Framing smart working in the Covid-19 Era: a data driven approach

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Abstract

Smart working was introduced as an agile and dynamic way of working providing high levels of performance, productivity, and job satisfaction in a “triple-win” configuration for customers, employees, and organizations. While the advantages and disadvantages of these new working practices have been identified in literature, what remains unclear is how they were perceived on a broad-scale, especially in view of their massive adoption during the Covid-19 pandemic. Based on these considerations, this work carried out a big data analysis to provide a frame for the collective perception on smart working. A large-scale text analytics study was conducted on Twitter from January to June 2021. The data-driven approach identified the most frequently used macro-concepts on smart working. Of these, the five positive perceptions were smartness, work-life balance, flexible approach, productivity, and innovative working environment while the other five on negative perceptions were tech paralysis, technostress, technology hiccups, demotivation, and social isolation. In this sense, the study offers several insights by generating useful implications for researchers and professionals in organizational design as well as in psychological and Human Resources Management.

1. Introduction

Over the last twenty years, work practices have been shaped by generational change, technological innovation, and by the emergence of new economic development models (Boorsma and Mitchell, 2011; Bednar and Welch, 2020). The new technological environment has provided opportunities for social innovation, community engagement, and economic growth, at whose core is a new way of understanding the relationship between individuals and their communities. Thanks to the development of interactive devices, including the World Wide Web, social networking, and smartphones, channels of access to information
have proliferated and multiplied, deeply affecting work practices in several sectors and the life of people all around. This scenario has spawned new paradigms on how work gets done, along with significant opportunities to innovate, leading to the definition of the so-called “smart working” concept. Across-the-board, workers have begun engaging in more collaborative and flexible forms of work so that their work contribution may be from virtually anywhere and with almost anyone. At the same time, the increasing demands for swift, real-time access to information and partners, coupled with the growing complexity of knowledge work, are behind the need to collaborate and thus engage a broader workgroup to obtain results.

In such context, the Covid-19 pandemic accelerated digitalising the economy and organizations, just as it brought to the forefront many issues and transformations that would have otherwise taken longer to address and posed unique demands in terms of conditions and scale of technology adoption at work (Wang et al., 2021). So, even if smart working had taken longer to adopt since it had been considered as occasional work pattern, during pandemic many organizations sent their employees home and created the conditions that saw smart working as the most extensive, mass experiment on record. As the pandemic phenomenon was happening, several studies were conducted (Comacchio, 2021; Mascagna et al., 2019; Bednar and Welch, 2020; Murmura and Bravi, 2021; Rahman et al., 2020; BucEA-Manea-Töniș et al., 2021; Moretti et al., 2020; Mari et al., 2021). Their purely qualitative nature, however, left the question open as to how these new work practices were perceived by those experiencing them. So, while the extent of the phenomenon may have been acknowledged, and while most of the research conducted was empirical and related to a limited number of people, how these new work practices were generally perceived remained unclear. This contribution looks at this question and paves the way for further large-scale investigations on smart working practices.

With these considerations in mind, this work carried out a big data analysis to frame the collective perception about smart working.

Briefly, Section 2 provides an overview of the theoretical background for our reflections with specific reference to the definition of smart working as well as the benefits and pitfalls in pre- and during the Covid-19 pandemic; Section 3 introduces the methodological framework for carrying out the sentiment analysis on Twitter; Section 4 provides an overview and discussion of the results; Section 5 finally lists the main theoretical and practical implications for our reflections and draws the main conclusions and directions for future research.

2. Literature review

The digital revolution along with socio-economic changes have led to organizing work through innovative approaches that rely on flexible arrangements and widespread use of Information and Communication Technologies (ICTs) so that work may potentially be carried out in “any time and space” (De Leede and Heuver, 2016). Such approaches denoted as “smart working” practices, while connected to different fields related to the technological revolution (as in Figure 1 below), generally refer to a new model of work organization (Boorsma and Mitchell, 2011; Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016; Bednar and Welch, 2020).
Figure 1: Keywords’ co-occurrences map for “smart working” - authors’ elaboration on VOSviewer (Van Eck and Waltman, 2013).

The co-occurrence map in Figure 1 was generated via the VOSviewer software used to build and view bibliometric maps (Van Eck and Waltman, 2010). Looking at the five clusters in the graph, it is possible to identify the two main research fields mentioned above and related to smart working. The clusters in green, purple, yellow, and orange are closely linked to each other and include keywords related to technological revolution such as: industry 4.0, smart manufacturing, internet of things, smart city, artificial intelligence, decision making, machine learning. Instead, the one in red includes keywords connected with organizational issues of smart working such as: job satisfaction, knowledge management, leadership, organization, smart work. The relevance of the organizational research area can be deduced from the higher numbers of co-occurrences in the red cluster and the size of the circle which states the number of publications associated.

