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Social Media Users' Opinions on Remote Work during the COVID-19 Pandemic. Thematic and Sentiment Analysis

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ABSTRACT

COVID-19 raised the interest in remote work tremendously. In this article, the phenomenon of this increase was assessed, by analyzing tweets on Twitter. It turned out, that the topic of remote work at epidemic peak in March 2020 increased almost 15 times during a year. The sentiment analysis confirmed the approval of remote work by over 60% of its users. The study proved the opinion that it will permanently stay in the post-COVID time.

KEYWORDS

Remote work; COVID-19; social media analytics; big data; sentiment analysis; word clouds; Twitter

Introduction

The impact of the COVID-19 pandemic on society and business attracts the attention of a growing number of researchers and research institutions. For example, the World Economic Forum COVID Action Platform identified 10 technology trends to be observed during the COVID-19 pandemic (WEF Forum). Most of them are strictly connected with Information Technology, in particular: online shopping and robot deliveries, digital and contactless payments, distance learning, supply chain 4.0 disruption, 5G and Information and Communications Technology (ICT) and finally – remote work. This is probably the area with the greatest change. At present, the visible physical picture of the accelerated implementation of remote work can be seen in the almost empty office centers of the cities and neighboring parking lots during the coronavirus time. This phenomenon has inspired our adequate research, by using social media analytics methods. Its results are presented in this paper. Thus, the aim of the paper is research – the identification, analysis and interpretation of the main opinions, issues and subject areas regarding remote work, using social media analytics methods, in particular Web Scraping (WS), Text Mining and Machine Learning (ML).

Within a few weeks, COVID-19 made a radical breakthrough from traditional office work to the remote type. Carroll and Conboy (2020) call it a “big bang” for organizations to be forced into a rapid change of technology. Even stronger, almost prophetically sound the words of Agerfalk et al. (2020), who stated that “the coronavirus disease 2019 (COVID-19) has changed our

world forever.” In fact, even the worldwide ending of the pandemic will not mean a return to the pre-COVID-19 office patterns.

Many employees declare their interest and willingness to continue digital, online work after the pandemic. As Swan (2020) quotes: “We are witnessing what will surely be remembered as a historic deployment of remote work and digital access to services across every domain.” Therefore, in just a few/several months, the role of remote work in society and business has evolved in the following three main stages:

- pre-COVID stage – optional remote work,
- COVID stage – the massive transformation in remote work,
- post-COVID stage – dominant remote work.

The first phase is already several decades old, starting with the first online store, established in 1995, thus initiating the rapidly spreading e-commerce. Gradually, the concept of digital technologies and services was transferred to other spheres of business and, more broadly, social activities. The number of electronic versions of digitally operating branches or specific activities grew every month, including among others, e-business, e-banking, e-commerce, e-learning, e-administration, e-insurance, e-tourism, e-health, e-sport, e-groceries, e-auctions and tens of the other nouns with the letter “e-” before them. According to Oberlo (2020), e-commerce shares of retail sales in 2020 were on the level of 20%. Many companies have implemented a digital module to their activities, which involved taking up remote work for some of the employees. Fully digital

companies, including global ones (for example, e-Bay), had already been functioning in this phase.

The changes to the experience and style of office work previously used in the first phase have now become irreversible and permanent for most companies in the second phase of the coronavirus pandemic as it spreads throughout the world. In its course, many novel systems and services of remote personal and team communication were developed that allowed for quick, almost immediate transition to remote work of all sectors of the global economy and social activity and, consequently, extremely useful during the time of common business lockdown in many countries. Remote work tools, such as MS Teams, Slack or Zoom, have started to be widely and successfully used by millions of users – employees and clients. One of the most spectacular examples of digital transformation is universities. Indeed, over the last 2–3 decades, academic didactics have been improved by using e-learning.

In addition to the routine e-learning courses, more advanced forms such as e-learning platforms, virtual campuses, or MOOCs (Massive Open Online Courses) have been gradually developed. However, they enjoyed moderate interest from faculty (in particular – older generation scholars) and students. However, e-learning has permanently entered academic practice, mostly in the form of blended-learning, i.e., e-learning content, supporting traditional university classes. These experiences and solutions allowed the academic community to make an almost immediate, essentially problem-free shift to the second phase – the worldwide transition of universities to remote work.

