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Digital divide, skills and perceptions on smart working in Italy: from necessity to opportunity

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Abstract

This is a pioneering study on how smart working could influence the way of working in Italy. The COVID19 pandemic is making workers discover opportunities that should have been seized 30 years ago. Once the emergency is over, the world and working methods will never be the same. The Coronavirus emergency has accelerated a reflection on smart working to govern the necessary changes in the organization of work also in the medium term. For this reason, the aim of the present research was to carry out a survey on smart working on the entire Italian national territory. Although the study is a pilot study, the survey results are encouraging giving the opportunity to reflect and define strategies. For this reason, is imaginable and desirable that further relevant national initiatives will be started during the year to investigate needs, define good practices on smart working and promote this "new" way to work.

Keywords: Digitalization; COVID19; smart working; smart manufacturing; digital divide

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1. Introduction

In Italy, smart working was introduced in 2017 with the approval of the law on Agile Work. However, the debate on the smart working is growing. The COVID19 pandemic has forced almost all production activities towards "*smart working*". The social life and the people working has been defined in a new way. All activities have been reorganized according to Italian government regulations on virus spread containment (March 9 DPCM "I'm staying home"). This conversion exploded when a profound transformation of the production systems was already underway [1], [2], [3]. The so-called Fourth Industrial Revolution (I4.0) had already pushed in come on the processes of digitization from bring the development of a world featured from: total connectivity (all is interconnected, anything, anywhere, anytime); a great mass of data personal (big date), the development of cybernetic production systems. Of course, not all economic activities take place in this way [4], [5], [6]. Sectoral, dimensional, and territorial differences entail a different degree of use of these technologies, but certainly the degree of diffusion is increasing in each sector [7], [8], [9]. Definitively, Italy is discovering a new way to work, a smart way to work in a digital era [10], [11]. The questions are: How is the quality of life in Italy today from the point of view of the digital services? What is the level of broadband infrastructures, cybersecurity, internet services provided for example by public bodies? The ***Digital Quality of Life Index*** (https://surfshark.com/dql2020) tries to answer these questions, a report prepared by *SurfShark*, a company that deals with VPN (virtual private networks), taking into consideration 5 parameters (Internet affordability; Internet quality; E-infrastructure; E-security and E-government) of the 85 most advanced countries in the world. Italy ranks at number 20 in the ranking. Not bad if we think we have 65 other nations behind us but much less well if we consider that the most important countries of the European Union Denmark, Sweden, France, Norway, Holland, United Kingdom, Poland, Estonia, Finland, Austria, Switzerland and Spain they all precede us. Another, important indicator is the *Digital Economy and Society Index* (DESI), that is a composite index that summarizes relevant 5 indicators (Connectivity; Human capital; Use of internet services; Integration of digital technology and Digital public services) on Europe's digital performance and tracks the evolution of EU Member States in digital competitiveness. Over the past year, all EU countries improved their digital performance. Finland, Sweden, Denmark and the Netherlands scored the highest ratings in DESI 2020 and are among the global leaders in digitalisation. These countries are followed by Malta, Ireland and Estonia.

Until now, the issue of the *digital life* had only been considered sporadically, but with the COVID-19, it has assumed a decisive importance. In this context, digitization is no longer the future, it is not possible. No, it is already the present. Today the market, whatever it is, is digital. We carry out every task with digital tools, via our smartphone or with our corporate and personal PC. A company that does not embrace digitization is a company destined to close or to be rid of the competition. In the context of the COVID-19 emergency smart working has literally saved many companies and allowed many entrepreneurs to continue to provide their services almost continuously. Smart working requires a digital re-engineering of the processes themselves. It is necessary to be efficient, effective and safe, respecting the new ways of working. It is not possible to apply smart working, without an important change in the mindset, in company processes and in relations with customers and suppliers. Without Digitization there can be no Smart Working. In recent decades there has been a real evolution of the concept of "physical workspace", due to the digital transformation process. At one time the "workstation" was simply made up of a desk, telephone, and fax. Today the situation has radically changed, and we can talk about digital workplace or workplace 4.0, understood as a place that goes beyond physical space [12]. The 4.0 office has no walls or addresses: all you need is a smartphone, an internet connection, and an efficient system of corporate collaborative software to work from anywhere, without interrupting the flow of information [13]. Smart Working, in fact, needs technologies to make its practices and models concrete, but at the same time it represents a great lever for a radical digitization of the company [14]. We cannot speak of smart working if the company has not first understood the importance of digitalization not only of processes, but also and above all in the mentality of employees.

