleworkers in national estimates and 5.5% in urban areas (between 4.5 and 4.7 million of workers). This is different in Colombia. Since the first quarter of 2020, a drop in the Colombian series was evident. This reflects the strong economic shock caused by the isolation measures in the face of the pandemic. There was an initial cessation of almost all kinds of activities, including tasks that could have been done by teleworking. However, immediately after, in the second quarter of 2020, pre-pandemic levels were recovered and in the third quarter teleworkers were already 56% more than at the end of 2019. From that point on, the trend has been an increase in teleworking population, both in the number of workers and in percentage, as well as national and urban areas estimation. The most recent information available indicates the presence of about 1.4 million teleworkers, this is 6.5% of the national total of workers, 1.2 million of teleworker (7.1%) in urban areas. Finally, Argentina shows the highest acceptance of teleworking, among studied countries; once tested, a larger fraction of this modality seems to

have been installed in the country. This could be due to its productive structure and the type of jobs it has. If the use of teleworking had not been attempted by the force of inertia in the traditional way of producing, in the face of the pandemic, companies were forced to look for new alternatives, finding teleworking as a valid form, as pointed out by Guyot and Sawhill (2020). This could be perceived as a structural change. In the second quarter of 2021, it is estimated that there were about 1.4 million Argentine teleworkers, which corresponds to 11.3% of its workers.

In any case, in the shock suffered by the economies, it is expected that there will be a double effect. On the one hand, isolation practices would encourage teleworking. On the other hand, the economic impact would cause companies to reduce their required level of employment. So, looking at growing numbers would suggest that teleworking played an important role in the global situation and the positive effect was higher.

Graph 3. Estimates of teleworkers in Argentina, Colombia, and Brazil



Source: Own calculations based on EPH-INDEC, GEIH-DANE, and PNAD-IBGE

Who are the teleworkers in Colombia, Argentina, and Brazil?

As an overview, without the objective of realizing an exhaustive analysis of the characteristics of teleworkers, we estimate averages in some key variables (see Table 1). We find that in Argentina, Colombia and Brazil, teleworkers, compared to other types of workers, tend to be more female, have university education, and work in small firms; they also are slightly older than

other workers. The differences in age are not large, but they show a trend of greater experience, greater teleworking. Perhaps the experience could provide tools for workers to be more autonomous and make it easier for them to work remotely. Note that in Argentina teleworkers have a marked university education compared to other types of workers, 61.0% versus 21.7%; this is consistent with the ICT skills needs mentioned in the literature. Likewise, it is striking that in Brazil and Colombia, teleworkers report working in small companies with high frequency, 86.9% and 85.7%, respectively. One hypothesis to consider on this matter is the greater flexibility that small companies could have had to quickly adopt the teleworking modality in the face of the abrupt appearance of the pandemic.

The details of the characteristics of teleworkers, as well as their dynamics over time, are such a deep topic that require further investigation. Such an analysis could show how the ideal profile of a teleworker is refined in these countries.

Table 1. Average characteristics of teleworkers versus other workers in Argentina, Colombia, and Brazil, 2019-1 to 2021-3

		Male	Age	University	Small firm	Medium firm	Large firm
Argentina*	Others	57.9%	41.1	21.7%	38.8%	21.3%	26.5%
	Teleworkers	44.6%	43.9	61.0%	57.9%	12.4%	25.9%
Colombia	Others	60.6%	39.5	26.6%	57.8%	13.9%	23.6%
	Teleworkers	47.5%	44.4	42.9%	85.7%	4.6%	9.8%
Brazil	Others	58.7%	39.0	21.6%	49.9%	22.4%	27.7%
	Teleworkers	36.4%	40.5	35.1%	86.9%	4.1%	9.0%

Source: Own calculations based on EPH-INDEC, GEIH-DANE, and PNAD-IBGE

* To Argentina 2019-1 to 2021-2

III. Conclusions and policy recommendations

First, before attempting to measure teleworking, it is crucial to study its concept in depth. This avoids confusion or mixture of definitions that make inference difficult. This study finds convergence in the definition of teleworkers as homeworkers with occupations supported by Information and Communication Technologies (ICT).