True, whole spheres of previous academic life were unfortunately excluded, but its main core – the transfer of knowledge and skills could be implemented.

The Gartner survey (2020) found that 82% plan to move their previously on-site workforce to permanently remote positions in the third phase – the post-COVID-19 plan. As a number of employees don't like to work from home, it seems that a hybrid approach will be applied in firms and institutions, so some of the functionality from the first phase will return. However, the dominant mode of work will be remote, according to various assessments, having a participation level of around 75%.

Intensive, ubiquitous applications of remote work have also shown their universal advantages for employees in many other sectors, businesses and industries, like savings on commuting by car or public transport, more effective organization of working time, less stress, leave from the company dress code or avoiding potential conflicts with colleagues. However, there are also disadvantages, such as limited contact with colleagues or

lower level of mobilization to work. Of course, companies also benefit from noticeable profits, such as savings on office space rental, using services, utilities such as electricity, and others.

Distance learning and remote work are not the only examples of solutions and practices which have been in a permanent manner introduced into business and social life in the third – post-COVID phase. As the spectacular examples of this trend it is worth mentioning the examples below:

- It is expected that tourism and airlines will be meaningfully limited and thus - considerably replaced by the Virtual and Augmented Realities for the aims of the virtual tourism.
- Online entertainment will appear commonly. Actors will more often play to empty theaters and the viewers watch the spectacles through videostreaming at their homes.
- Another significant change regards catering, which will turn into so called “ghost kitchen”. Restaurants will only offer home delivery without investing in the restaurant space as the number of restaurant customers will decrease substantially.

Several appropriate methods for this specific research have been used, like social media analytics methods to identify the phenomenon of remote work among Twitter users. They are descriptive analysis, text mining, unsupervised Machine Learning, sentiment analysis, and functional analysis. The following hypothesis was formulated to verify the changes in social media discussions regarding remote work: analysis of tweets on Twitter indicates that the COVID-19 pandemic introduces the permanent, lasting continuation of remote work to the routine office jobs of company and institution employees.

The article is structured into five chapters. After the introduction, a literature review was carried out in two areas, i.e., remote work in the COVID-19 period, and then social media analytics applied in this article. The research model and the method applied in this paper are clarified in the third chapter. The next one presents the results of the research – Twitter tweet dynamics, word clouds, sentiment analysis, and thematic analysis. The last, fifth part contains the conclusions and future work.

The literature review

Although to date, the COVID-19 pandemic has only been present for 6–8 months, depending on the country, already numerous research and opinion thematic articles and conference papers about it have been published. During August AMCIS'2020 (Watson et al., 2020)

indicated COVID-19 research directions in the Information Systems academic field. They have been encouraging the IS scholars community to take up multi-dimensional observations, research, and publishing the relative submissions. Currently, the first scientific publications, presenting the early, preliminary results of the research regarding COVID-19 have appeared at IS conferences and in journals. In this context, three methodological approaches have gained the recognition of academics so far:

- (1) first and foremost, Big Data – including Machine Learning, sentiment analysis, emotional analysis, and functional analysis;
- (2) The Normalization Process Theory (NPT);
- (3) The Growth Theory (as a suggestion) (Siau & Han, 2020).

The first of these two research approaches will be presented in this part of the article.

Regarding the application of the Big Data approach, it is currently dominating. One of the early, preliminary studies on the behavioral panorama of social media users (specifically Twitter), regarding the COVID-19 pandemic, has been presented in (Bojja et al., 2020). The research was carried out using social media analytics, like sentiment, emotion, and thematic analyses.

Very interesting research and rich scientific conclusions regarding the role of social media during the pandemic and influenza in the aspect of the Information Systems academic field can be found in the works of the following authors: (Broniatowski et al., 2015), (Signorini et al., 2011) and in relation to the COVID-19 pandemic, the recommendations of the World Health Organization (2020a).

The Normalization Process Theory (NPT) plays a significant role among the scientific methods of studying the transformation of the working pattern of workers in a pandemic situation. It was originally proposed by May and Finch (2009). As COVID-19 generates new technology-driven processes (Carroll & Conboy, 2020), companies and institutions should standardize them to accomplish goals through these practices. The NP theory gives guidelines for practitioners to build better plans and manage these new normalized processes.