The sample set of articles used for the bibliometric map consists of 303 research papers in English, published from 1983 to 2021, and on topics from either Business or Management. The search for articles was conducted on the largest academic online database, Scopus, utilising the keyword “smart working” in the title, abstract, and keywords. In the document selection process, only articles were chosen since they are considered documents with validated knowledge (Podsakoff et al., 2005). E-books, book chapters, conference papers, and articles under review, i.e., the gray literature (Adams, Smart and Huff, 2017), were not included because they are more variable and less available (Jones et al., 2011).

In the first subparagraph of the literature review, we start framing smart working in terms of main definitions and research fields related to it starting from the insights we obtained via VOSviewer. In the second subparagraph, we then present more detailed and integrated observations about smart working advantages and disadvantages in pre- and during the Covid-19 Era.
2.1. Framing smart working: main definitions and research fields

Among the most radical consequences of the Industry 4.0 paradigm and smart city model is the dematerialization of workplaces that results from the widespread adoption of digital tools (personal computers, tablets, smartphones). Connected to the Internet, these devices make it possible for workers to perform their services in places that are not necessarily the company’s buildings (Bednar and Welc, 2020; Kylili et al., 2020; Mubaroq et al., 2020; Kirimtat et al., 2020). The smart working agenda, indeed, is linked to the advent of Industry 4.0 and integrated manufacturing systems (Lee et al., 2018), the supply of services (Barile and Polese, 2010; Armenia and Loia, 2022), and the need to reach competitive advantage in complex context (Pahurkar et al., 2019; Festa et al., 2022).

However, the scope and the complexity of the digital revolution in the framework of Industry 4.0 and smart city highlight the importance of effective organizational analysis, especially recognizing the political and social dimensions involved. Digitally-enabled arrangements permeate and reshape different industries and fields of research, leading to deep changes in organizational models and Human Resources Management (HRM) practices (Alvesson and Kärreman, 2011). As a result, even if smart working has its roots in the digital revolution, its implications are mainly related to organizational aspects.

Smart working has, indeed, been defined as an evolutionary transformation taking place over a number of different dimensions in the world of work (Boorsma and Mitchell, 2011). In the context of the many changes in approaches to “work, work cultures, business architectures, premises, decision making, communications, and collaboration” (Boorsma and Mitchell, 2011, p.2), the physical place of work activities has become less important; on the other hand, aspects as collaboration, employee autonomy, talent management, and innovation have been acquiring greater relevance (Hamel, 2007). Lake (2013) instead highlights flexibility as a key feature of new, smart working practices. All this lies in the basic concept of placing man at the centre of the corporate organization. The idea of work in smart working arrangements is different, in as much as it is no longer associated with a place but in what is done and so in the results reached according to the objectives set ahead of time (Rodgers and Hunter, 1992; Watson and Gallagher, 2005; Antoni, 2005). Smart objectives consist of specific, measurable, achievable, relevant, and timely objectives in line with the SMART criteria suggested by Chen (2015).

It follows then that place and time can be managed alternatively. In this sense, flexibility in work schedule and locations has already been shown to increase employee morale, has been linked to the concepts of work–life balance, satisfaction, and performance (Hill et al., 2001; Gajendran and Harrison, 2007). Flexibility and disappearance of place however are only a feature of smart working, McEwan (2013) defines its practices as “agile, dynamic and emergent […] outcomes of designing organizational systems that facilitate customer-focused, value-creating relationships that are good for business and good for people”. The Chartered Institute for Personnel and Development – CIPID (2008) reports ‘smart’ work categorized as systems aimed at “managing and optimizing both the physical and philosophical work environments to release energy that drives business performance”. In the view of the CIPD, the focus in defining an organization as “smart” runs on two fundamental elements: core beliefs/culture and enable technologies that together enable “multiplicative relationships” – namely interacting sub-systems that, thanks to management values and high-performance systems, pervade and enhance working environments. Interacting technologies, to the extent
that they may be of support to knowledge management and virtual teams, manage knowledge heterogeneity and discontinuity (Yoo, 2010), are more likely to be effective if the organization designs them in such a way that it promotes self-determination and choice for those who engage with them. In this sense, socio-technical perspective and socio-technical design tools are needed to explore and support these ‘multiplicative relationships’. Other scholars shed light on the potential of these innovative work and management practices in fostering both organizational agility and new workforce expectations (Zheltoukhova, 2014; McEwan, 2016; Bednar and Welch, 2019). In this regard, a shared sense of trust and of building team spirit have become fundamental aspects (Allen, 2015), and a healthy daily routine may contribute to managing loneliness and isolation (Király et al., 2020; Boyer et al., 2016). These and other tools might lead to even better processes since virtual team meetings are better structured, and its members receive more reliable information on the other members’ moods and feelings via the online feedback tools (Rudolph et al., 2020).