Second, using the definition to which literature has converged and the information available, this research shows that it is possible to identify approximate teleworkers in a comparable measure across countries by following a four-step methodological proposal: (i) by counting the general population. (ii) by identifying workers according to globally accepted guidelines. (iii) by selecting among them those who are homeworkers. (iv) estimating approximate teleworkers by filtering potential occupations that could be done using ICT. The use of this methodology makes it possible to estimate effective homeworkers, not only potential ones. Moreover, we try to go a step further by estimating the approximate factual teleworkers, our main object of analysis.

Third, as a novel approach, we found that Colombia and Argentina present similar levels of home work, about 16.0% and 17.9%, respectively. In contrast, Brazil exhibits just under half of that level, around 7.2% (national) - 7.8% (urban). In addition, given the availability of urban and national information for Brazil and Colombia, it was evident that the behavior of home work in both areas has similar trends for these countries, but it is higher in urban areas.

Fourth, from highest to lowest according to its proportion with respect to the workers, telework in urban areas is notable in Argentina (11.3%), then in Colombia (7.1%), and finally in Brazil (5.5%). The teleworking estimate for the national total in Colombia was 6.5% and in Brazil 5.0%. Then, the conditions imposed by the pandemic seem to have increased levels of effective use of telework in the countries studied. It is possible that a part of those who tried it (firms and workers) continued in this type of work, while new users have been adding, since the trend of the series is growing as can be seen in the observed period of time. However, the use of telework has not been "massive", even in the face of the severity of the pandemic, evidencing possible restrictions on the incorporation of ICTs and remote work practices in the Region. This is an interesting topic for future research.

Fifth, we find that in Argentina, Colombia and Brazil, teleworkers compared to other types of workers, tend to be slightly more female, with a university education, slightly older and more frequent in small companies.

Sixth, the exercise proposed in this paper seeks to have a measure that allows identifying teleworking in Latin American countries and studying the phenomena in a comparable way with standard household surveys. Nonetheless, the measurement proposed is an “approximate” and it is limited to the concept of “home office” due to the possibilities offered by a standard survey in Latin America. However, teleworking can be done anywhere outside the employer's facilities

because current ICTs offer the possibility of having a "Virtual Office" which can be accessed from different mobile devices and anywhere with a connection wired or wireless, as indicated by Messenger and Gschwind (2016). In this sense, for a precise measurement and analysis of teleworking, it is recommended to have a set of specific questions in the official labor surveys, inquiring about: (i) Use: Last week, did you use Information and Communication Technologies to work outside the facilities of your employer or contracting party? (ii) Frequency: Last week, how many days did you telecommute or work outside the facilities of your employer or contracting party using ICT? (iii) ICT use: What kind of ICT do you use to work outside the facilities of your employer or contracting party? (iv) Locations: Where do you regularly telework?

Finally, this article provides a proposal to identify the teleworking population in Latin American countries, with a practical application in Argentina, Brazil, and Colombia. Having this methodology opens possibilities to understand the conditions and dynamics of teleworkers in the region. Therefore, this contribution is expected to allow the academic community to explore and help understand this phenomenon in order to provide information that guides and supports public policy interventions to optimize teleworking, taking advantage of its benefits and facing its challenges. In this sense, possible relevant research topics are detected. For example, it is pertinent to identify and analyze in depth the characteristics of teleworkers in Latin America, as well as their dynamics, especially in the recent adoption process of this modality of work. It would also be useful to broaden the research on the working conditions of teleworkers in relation to other types of workers.

References

Albrieu, R. (2020). “Evaluando las oportunidades y los límites del teletrabajo en Argentina en tiempos del COVID-19.” Buenos Aires: CIPPEC.

Amigoni, M., and Gurvis, S. (2009). “Managing the Telecommuting Employee: Set goals, monitor progress, and maximize profit and productivity.” EEUU: Adams Business.

Baines, S. (1999). “Servicing the Media: Freelancing, Teleworking and 'enterprising' careers.” New Technology, Work and Employment.

Baruch, Y. (2001). “The Status of Research on Teleworking and an Agenda for Future Research.” International Journal of Management Reviews, 3, 113-129.