Thus, the present research is pioneering study that aims to investigate how smart working could influence the way of working in Italy and how the COVID-19 is accelerating the transition to smart working in many companies. For this purpose, first of all a research was conducted to understand the state of the art. Subsequently a survey was designed to investigate the phenomenon at national level. According to the previous considerations, the rest of the paper is organized as follows: Section 2 intends to provide a first analysis of academic literature, considering that the topic is very recent. Section 3 provides details on methodological approach. 4. Good practice recommendations on

smart working are summarized in Section 4. Finally, the main conclusions of the study and future development are presented in Section 5.

Nomenclature

COVID19	Coronavirus
DPCM	Decree of the President of the Council of Ministers
DESI	Digital Economy and Society Index
DQL	Digital Quality of Life Index
I4.0	Fourth Industrial Revolution
EU	European Union
VPN	Virtual Private Networks

2. State of art on the relationship between smart working and COVID-19

An investigation of SCOPUS, the largest abstract and citation database of peer-reviewed literature, pointed out that the academic community is taking an interest in the issue that links smart working to the pandemic. Of course, the result is not surprising. In detail, the following search tips were used: (TITLE-ABS-KEY (smart AND working) AND TITLE-ABS-KEY (covid) OR TITLE-ABS-KEY (coronavirus)). It is interesting to note that although the pandemic exploded in March 2020, 8 scientific papers have already been published on "*smart working and COVID-19*" in the current year. Naturally, there are no publications before 2020. It emerges that 50% of the publications are by Italian authors (followed by United Kingdom and United States). While, documents by subject area are distributed as below: Medicine (66,7%); Computer Science (11,1%); Mathematics (11,1%); and Social Science (11,1%). Table 1 shows the full list of papers retrieved and analyzed.

Table 1. Full list of papers retrieved and analyzed.

Authors	Document by Type
Gebbia, V., Bordonaro, R., Blasi, L., (...), Tralongo, P., Firenze, A.	Article
Sarti, D., De Salvatore, M., Gazzola, S., Pantaleoni, C., Granocchio, E.	Letter
Cervino, G., Oteri, G.	Editorial
Soled, D., Goel, S., Barry, D., (...), Vora, K., Scott, K.W.	Article
Rodriguez Socarrás, M., Loeb, S., Teoh, J.Y.-C., (...), Van Poppel, H., Gómez Rivas, J.	Review
Rubulotta, F., Soliman-Aboumarie, H., Filbey, K., (...), Ganau, M., Hemmerling, T.M.	Article
Bianchi, S., Gatto, R., Fabiani, L.	Note
R, V.A., J, P., P J, K., (...), S, S., Jothikumar, R.	Article

Gebbia et al. [15], denounced that smart working may be very useful, but it may harbor potential legal harms for health personnel and patients and safety. Moreover, authors declared that more articulated legal regulations are strongly needed starting from lessons learned from this epidemic. Presumably, a similar epidemic may happen again in an unpredictable future. While, Sarti et al. [16], conducted a study within the Management of Fondazione IRCCS Istitute Neurologico Besta in Milan. As is well known, Milan is the city most affected by COVID-19. Thus, in their research, authors described how the Institute started a project of telemedicine for outpatient activities and allowed smart working procedures for professionals involved in children diagnosis and rehabilitation, with the only exception of doctors and nurses. Similarly, Cervino and Oteri [17] described in a hospital scenario in which telemedicine, smart phones and apps are applied in order to prevent virus transmission and to perform quick diagnosis and management at medical offices. The manuscript could be an important starting point for future perspectives about telemedicine and virtual patient management. Always in the medical field an interesting point of view was proposed