Compared to the concepts of teleworking, telecommuting, home-working, or remote working, which more generally refers to any type of distributed work enabled by the use of ICTs (López-Igual and Rodríguez-Modroño, 2020; Loia and Adinolfi, 2021), smart working is an agile and dynamic way of working whose high levels of performance, productivity, and job satisfaction is a “triple-win” configuration for customers, employees, and organizations (Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016). In this sense, smart working requires a proper, “smart” leadership approach, one that has a participated view of change and a thinking ahead type of thinking. Smart leadership, in fact, refers to an agile and flexible approach that aims at creating an exciting and compelling vision, at inspiring people to deliver on it, at energizing them to unleash and exploit their talents, at managing a team with the wisdom that comes from experience and knowledge (Singh, 2017; Iannotta et al., 2020).

Particularly valuable were the "smart working" lessons that ensued from the recent Covid-19 pandemic. All within a very short time since the onset of this global crisis, governments enforced lockdown conditions, so that a large number of daily activities were redirected from industrial and office environments to workers' homes. In view of that, the great potential of the role of smart working strongly emerged. That said, much further research is needed to address the deep changes in how work was organizes during the pandemic, due to its strong socio-economic impact in such a brief time.

2.2. Advantages and disadvantages of smart working: pre- and during the Covid-19 Era

As recently as the last couple of years, smart working practices have shown to have great potential at multiple levels and have thus drawn significant attention from researchers and society alike.

The advantages associated with smart working generally include better work-life balance, saving time and money on commuting, lower rents and running costs for organizations, attracting new talents into the workforce, increasing productivity, and reducing absenteeism (Gastaldi et al. 2014; HM Government UK, 2015; Dominguez, 2017; Errichiello and Pianese, 2019). Its supporters also highlight that collaborative and mobile technologies provide better support for team-working and innovation (Bednar and Welch, 2020). Likewise, they hold that the pervasiveness of digital technologies may improve employees' productivity and
quality of the work experience (Tarafdar et al., 2015). Smart working seems to support the
goal orientation of managers in their relationships with their colleagues as well as facilitate
the crossing of the trade-off between work and life, being this one of the most relevant
challenges (Sarti and Torre, 2017). Moreover, smart working has been found as facilitating
work-life balance in some special circumstances. These include workers, for example, who
have chronic diseases, disabilities, who may be in therapeutic or pharmacological treatment
or experiencing other health-related situations, even if temporary. Thanks to smart working,
these employees can have work continuity and favour their psychophysical well-being
(Mascagna et al., 2019). On the other hand, smart working requires an optimal balance of
skills, engagement, and of supporting technologies and so it requires professional education
and commitment from staff (Bednar and Welch, 2020). Smart working is now recognized as
calling for very careful planning and can involve a shift of costs from the employer to the
employee. Likewise, during the period of smart working, employees may experience
increased isolation (Bednar and Welch, 2020), may feel bad from a psychological and/or
physical point of view (i.e., Tarafdar et al., 2015), and may have mental health problems and
experience mental disorders due to the changes in routine (ILO, 2021). From the employees’
point of view, smart working cannot be successfully implemented without adequate
computer equipment, technology, soft skills and no arrangement has been made for
 technological infrastructure to be enabled (Iannotta et al., 2020). Technological skills, indeed,
are crucial to achieve value-creation processes (Bednar and Welch, 2020; Zheltoukhova, 2014;
McEwan, 2016). Especially during the pandemic, skills such as dealing with simple technical
issues – i.e. accessing VPN, installing new software, or restoring backups – or identifying
major technical problems and asking for help when needed - are considered highly
important in remote working. Also, being able to handle technical devices, i.e. installing,
configuring and using basic communication equipment for remote work, is considered
extremely important (Siegl, 2021). Most advanced technological innovations can affect
existing jobs, especially with regards to aspects such as autonomy and control of workers
(Ales et al., 2018; Balsmeier and Woerter, 2019), standardization of behaviours, and a
decrease in the variety of activities and skills (Wang et al., 2021). Moreover, the concept of
 techno-stress has received growing attention from organizational scholars (Barley et al., 2011)
since employees struggle with the fast pace of innovations and have to spend more time and
effort in renewing their technological skills. This may lead to workers to being exposed to
continuous changes in work conditions, the risk of permanent availability, or the loss of
boundaries between working and non-working activities.

As Covid-19 spread in Spring 2020, a massive work-from-home (WFH) experiment abruptly
started almost worldwide along with big changes linked to the work detachment from
standard places where they used to be carried out  (Comacchio, 2021). In addition to the
benefits generally associated with smart working, several authors (Mascagna et al., 2019;
Bednar and Welch, 2020; Murmura and Bravi, 2021) shed light on the environmental benefits
generally recognized to smart working practices for air pollution reduction during the
pandemic. Along these lines increased labour productivity, eco-innovation, innovative
leadership approach, innovative work behaviour, and economic sustainability are associated,
to a higher extent, with companies that agreed to more flexible working practices (Rahman et
al., 2020; Bucea-Manea-Țoniș et al., 2021). However, other authors (Moretti et al., 2020; Mari et
al., 2021) shed light on the main pitfalls of smart working during the Covid-19 pandemic that
included work-related stress, mental health, and musculoskeletal problems.
Notwithstanding the unprecedented nature of the shutdown experience, the changes experimented in this period might go well beyond the end of the restrictive measures due to the estimated long-term growth of remote working, the acceleration of virtuality and connectivity at work. According to Hu (2020), this new normal, once in place during Covid-19, will necessitate new thinking about workplace management, space design, HRM, and organization design to disrupt many norms rooted during the industrial age. Yet, even if the extent of the phenomenon has been acknowledged, what is still unclear is how these new work practices have generally been perceived; likewise, since most research carried out has been empirical and related to a limited number of people, it opens the way for further investigations on large scale about smart working practices.