Baruch, Y., and Nicholson, N. (1997). “Home, Sweet Work: requirement for effective home-working.” Journal of General Management, 23(2), 15-30.

Benjumea-Arias, M., Villa-Enciso, E., and Valencia-Arias, J. (2016). “Beneficios e impactos del teletrabajo en el talento humano. resultados desde una revisión de literatura.” Revista CEA, 59-73.

Beraud, I. (2018). “Cuarta Revolución Industrial. Impacto de la Inteligencia Artificial en el modo de producción actual.” Revista Conjeturas Sociológicas.

Brussevich, M., Dabla-Norris, E., and Khalid, S. (2020). Is Remote Working? An Index of Teleworking Capacity by Country. In IMF, IMF Research Perspectives: Fall-Winter 2020. Washington D.C.: IMF.

Bureau of Labour Statistics. (2019). “Job flexibilities and work schedules, 2017-2018. Data from the American Time Use Survey.” U.S Department of Labour.

Cabrera, R. (2016). “España 4.0. El reto de la transformación digital de la economía.” Madrid: Siemens.

Cabrera, S. (2020). 2Las Organizaciones y el desafío de Formación Permanente del Recurso Humano en Tecnologías Digitales para enfrentar la Cuarta Revolución Industrial. Revisión de Literatura.” In K. Gherab, Tecnociencia, innovación y sociedad. Madrid: GKA Ediciones.

Cárdenas, J., Motana, J., and Bosworth, D. (2021). “Which Workers are Most Exposed to covid-19 and Social Distancing Effects in a Dual Labour Market?” Revista de Economía del Rosario, 1-44.

Castellano, M., Faria, C., Virviescas, M., and Martínez, J. (2017). “El teletrabajo como estrategia laboral competitiva en las PYME Colombianas.” Espacios.

Cherns, A. (1976). The principles of sociotechnical design. Human relations, 783-792.

CNI. (2020). “Teletrabalho no Brasil e Mundo: legislações comparadas estudo de relações do trabalho.” Brasilia: Confederação Nacional da Indústria.

Comín, F. (2011). “Historia económica mundial. De los orígenes a la actualidad.” Alianza Editorial.

Convention 177. (1996). Home Work Convention. Geneva: ILO.

Da Silva, A. (2020). “Teletrabalho: origem, conceito, fundamentação legal e seus desafios.” JUS.

DANE. (2020). “Acciones del DANE frente a la crisis de COVID 19 - Gran Encuesta Integrada de Hogares – GEIH”. Bogotá: DANE. Retrieved from https://rtc-cea.cepal.org/sites/default/files/rtc_connected/files/acciones-dane-covid.pdf

DANE. (2021). “Formulario Gran Encuesta Integrada de Hogares - Trimestre I.” Bogotá.

Decree 884. (2012). “Por medio del cual se reglamenta la Ley 1221 de 2008 y se dictan otras disposiciones.” Bogotá: República de Colombia.

Dingel, J., and Neiman, B. (2020). “How Many Jobs Can be Done at Home?” NBER - Working Paper 26948.

ECLAC. (2022). Lessons and challenges of the COVID-19 pandemic for household surveys in Latin America. ECLAC. Retrieved from https://repositorio.cepal.org/handle/11362/47989

Ellison, G., and Glaeser, E. (1999). The geographic concentration of industry: Does natural advantage explain agglomeration? American Economic Review, 311–316.

Espinoza, R., and Reznikova, L. (2020). “Who can log in? The importance of skills for the feasibility of teleworking arrangements across OECD countries.” OECD Social, Employment and Migration Working Papers (242), 1-26.

Eurofound and ILO. (2019). “Working anytime, anywhere: The effects on the world of work.” Geneva: ILO.

Feldman, M., and Audretsch, D. (1999). Innovation in cities: science-based diversity, specialisation and localized competition. European Economic Review, 409–429.

Fernández, A., and Díaz-Pérez, S. (2018). “La cuarta revolución industrial y la agenda digital de las organizaciones.” Economía Industrial, 95-104.

Foschiatti, C., and Gasparini, L. (2020). “El Impacto Asimétrico de la Cuarentena: Estimaciones en base a una caracterización de ocupaciones.” CEDLAS: Working Paper.