by Soled et al. [18]. At Harvard Medical School (HMS), student leaders created a COVID-19 Medical Student Response Team to develop a student-led organizational structure that would optimize students' ability to efficiently mobilize interested peers in the COVID-19 response, both clinically and in the community, in a strategic, safe, smart, and digital way. Rodriguez Socarrás et al. [19], declared that telemedicine provides remote clinical support using technological tools. It may facilitate health care delivery while reducing unnecessary visits to the clinic. Of the same opinion are Bianchi et al. [20]. A different point of view is provided by Rubulotta et al. [21]. In Their study, authors declared that the working conditions in isolation could cause gaps or barriers in communication, fatigue, and poor documentation of provided care. Implementing technologies for safeguarding health care providers as well as monitoring the limited pharmacological resources are paramount. Finally, Vijay Anand et al. [22], explained how IoT in prevention of COVID-19 and health care workforces behavioral intention in India is a key factor. The state of art is promising [23]. However, at present it is much more focused on the medical aspects. There is a lack of research that analyze the impact of digitization on work or rather how smart working is influenced by digitization and how new pandemics can represent a continuous threat to traditional work. Our research intends to investigate the above factors and aims to cover the literature gaps.

3. Material and methods

Conducting survey research may seem like a simple task, but when it is not done correctly, it wastes time and money [24], [25]. Thus, the proposed survey is based on a rigorous scientific approach, as shown in Figure 1 and detailed below.

Fig. 1. Steps of the survey

Step#1: Define the goal. The first step, which is also the most important, is to precisely identify the goal of the investigation. A clear and focused goal helps create a survey that contains only the necessary questions. A survey should be logical, focused and short. Before to start a survey, it is necessary to form a clear picture of the expected outcome.

Step#2: Define the questions. The survey questions should be clear. Vague, general, multi-part questions can be confusing and difficult to answer. There are many different types of questions that can be used on a survey, like open questions, closed questions, matrix table questions, and single- or multi-response questions. Other important considerations followed in our investigation are:

- Avoid Yes/No questions as this type of question does not capture the nuances in the respondents' opinions;
- Avoid tables. In fact, when faced with a table, respondents are usually more focused on filling in the grid, rather than really paying attention to each question, which could affect the quality of the data.
- Use words, not numbers. In fact, to use phrases such as "unlikely" or "extremely likely" rather than numbers such as "2" or "4" to indicate degree of preference allows for better results. Response options

using the *Likert scale* are easier to understand. Likert scales (named after their creator, the American sociologist Rensis Likert) offer one of the most reliable systems for measuring opinions, perceptions and behaviors;

- Create closed-ended questions. Open questions take effort and time. As a result, respondents leave the survey earlier than they would if the questions were closed-ended.
- Do not include personal opinions in questions (or ask "leading questions") to avoid "conditioned" responses that do not fully correspond to reality. In fact, if respondents are not empowered to provide honest and thoughtful feedback, you risk getting unreliable answers.
- Make most questions optional. Participants may not be able to answer all of your questions, or sometimes they may simply not feel comfortable answering them.

Step#3: Invite the participants and gather responses. There are many ways to invite people to take part in an online survey. An email to our subscriber list was sent. Furthermore, the survey was posted on Facebook and LinkedIn. There is no worse feeling than discovering that a newly submitted survey contains errors. Thus, to prevent errors first the survey was shared with colleagues and an ideal cluster of stakeholders.

Step#4: Analyse the results and write a report. After all responses were gathered, all results were visualized by using charts and graphs, as this helped us quickly reference our results in reports. Finally, in conducting online surveys is necessary to write a report explaining our findings and whether they have met our research goals.

4. Good practice recommendations on smart working

The survey is based on a standardized questionnaire which required 10 minutes of your time. The Coronavirus emergency has given a strong impetus to the adoption of smart working, making it necessary to reflect on the modalities to govern the necessary changes in the organization of work also in the medium term. For this reason, the present survey was carried out. It was administered on a sample of over **500 companies** distributed throughout the entire Italian national territory. The survey results are encouraging. Here below a summary of the main results is provided. Most respondents are 61% men, while 39% are women. The mean age of respondents using smart working is between 31 - 40 years (41%). Currently operate in agile work mode just under half of the workers, but there is a perception that this can be increased percentage up to involving six out of ten workers. The workers also appreciate this method and there are no major differences between employees of different ages and different functions in adapting to smart working. Companies are willing to invest to spread remote work and consider making available to employees' adequate technological equipment is a priority as well as a new work organization and activity planning models by objectives. The survey showed greater use of smart working, in the North Italy (41%) compared to the South (25%). In particular, smart working is used above all in Lombardia (39%), followed by Lazio (32%) and Campania (29%). The results is not a surprise as these regions are the most populous in Italy (see Figure 2).