3. Materials and method: a data-driven approach on Twitter

While the Covid-19 pandemic has presented unprecedented challenges to humanity, the scientific community has been able to access openly available data online with the scope of advancing science in different fields of research (Lwin et al., 2020; Rufai et al., 2020; Shasi et al., 2021). Social media platforms such as Twitter and Facebook have an abundance of text data for research purposes (Banda et al., 2021). For our study however we opted to focus on Twitter. In addition to being a popular platform used around the world to discuss major social issues, Twitter has proven over the past decade to be a valuable resource during disasters for many-to-many crisis communication (Bruns and Liang, 2012; Zou et al., 2018).

In our data-driven approach, our main objective was to understand how smart working was perceived as Covid-19 spread. Likewise, since our aim was to avoid interpretive biases in tweet ratings, our analysis covered a six-month period, from the beginning of January to the end of June 2021. Within this time frame more than in any other period of the pandemic (Diamond, 2021), a greater number of people died from the disease even though vaccination plans had already begun. In fact, in that Spring even if the pandemic had passed its critical stage, many employees continued working remotely or in hybrid form until July 2021 (Estrada, 2020; Conger, 2020) due to the complex situation of variants still spreading.

The data we accessed had been captured via Twitter’s API, its application programming interface, whose back-end server stores all of people’s tweets and thus allows for its data collection. While there are ample methods to process data, we pursued the approach adapted from Miner et al. and used the TwitteR package for the R programming language. TwitteR provides a well-documented and accessible means of mining data in a commonly used statistical data mining program.

We utilised a dictionary-based method to analyse Twitter social media micro-blogging data. Adopting this approach, the semantic orientation of the text is calculated by summing the semantic orientation of words and phrases in the document. Specifically, this method relies on a specific dictionary of annotated words with their semantic polarity. Compared to Machine Learning techniques, the lexicon-based approach requires little effort in the human-labelled document and does not depend on the quantity and quality of the training dataset. Specifically, data collection was performed by establishing and then implementing specific filters in the form of hashtags so as to identify all user comments related to the topic of the analysis. A hashtag can be defined as a string of characters preceded by a hash character (#) that in a word summarises a concept then described in 280 characters or less. In our case, the
crawler solely considered tweets with the #smartworking hashtag. All text mining processes were defined and operationalized in R, an open-source statistical environment based on a programming language and a specific development environment for statistical data analysis.

Figure 2 below outlines the steps we took in building and analysing our dataset from Twitter. In the “Data access” phase, we employed the TwitteR package to filter and combine messages according to both a keyword (#smartworking) and a specific place. We then proceeded with cleaning the data. To do so, we utilised other packages to clean up special characters, such as carriage returns, removing URLs, large blank spaces, removing stop words (non-functional), punctuation, and performing stemming (i.e., getting the root of the words). The output of this step is a structured representation of the tweets called “Term-Document Matrix” whose contents are then used in the “Data analysis” phase which allows the extraction process, that includes finding association rules and the most frequent terms; performing sentiment analysis through the lexicon-based approach, which uses a set of positive and negative words. A scoring function is used to assign a score to each tweet. In the “Visualization stage”, the word-cloud package and bar graphs are shown to represent the frequency of words in the collected tweets and the sentiment and emotion scores.

Specifically, at the end of the collection phase, approximately 6,000 tweets were collected and analysed for proper interpretation. The dataset included tweets as well as retweets. There are several practical reasons for keeping the retweets; tracing important tweets and their dissemination is one of them (Banda et al., 2021). To prevent conceptual bias, as per the framework described above, the extracted text was cleaned of all stop words, punctuation, and white spaces. Specifically, after an initial step of determining the grammatical functions of words, Word Indexing grouped nouns that exceeded 1%. Next, synonyms were divided into homogeneous categories. After extraction, the word cloud representation of the tweets was performed. The size of each term in the cloud indicates how frequently the term was mentioned in the tweets, and thus reflecting its importance. Moreover, to investigate the impact of telecommuting on people during the pandemic, the emotional content of the text was highlighted, through emotion lexicons, a list of English words associated with eight basic emotions (anger, fear, anticipation, confidence, surprise, sadness, joy, and disgust) and two feelings (negative and positive). In addition, we put the data collected through the sentiment analysis module which allows identifying people’s perceptions about telecommuting: the most frequent words were then weighed against a sentiment lexicon to determine whether they were potentially positive or negative.
Figure 2. Methodological steps related to sentiment analysis on Twitter based on R Language - authors’ elaboration based on Loia and Adinolfi (2021) and Younis (2015).