Gajendran, R., Harrison, D., and Delaney-Klinger, K. (2015). “The Good, the Bad, and the Unknown About Telecommuting: Meta- Analysis of Psychological Mediators and Individual Consequences”. Personnel psychology, 353-393.

Gentilin, M. (2021). “Pasado, presente y futuro del Teletrabajo. Reflexiones teóricas sobre un concepto de 50 años.” Working Paper - Universidasd EAFIT.

Goés, G., and Martins, F. (2020). “Nota Técnica Potencial de teletrabalho na pandemia: um retrato no Brasil e no mundo.” Carta de Conjuntura.

Golden, T., Veiga, J., and Dino, R. (2008). “The impact of professional isolation on teleworker job performance and turnover intentions: Does time spent teleworking, interacting face-to-face, or having access to communication-enhancing technology matter?” Journal of Applied Psychology, 1412–1421.

Greer, T., and Payne, S. (2014). “Overcoming telework challenges: Outcomes of successful telework strategies”. The Psychologist-Manager Journal, 87–111. doi: https://doi.org/10.1037/mgr0000014

Greif, M. (1991). The visual factory: building participation through shared information. Portland: CRC Press.

Guyot, K., and Sawhill, I. (2020). Telecommuting will likely continue long after the pandemic. The Brookings Institution. Retrieved from https://www.brookings.edu/blog/up-front/2020/04/06/telecommuting-will-likely-continue-long-after-the-pandemic/

Guntin, R. (2020). "Trabajo a Distancia y con Contacto en Uruguay." Mimeo.

Hensvik, L., Le Barbanchon, T., and Rathelot, R. (2020). "Which Jobs Are Done from Home? Evidence from the American Time Use Survey." IZA Discussion Paper Series.

IBGE. (2020). Nota Técnica - Informações referentes à divulgação dos dados do 2 o trimestre de 2020. Rio de Janeiro: IBGE. Retrieved from https://biblioteca.ibge.gov.br/visualizacao/livros/liv101808.pdf

IBGE. (2021). "Dicionário das variáveis da PNAD contínua."

IBGE. (2021B). "Classificação de Ocupações para Pesquisas Domiciliares." IBGE.

ILO. (2006). "Occupations in Information and Communications Technology: Options for Updating the International Standard Classification of Occupations." ILO Discussion Paper - Policy Integration Department Bureau of Statistics.

ILO. (2020). "2020 Labour Overview. Latin American and Caribbean. Covid 19 - Edition." Policy Brief.

ILO. (2020A, Julio). "COVID-19: Guidance for labour statistics data collection - Defining and measuring remote work, telework, work at home and home-based work." Technical Note.

ILO. (2020B). "Working from Home: A potential measure for mitigating the COVID-19 pandemic." Policy Brief.

ILO. (2020C). "ILO Monitor: COVID-19 and the world of work. Second edition. Updated estimates and analysis." International Labour Organization.

ILO. (2021). "ILO Monitor: COVID-19 and the world of work. Seventh edition." International Labour Organization.

ILO. (2021). "Working from home: From invisibility to decent work." Geneva: ILO.

ILO. (2021A). Labour Overview 2021 - Latin America and the Caribbean. Lima: ILO.

INDEC. (2001). "Classificação de Ocupações para Pesquisas Domiciliares." Buenos Aires: INDEC.

INDEC. (2003). “La nueva Encuesta Permanente de Hogares de Argentina.” Buenos Aires.

INDEC. (2020). Consideraciones metodológicas sobre el tratamiento de la información del segundo trimestre de 2020. Buenos Aires: INDEC. Retrieved from https://www.indec.gob.ar/ftp/cuadros/menusuperior/eph/EPH_consideraciones_metodologicas_2t20.pdf

INDEC. (2021). “Encuesta Permanente de Hogares: Diseño de registro y estructura para las bases preliminares Hogar y Personas.” Buenos Aires.

Jaramillo, F., and Restrepo, F. (2011). “El perfil del teletrabajador y su incidencia en el éxito.” Revista Virtual Universidad Católica del Norte, 1-6.

Jones, J. (1957). “Automation and Desing.” Desing, 103-110.