Research model and methods

As stated before, the social media analysis is mostly supported by Big Data analytics tools and methods (Ghani et al., 2019). Social media analytics are classified as Business Intelligence & Analytics 2.0, which includes

information retrieval and extraction as well as opinion mining, used in this paper to extract valuable information from Twitter (Chen et al., 2012). Typically, social media analytics can be used in business to measure brand personality, e.g., if the brand is young or old (Hu et al., 2019), to deepen the understanding of technological discontinuities and changes (Bullini Orlandi et al., 2020), to facilitate business to business sustainability (Sivarajah et al., 2020) or even the relationship between investor sentiment and stock returns (McGurk et al., 2020). An overview of Big Data analytics in social media is presented in Figure 1.

According to Figure 1, social media content can be derived from several different data sources. It includes microblogging, news articles, blog posts, internet forums, reviews as well as Q&A posts. The common feature of these data sources is the unstructured form of the data, i.e., text, images, movies, etc. It means that the methods used to acquire or process the social media posts are not traditional, like databases, but mostly related to Big Data analytics. The characteristics of such data can be diagnosed with several different methods, i.e., descriptive, diagnostic, predictive, or prescriptive. The first group, descriptive, is used to extract the basic features of the data in a study, including fundamental measures such as mean, sum, etc. Diagnostic methods are rather related to regression analysis, considering explanatory variables to explain hypotheses. Predictive methods are related to statistical techniques to make predictions about future or any unknown events. Prescriptive methods are used to support final business decisions and are also related to predictive and descriptive methods. More advanced analyses can be done with the methods described in the computation intelligence group. All of them are related to Machine Learning.

The aforementioned methods include artificial neural networks, fuzzy systems, swarm intelligence,

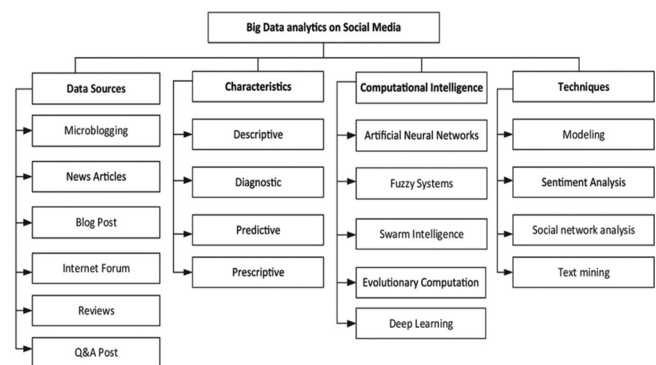


Figure 1. Big Data analytics used for social media analysis. Source: (Ghani et al., 2019).

evolutionary computation, and deep learning. The first method, artificial neural networks, is mostly used in social media analysis to find link between entities, i.e., posts or users. The second, fuzzy systems, is a set of methods used to analyze the data as analog input values, instead of discrete values, which is a key issue in selected applications of text analysis, including social media posts analysis. Swarm intelligence is used to analyze social media as an artificial self-organized system. Evolutionary computation in social media analysis is related to learning classifier systems and its techniques to optimize the results. The fifth method in this group – deep learning is used in social media to create neural networks to improve methods of natural language processing. The last group – techniques – includes modeling, sentiment analysis, social network analysis, and text mining.

The modeling technique in social media is used to classify text or any other form of posts, i.e., image or video. Sentiment analysis is used to find the general emotion in a social media post. It can be done in different ways, including lexicon-based or Machine Learning approaches, or a combination of both (Dhaoui et al., 2017). Social network analysis (SNA) is used to identify social structures, usually supported with networks and graph theory. Text mining in social media relates to the process of deriving high-quality information from text.

In general, most of the social media analytics methods are related to Machine Learning (computational intelligence), including sentiment analysis and text mining. However, current text analytics tools mostly focus only on the semantics of language. Because of this fact, new emerging methods are introduced to more complex and reliable analyses of the text, e.g., LAP – language-action perspective, to detect not only what people say but what they do with the language (Abbasi et al., 2018). Another aspect is to detect fake news, which can be an issue when discussing COVID-19 on social media. There are different fact-checking tools used to check if the news is real or fake. They usually use reliable news sources to confirm the real facts from the message (Moravec et al., 2019).