4. Results and discussion

Data-driven analysis performed on Twitter enabled extracting the stream of data posted there on smart working by users around the world within the time interval mentioned. Specifically, about 6,000 tweets carrying the #smartworking hashtag were collected, cleaned, and analysed according to the methodological approach presented above.

4.1. Word cloud on #smartworking

Word cloud analyses enable us to visualise the word frequency on #smartworking. Aside from stop words, the more frequently terms appear within the Tweeter crawled text, the larger they show in the word cloud image generated. Their size in the figure, then, is directly proportional to the number of times of their occurrence in the text. In detail, words are colour-coded, red or blue, as per their positive or negative connotation.

As Figure 3 below illustrates, the overall frequency for the most positive or for the most negative terms is approximately the same. So, if difficulties (“hard”) and technical pitfalls (“cloud” and “break”) related to these new work modalities stand out among the negative terms, these preliminary results also provide insight into some positive perceptions associated with smart working, especially related to keywords such as “smart”, “benefits”, and “success”.

4.2. Most recurrent emotions related to #smartworking

From the perspective of users, the emotional content of the most recurring words associated with #smartworking is highlighted in Figure 4 below. As its graphs show, users increasingly acknowledged more positive emotions than negative ones. One possible explanation for this may be that, after an initial interval of high turbulence and fear which the emergency caused, smart working started being perceived, namely in the third wave of Covid-19, as a new working habit that could usher in different opportunities.

Assessing the most recurring words, “anticipation” emerges as a key emotion. Users show a form of excitement for smart working practices and their potential for success, better time management, and, more generally, for a happier and more joyful approach towards work. In this sense, users recurrently utilise “time”, “success” and “start” to express some form of enthusiasm about working at home. Something similar happens with joy, whose most recurrent keywords are “success” “love” and “enjoy”, representing those smart workers who appreciate having flexibility and independence in choosing their working hours and locations thanks to the use of digital tools which make greater agility in daily life possible. In this direction, most keywords related to positive emotions are “productivity”, “technology”, and “success”. This is in line with the literature (Boorsma and Mitchell, 2011; Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016; Bednar and Welch, 2020) which points out how the widespread use of ICTs allows smart working to improve performance, productivity, and thus results in a successful “triple-win” configuration for customers, employees, and
organizations (Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016). Keywords such as “team”, “enjoy”, and “management”, related to the emotion of trust, probably resulted since smart working practices involve a trust-based culture. This implies being confident for employees to act as mature individuals who can, having the appropriate guidance and management accord, make responsible choices on how to deliver work. This is a necessary context for result-based management whose focus is on the quality of employees’ work rather than on their turning up and sitting at a desk as literature indicated (Watson and Gallagher, 2005). This will in many cases require more systematic planning, organizing, and monitoring as well as knowing what the outputs and outcomes of people’s work should be.

Yet the analysis also sheds light on how this difficult global change has impacted living standards and circumstances which in turn have affected people’s emotional states. Undoubtedly, negative emotion (associated with keywords such as “pandemic”, “lazy”, “calls”), the emotion of sadness (related to “pandemic”, “revolution”, “losing”), and fear (associated with “pandemic”, “change”, and “revolution”) are very recurrent feelings in the interval that the analysis covers.

Figure 4. Emotion analysis of tweets related to #smartworking (Authors’ elaboration)

4.3. Advantages and disadvantages of #smartworking

The collected data were evaluated through the sentiment analysis module that allows identifying people's perceptions about smart working: the most frequent words were grouped into homogeneous categories according to similarity in meanings and then compared with a sentiment lexicon to establish their positive or negative potential. This identified 10 main concepts for #smartworking by Twitter users: five perceived positively (“Smartness”; “Work-life balance”, “Flexible approach”, “Productivity”, and “Innovative work behaviour”) and five perceived negatively (“Tech paralysis”, “Technostress”, “Technology hiccups”, “Demotivation”, and “Social isolation”), as shown below in Table 1.
Among the positive macro-concepts, the extensive use of keywords all echoing "smartness" (i.e. "smart", "smarter", "intelligent") make it stand out as the most important. Smartness refers to employees' self-management, their taking responsibility and thus overcoming the idea of "stressed workers": an image that has long been with employees and that emerged from the constant friction between the – ever evolving – market and a stereotyped way of working, which imposed a single vision for doing things. In an organizational context that seeks fostering a balance between employee well-being and being at the forefront of market demands, genuinely "smart" goals may be set, as literature has already pointed out (Chen, 2015), starting from company-worker negotiations (Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016). Moreover, the complex situation brought about by Covid-19 prevented the entire workforce from returning to the employer's place of business, and the smart working paradigm has become particularly relevant for at least part of the workforce, especially for high-risk and vulnerable groups.