Kelly, M. (1985). “The Next Workplace Revolution: Telecommuting.” Supervisory Management, 30(10), 2-7.

Kuper, H. (2020). “Industry 4.0: Changes in Work Organization and Qualification Requirements - Challenges for Academic and Vocational Education.” Entrepreneurship Education, 3, 119-131.

Laloux, F. (2014). “Reinventing organizations: a guide to creating organizations inspired by the next stage in human consciousness.” Brussels, Belgium: Nelson Parker.

Lamond, D., Standen, P., and Daniels, K. (1998). “Contexts, Cultures and Forms of Teleworking.” Management Theory and Practice: Moving to a New Era.

Las Heras, M., and Barraza, M. (2019). “Un lugar de trabajo sostenible: hacia un modelo remoto y presencial.” IESE.

Law 1221. (2008). “Por la cual se establecen normas para promover y regular el Teletrabajo y se dictan otras disposiciones.” Bogotá: Congreso de la República de Colombia.

Law 13.467. (2017). “Altera a Consolidação das Leis do Trabalho(CLT).” Brasilia: Órgão: Atos do Poder Legislativo.

Law 27.555. (2020). “Régimen Legal del Contrato de Teletrabajo.” Buenos Aires: Congreso de la República Argentina.

Leibovici, F., Santacreu, A., and Famiglietti, M. (2020, March 24). “Social Distancing and Contact-Intensive Occupations.” Retrieved from Federal Reserve Bank of St. Louis.: https://www.stlouisfed.org/on-the-economy/2020/march/social-distancing-contact-intensive-occupations

Marshall, A. (1919). Principles of economics. London: MacMillan.

Maurizio, R. (2021). “Desafíos y oportunidades del teletrabajo en América Latina y el Caribe.” Nota Técnica - Serie Panorama Laboral en América Latina y el Caribe 2021.

Messenger, J., and Gschwind, L. (2016). “Three generations of Telework: New ICTs.” New Technology, Work and Employment, 195-208.

MinTIC. (2020). “Quinto Estudio de Percepción y Penetración en Empresas Colombianas 2020.” Bogotá. Retrieved from https://www.mintic.gov.co/portal/715/articles-179742_recurso_1.pdf

Nilles, J. (1975). “Telecommunications and Organizational Decentralization.” IEEE Transactions on Communications, 1142-1147.

Nilles, J., Carlson, F., Gray, P., and Hanneman, G. (1976). “The Telecommunications-Transportation Trade-Off.” Chichester: Wiley.

Oviedo-Gil, Y., and Cala, F. (2023). “Teleworking and Job Quality in Latin American Countries: A Comparison from an Impact Approach in 2021”. Social Sciences, 12(253), 1-18. https://doi.org/https://doi.org/10.3390/socsci12040253

Oviedo-Gil, Y., and Cala, F. (2023A). “Dynamics of the Determinants of Teleworking in Colombia, Brazil, and Argentina 2019-2021”. International and Multidisciplinary Journal of Social Sciences, 1-33. https://doi.org/http://dx.doi.org/10.17583/rimcis.11541

PNUD. (2020). “Encuesta: Respuestas de las empresas argentinas ante el impacto de la cuarentena general en sus operaciones.” Programa de Naciones Unidas para el Desarrollo. Retrieved from https://www.ar.undp.org/content/argentina/es/home/library/environment_energy/PGEncuestaCOVID19.html

Raghuram, S., Wiesenfeld, B., and Garud, R. (2003). “Technology enabled work: The role of self-efficacy in determining telecommuter adjustment and structuring behavior.” Journal of Vocational Behavior, 180-198.

Requeijo, J. (2021). “Economía Mundial.” McGraw Hill.

Saltiel, F. (2020). “Who Can Work from Home in Developing Countries?” Mimeo.

Sánchez, G., and Montenegro, A. (2019). “Teletrabajo una propuesta de innovación en productividad empresarial.” Dialnet.

Tapasco, O. (2021). “Factores que inciden en la productividad laboral del teletrabajador en el contexto del sector de servicios intensivos en conocimiento.” Manizales: Tesis Doctoral.

Toffler, A. (1980). “The Third Wave.” London: Collins.