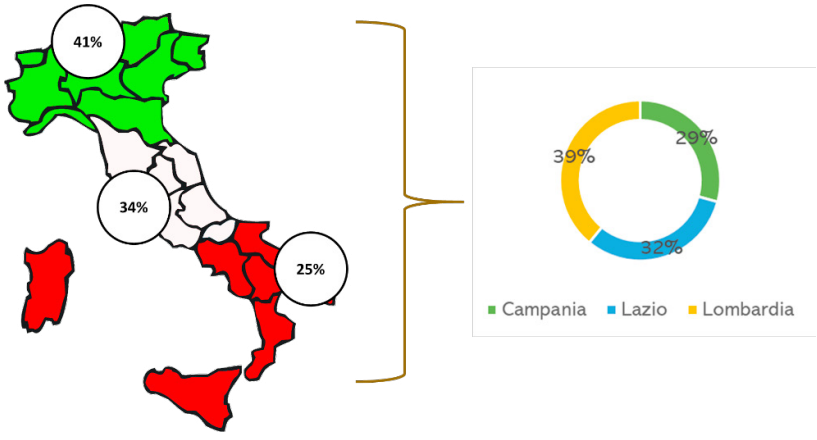

Fig. 2. Geographic distribution

The survey pointed out that most of the interviewees work in the industrial sector (39%). Most of the respondents (about 65%) work in a large company/multinational; as shown in Figure 3.

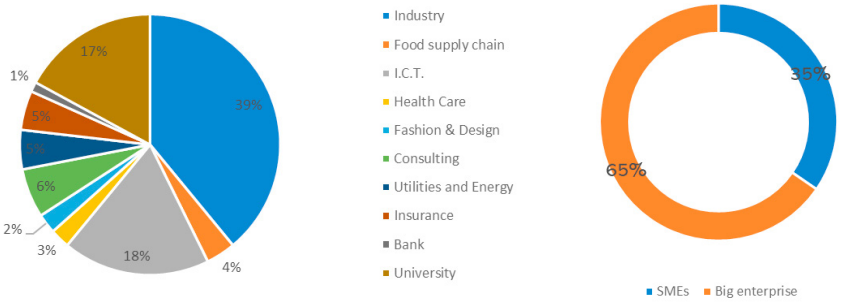

Fig. 3. Sector of companies / organizations

Most of them are employees on permanent contracts (70%). It emerged that 96% of them generally work full time (morning and afternoon), flexibly during the day (18%). Other interesting aspect is that 64,7% of them claimed to use the car to go to the workplace. In Italy, before COVID-19, the companies that had activated smart working were less than 50% as followed: 19% of them adopted smart working only for specific work activities; 15% of them adopted smart working only for employees with specific tasks and by choice of the employer; 12% of them adopted smart working only for employees with personal needs. However, due to the COVID-19 pandemic, many companies have been forced to use smart working as followed: 63% of them adopted smart working for all employees. Only 2% of them did not adopt smart working despite the lockdown period (see Figure 4).