"Work-life balance" follows next among the positive macro-concepts with keywords such as “well-being” and “enjoy”. Work-life balance, as reported in the literature review (Gastaldi et al. 2014; HM Government UK, 2015; Dominguez, 2017; Errichiello and Pianese, 2019), is an important aspect of a healthy work environment, which can be reached thanks to optimised time schedule and high productivity. Smart working, in this sense, may allow employees to manage time more efficiently so that their free time is to recharge and feel more energetic in other overall life. Striking the perfect work-life balance is by no means a foregone conclusion: up until now, the tendency (due to an all-too widespread management style with regards to the so-called presence) was to assume that personal time outside of work was expendable. Today this way of understanding work and its link with private life is neither current nor accepted. If, in fact, work-life balance has become a determining factor in choosing one job over another, it is on improving this aspect that companies must strive to keep their competitiveness in the labour market to attract (and retain) resources in the company. Moreover, as mentioned earlier, smart working has turned out to be useful solution in
facilitating a good work-life balance in particular circumstances concerning employees’ special needs. For example, workers suffering from chronic diseases, the disabled, those in therapeutic or pharmacological treatments or other similar situations, even temporary and physical, thanks to smart working, can maintain continuity with their work, thus favouring their psychophysical well-being (Mascagna et al., 2019).

"Flexibility", whose most recurrent keywords are "flexible" and "agile", refers to the employees' option, during smart working, of having a more flexible schedule and thus be free to work away from the employer's premises. For Lake (2013), flexibility is a key feature of new, smart work practices through which the concept that sees people at the core of the corporate organization may become a reality. Smart working arrangements are in fact based on an idea of work that is represented in the job done rather than where it is carried out and thus in the results that are reached according to the SMART objectives previously defined (Chen, 2015). In this sense, flexibility with respect to work schedule and locations has already been shown to increase employee morale, as it has been linked to the concepts of work–life balance, satisfaction, and performance (Hill et al., 2001; Gajendran and Harrison, 2007). In addition to being as relevant as ever in the Covid-19 Era, this is perfectly in line with mainstream studies (Rodgers and Hunter, 1992; Watson and Gallagher, 2005; Antoni, 2005) which say that smart working can include identifying goals, tasks, milestones, and monitoring progress remotely, allowing staff the flexibility and autonomy to work without the manager having to constantly monitor progress.

“Productivity”, by referring to sub-concepts such as “active”, “productive”, and “easy,” highlights that smart working not only ensures business continuity and the required level of production even outside the physical office but can also improve employee productivity. This concept is also in line with the literature on smart working, as shown, which refers to a dynamic way of working that leads to high levels of performance, productivity, and job satisfaction (Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016). Goal setting, participation in decision making, and objective feedback have each been shown to increase productivity (1991). Smart working advantages, indeed, include increasing productivity and reduction of absenteeism. (Gastaldi et al., 2014; HM Government UK, 2015; Dominguez, 2017; Errichiello and Pianese, 2019). Increased labour productivity during the spread of Covid-19 has been associated, to a higher extent, with companies that agreed on more flexible working practices. (Bucea-Manea-Țoniș et al., 2021). Work performance can be achieved and even improved after proper organization is put in place (i.e. a good environment as well as good physical, psychological, and ergonomic aspects), especially in jobs that require high mental concentration (Loia and Adinolfi, 2021).

Among the advantages, “innovative work behaviour” has also been recognized as a positive macro-concept and it includes these keywords: “innovative”, “innovation”, and “new”. From the literature reviewed, several scholars had shed light on the potential of these advanced work practices (Zheltoukhova, 2014; McEwan, 2016; Bednar and Welch, 2019) to provide better support to innovative work behaviours (Bednar and Welch, 2020). During the Covid-19 period, in addition to the benefits generally associated with smart working, an innovative leadership approach was associated, to a higher extent, with companies that agreed to more flexible working practices (Rahman et al., 2020).

Disadvantages
Chief among the disadvantages and represented by keywords such as “hard” and “difficult”, “Tech paralysis” emerged as one of the most relevant negative macro-concepts in reference to smart working. As literature points out and despite the advantages noted, there are cases when smart working arrangements may cause big difficulties and crippling issues in carrying work out via ICTs since these practices require having technological skills that are crucial to value-creation processes (Bednar and Welch, 2020; Zheltoukhova, 2014; McEwan, 2016). From an employees’ perspective, indeed, smart working cannot be implemented properly unless people have an adequate computer, technology and soft skills (Iannotta et al., 2020). According to the Connected Worker Survey (Deloitte, 2018), 44% of workers reported having had to waste ten minutes per hour on technology-related issues. This was even more relevant throughout the Covid-19 pandemic, when any and all kinds of organizations were forced to adopt remote working modes.

As a result, “Technostress” is the second most recurrent concept that emerged from the big scale analysis. When referred to sub-concepts such as “hate,” “degradation,” and “stress” in the analysis, technostress can be defined as symptoms of post-traumatic stress disorder, anger, and emotional exhaustion due to the combination of technology and work. As literature highlights, technostress refers to psychosomatic illness caused by daily work with ICTs, and includes increased fatigue, irritability, the inability of switching off from work and getting enough rest. Being constantly connected compounded with information overload and with frequent system changes leads not only to feelings of uncertainties and of having to learn over and over but also to an overall sense of job insecurity related to technical problems in using information technology.

As previously highlighted, the concept of technostress has received growing attention from organizational scholars since employees struggle with fast paced innovation and need to spend more time and effort to update their technological skills. Owing to this, workers may be exposed to continuous changes in work conditions as well as to the risk of permanent availability, or rather to the loss of boundaries between working and non-working activities. During the spread of Covid-19, some authors warned about the main pitfalls of putting smart working in place, highlighting effects such as work-related stress and mental health.

In third place and related to keywords such as “break”, “slack” and “broken”, “technology hiccups” refers to a problem that, though indeterminate as to its cause and non-recurrent, does usually disrupt work temporarily on ICT platforms. These technology related failures may occur and possibly lead to confusion, to eating up valuable time and looking unprofessional. Thus, it is advisable that the impact of tech snafus be reduced to the least possible. As emerges from literature, smart working cannot be implemented in a proper way unless people have the adequate technological equipment.

Among the negatively perceived concepts, “demotivation” singles out how smart working arrangements may affect employees’ performance (“lazy”, “boring” and so on). Smart working practices may also impact the efficiency of organizations and thus cause a loss in productivity. This negative consequence, as pointed out in the section on disadvantages, is especially hard on those workers for whom work includes its socialising aspect and thus view carrying it out in remote as less engaging and less motivating. Another reason for lost productivity is the difficulty in monitoring employees’ work, which is a problem identified by some studies, especially in cases that involve low self-discipline levels and of inadequate leadership styles (Loia and Adinolfi, 2021).
“Social isolation” highlights the sense of feeling lonely that employees may experience in relation to organizational or social loneliness. Isolation and loneliness, as we read in Bednar and Welch (2020), can lead to severe depression. In work environments, a lack of face-to-face contact may also affect relationships among co-workers that could potentially turn into conflicts. Likewise, there is lesser room for team leaders to monitor and decreased feedback on team processes. Within the Covid-19 pandemic crisis, effort was made to curb spatial dispersion so that virtual collaboration provided multiple ways to keep collaborating in a safe environment and offered additional opportunities to stay socially connected while maintaining high team spirit despite spatial dispersion. This was facilitated by regular video conferencing with the entire team (i.e., morning briefings, virtual coffee breaks), ongoing communication among individual team members (i.e., online chat), and steady updates on work progress (i.e., as part of advanced groupware tools).

5. Conclusions and implications

In recent years, several authors have shown that integrating digital technologies, such as social, mobile, analytics, and cloud, is profoundly transforming organizational models, with specific reference to how companies and public administration design new organizational forms, modify inter-organizational relations, and manage HRM work practices and processes (i.e., Kane et al., 2015). Issues such as internal commitment to digital progress, the HRM lifecycle, and talent attraction and retention are closely intertwined with the ongoing digital transformation of modern organizations (Orlikowski, 2007). The underlying tenet of this revolution is in the increased potential for organizational actors to utilise digital information and communication technologies to organize work across conventional organizations (Faldetta et al., 2021). In a scenario that attributes lesser importance to the physical place for work activities, smart working practices have been developed as an evolutionary path in the world of work (Boorsma and Mitchell, 2011) to improve collaboration, employee autonomy, flexibility, talent management, and innovation in organizations thanks to the technological advanced environment (Hamel, 2007; Lake, 2013). Smart working arrangements are in fact based on the so-called Work From Anywhere idea so that the focus is on the work being done and to what extent it meets the objectives (Rodgers and Hunter, 1992; Watson and Gallagher, 2005; Antoni, 2005). In some contexts, such as in Italy, smart working is often associated with the concept of teleworking (Loia and Adinolfi, 2021). Yet even if smart working and teleworking somewhat overlap, smart working is the latter’s natural evolution because if it compared to the features of the “traditional” distance work, it has added mobility and versatility. In fact, in addition to being much more flexible with regards to time and place of the work performance, smart working focuses on meeting and assessing the production objectives agreed upon with the entrepreneur/employer.

If smart working practices became widespread due to the Covid-19 phenomenon, they were experimented in an atypical way driven as they were by need and not by choice of all involved. It is rather safe to say that the unprecedented nature of the shutdown experience and the deep changes experimented within this period may have lasted beyond the end of the anti-Covid measures due to the estimated long-term growth of smart working and the acceleration of virtuality and connectivity at work. This new normal necessitates new
thinking about workplace management, space design, HRM, and organizational design (Hu, 2020).

As it emerged from the analysis in the timespan we examined, the smartness in the working practices is generally recognized as a fundamental aspect of the current world of work, in its aim to overcome the idea of "stressed worker" and reach instead a positive work-life balance by setting “smart” objectives that guarantee employees’ flexibility and productivity (Gastaldi et al., 2014; Zheltoukhova, 2014; McEwan, 2016). We note, however, that the results of the analysis are not entirely homogeneous, and some negative outcomes also emerge such as those relating to tech paralysis, technostress, and technological hiccups.