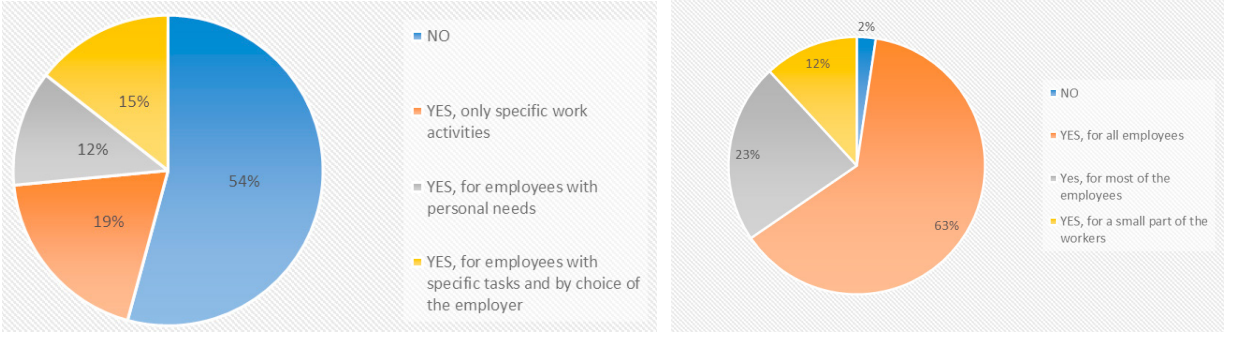

Fig. 4. Smart working before COVID-19 (left); Smart working during COVID-19 (right).

Of course, it was necessary also to investigate *how smart working was "activated"*. Considering this aspect, it emerged that in 46% of cases, smart working was a necessary condition and imposed by the CEO; in 31% of cases, smart working was agreed according to specific tasks. Furthermore, emerged that in 71% of cases, smart working was applied full time. Another interesting aspect that emerged is that 45% of employees declared that can be useful to work in smart working even after the pandemic not full time, but for 1-2 days a week.

To deal with the health emergency, the reaction of the Italian companies was prompt and decisive. Over 29% of them provided equipment and devices to workers such as PC/Tablet/notebook (see Figure 5).

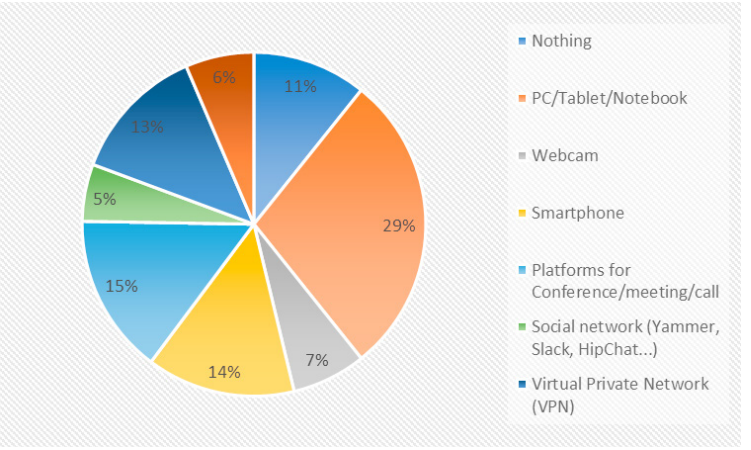

Fig. 5. Devices and equipment provided for smart working.

Obviously, several and different web platforms were used during smart working. The most used communication platforms for smart working were Microsoft Teams and Skype as shown in Figure 6.

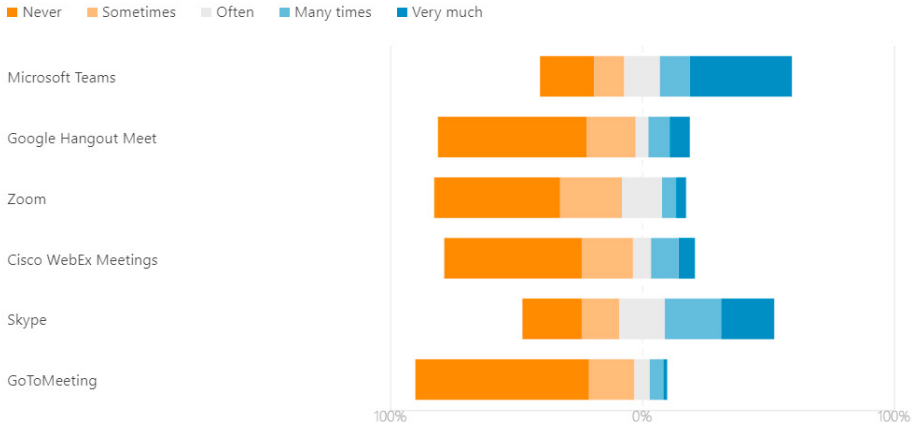

Fig. 6. Web platforms for smart working.

To encourage smart working, one or more activities were implemented as shown in Figure 7.