The data on the bipolar nature of collective perception about smart working is useful for professionals and researchers who are called upon, in this historical time, to build on the pandemic experience and lay the cultural foundations for the new normal mentioned earlier. The analysis reveals two main theoretical and practical implications on both organizational design and Human Resources Management which may inspire future research and organizational practices.

The first implication concerns the organizational and cultural issues. In forming the big picture of post-pandemic normal, these call for a smart leadership, one whom the hard lessons learned from the pandemic experience have “enlightened” and may thus provide an accurate interpretation of its complexity. This new smart leadership could create an exciting and compelling vision, supporting people based on their knowledge, experience, and skills, in managing teams wisely (Singh, 2017; Iannotta et al., 2020). Likewise, in giving priority to organizational performance, smart leaders could provide an original interpretation of time and space that, while moving beyond the traditional paradigm of quantitative and physical control, favours delegating and empowerment injected, purposefully, at different levels of an organization. In this regard, the paper points out that given the different categories of workers/users, customized courses are needed as per the technological skills that can better support employees who have the most difficulty with technology to ensure the beneficial aspects of smart working. In other words, this suggests that smart leaders adopt a people-care approach to meet the specific needs of each employee by improving autonomy, engagement, and motivation.

Moreover, smart working practices require a strong team agreement. When working patterns change enabling more choices in how work is done, it is crucial for team agreements to clearly delineate expectations with regards to keeping others informed as to where and when you are working, keeping calendars and workflow systems updated, ensuring availability for the various kinds of meetings and calls, making work-in-progress available to others, and reporting problems and issues in a timely manner.

The depth of smartness is also connected to the leadership and its ability to bring in new perspectives that, in addition to inspiring followers, looks for ways to innovate. Our analysis shows however that work related environmental ethics is still a marginal issue. In particular, where smart working comes through as a good ally of the environment, especially during the Covid-19 Era (Mascagna et al., 2019; Bednar and Welch, 2020; Murmura and Bravi, 2021), environmentally related considerations have not emerged on a large scale from users’ opinions on smart working in the post-Covid Era. It would be strongly advisable then for organization to implement communication policies that clearly inform workers not only on personal benefits relating to performance, flexibility, and work-life balance, but also, as Loia
and Adinolfi (2021) point out, on the great opportunities that smart working offers in terms of reducing human impact on the environment which, as our analysis shows, awareness of the environmental benefits of smart working is still scarce. This dimension could be a powerful source of inspiration for workers and the organization, and a distinctive feature of smart leadership.

The second implication of the research concerns the crucial role that workplace design has to keep playing for smart working to be fully successful. In the post-pandemic scenario, the workplace can in fact become a strategic artifact where many of the negative emotions that emerged from the study can be resolved. On workplace design there are new and thought-provoking considerations that envision the conceptual shift from "space" to "place" (Robelski et al., 2019). This would imply creating a sense of belonging for workers who inhabit such space, both physical and virtual. Physical layouts and innovative virtual workplaces, in fact, can contribute to engaging current smart workers as well as attracting talents, especially those from new generations.

In conclusion, if the world was dared with a sudden pandemic and it did its best by resorting to smart working, the post-pandemic challenge ahead is to succeed in bringing about a true cultural revolution that innovates the relationship between employees and employers, followers, and leaders as well as the physical and virtual way of organizing work.

6. Limitations and future lines of research

The new technological scenario triggered the need of rethinking work practices and prompted future organizational efforts to define and follow new paradigms on how work is done, along with significant opportunities for innovation, leading to the definition of the so-called "smart working" concept. The Covid-19 pandemic accelerated the digitalization of the organizations and posed unique demands in terms of conditions and scale of technology adoption at work, by leading the conditions for the most extensive, mass smart working experiment on record. Given the intensity and relevance of the phenomenon, our work has carried out a big data analysis to frame the collective perception about smart working, by analysing the collective perceptions of Twitter users on smart working.

Up until this point, however, this contribution provides preliminary insights that pave the way for further investigation and a deeper understanding of smart working. In this sense, the limited nature of the research does not allow us to generalize although the insights from this initial study can provide a foundation and useful stimulus for other studies, be they theoretical and/or empirical, qualitative and quantitative. Future lines of research could concern, for example, a different big data analysis on another social network – for instance Facebook or Instagram – to frame in a broader way the collective perception on this issue which deeply impacts society. Additionally, it may also be interesting to extend the tweet collection to a post-Covid 19-time interval. Moreover, due to the relative scarcity of specific literature, it might be of interest to carry out in-depth interviews to select users who meet specific demographic and social characteristics.

**Keywords**
References


HM Government (UK) (2015) PAS 3000:2015. ICS 03.100.01 Committee ZZ/3, Smart Working Code of Practice, 30 November 2015, BSI.