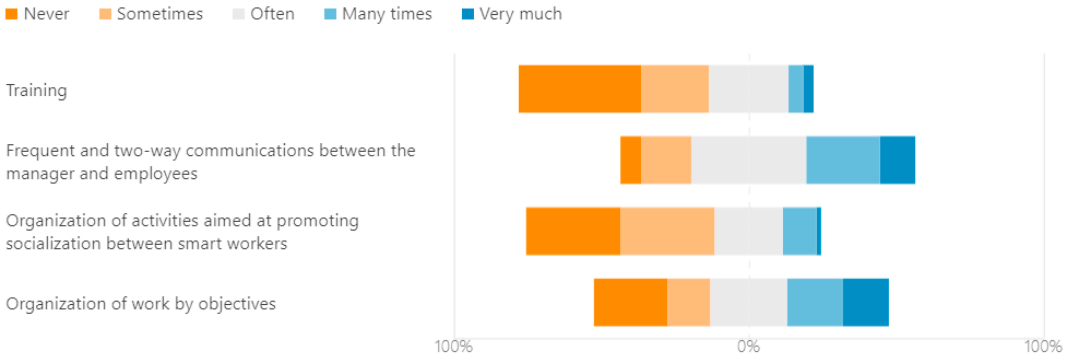

Fig. 7. Activities have been implemented for smart working.

The survey pointed out that some criticalities of smart working. Some of them are: 1) loss of the social aspect of work (21,7%); lack of a clear line between work and personal life (15,7%); and technostress (10,8%). However, the interviewees also highlighted many strengths related to smart working. Most of them declared that smart working helped the conditions of well-being (73,9%). Furthermore, most of them declared that productivity in the workplace increased (48,4%). 85% of the interviewees affirmed that smart working reduced the costs related to parking, gasoline, lunches, etc. Finally, the survey investigated what are the fundamental elements to best implement smart working. Results are shown in Figure 8. It emerged that the main critical element is the importance of digitization of business processes and use of digital technologies (27%), followed by the importance to define measurable actions (17%) and the importance to adopt a result oriented approach (17%).

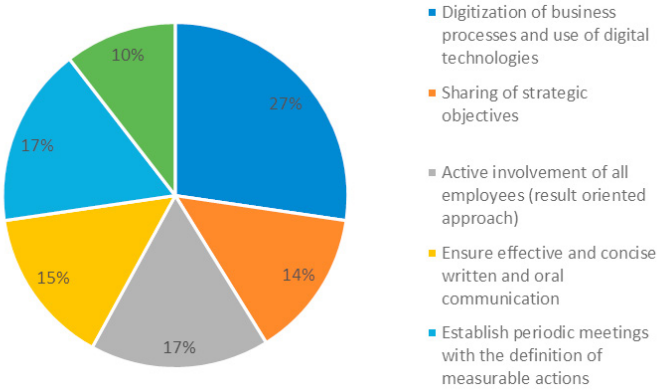

Fig. 8. Fundamental elements to best implement smart working.

Definitively, the interviewees perceived the high utility of smart working, but they recognized a technological gap between what could be done and what can be done.

5. Conclusions

The present research aimed to investigate how the COVID-19 is changing the way of work in Italy. There will certainly be changes. One of these will be the way to stay at work. Many people are experimenting smart working, even if they are doing it more out of necessity than out of personal conviction. And perhaps many people are understanding that it is the best solution, which guarantees a good quality of life and a good product regardless of the presence. There will be change, indeed there is already: right now, there are 3-400 million people in the world who are working from home. This figure would never have been possible without fear of an epidemic. Thus, how do we live in digital Italy in 2020? We are behind. Our companies are behind companies in other countries, which are more prepared and trained than ours. But if this is so then it is also true that the coronavirus represents a great opportunity for change, we must seize it. The question is if we had already had smart working widespread in our companies, could the virus have been contained? Of course. There is no doubt. And then we would have increased the country's productivity by 20% and reduced the waste of money that thousands of workers have to endure to move from one place to another, as well as the money spent on babysitters. We would have increased the quality of life, also obtaining environmental benefits, less traffic on the street and the companies would have saved space and services and reduced conflict between employees. The benefits are immense, but we need the pestilence to understand it. Future developments of the present research will promote relevant national initiatives that will be started during the year in order to investigate needs and good practices on smart working.

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