Although to date, the COVID-19 pandemic has only been present for 6–8 months, depending on the country, already numerous research and opinion thematic articles and conference papers about it have been published. One of the preliminary studies on the behavioral panorama of social media users (specifically Twitter) regarding the COVID-19 pandemic has been presented in (Bojja et al., 2020). The research was carried out using social media analytics, like sentiment and emotion and thematic analyses. Siau and Han (2020) announced research on the effects of information and

communication technologies (ICT) on COVID-19 pandemic management and control, to administer, for example, contract tracing using Growth theory and secondary data; no social media analytics will be used. The best practices in using ICT for pandemic management and control will be generated. The group of recognized Authors (Watson et al., 2020) emphasize the leading role of IS in dealing with the COVID-19 challenge, transforming education and office business work into remote work, and the long-term implications and consequences of this. Rao et al. (2020) explored the use of Twitter as a crisis communication tool, through alarming and reassuring messages in the context of the Coronavirus pandemic. They plan to develop a generalized crisis management framework, being the decision-making tool in different sectors. The process of data acquisition, transformation, and analysis was conducted with the following steps, shown in Figure 2.

As presented in Figure 2, four different steps have been used to present the results from the survey. After the first step, collecting the tweets in each period, we had to transform the data, i.e., to cleanse it and put it in the correct format in the dataset for further analysis. All the processing and analysis jobs were done in the Python language, with its libraries including pandas, sklearn, numpy, wordcloud, and VADER. The results of the analyses are shown in the set of charts and tables in the next chapter of this paper.

Four different methods of big data analytics for social media were used in this survey, i.e.:

- (1) data acquisition through Twitter API,
- (2) text mining (including NLP – Natural Language Processing),
- (3) unsupervised Machine Learning (K-means),
- (4) supervised Machine Learning for sentiment analysis (Naïve Bayes).

Firstly, we used Twitter API to collect tweets in the period between 1st of February 2020 and 10th of August 2020. Moreover, tweets from March 2019 were also used for selective comparative analysis, shown in the next part of this paper. The data were filtered to show tweets concerning remote work only. The

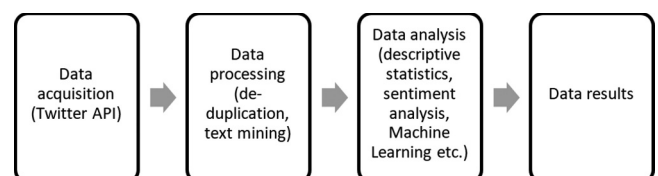


Figure 2. The process of the Big Data survey used in this study.

following attributes were used: tweet id, user, text, hash-tags, and geo location (if available). In total, 523 thousand tweets were collected.

Then, text mining methods were used to generate the word clouds. The purpose of this step was to identify the most common words and topics related to remote work. During the text mining process the following methods were used: lemmatization (grouping together the inflecting forms), stemming (identifying the core of the word), removing stop words (a dedicated to social media list was used), removing punctuation, de-duplication, etc. The second aim of the text mining use was to prepare a dataset for Machine Learning applications, i.e., to cleanse the text as written above.

The unsupervised Machine Learning method was used to detect the general topics of the tweets related to remote work. We decided to divide the Twitter dataset into 10 clusters, each of them identifying different topics. The method used was K-means.

Supervised Machine Learning was used for sentiment analysis. The training dataset was based on lexicons from VADER (Valence Aware Dictionary and sEntiment Reasoner), which is a Python library built for sentiment analysis of social media texts. Sentiment Analysis, also known as Opinion Mining, is a sub-field of Natural Language Processing (NLP). The method used was Naïve Bayes, which is the most suitable approach to text analysis.

Results of investigation – dynamics, word clouds, sentiment analysis and thematic analysis

This chapter will start with the descriptive analysis of the tweet time series related to remote work. Next is the comparative analysis of tweets for four periods: March 2019, February 2020, March 2020, and June 2020. In the third part of this chapter, the word cloud of words and hashtags related to remote work in the analyzed tweets is presented. The crucial part of this chapter is the thematic analysis of the studied tweets' collectivity. Finally, the sentiment analysis with regard to the four aforementioned periods was accomplished.

The research was carried out on the more than 500 thousand tweets regarding remote work in the period between 1st of February 2020 and 10th of August 2020. In the case of the specific comparative analysis regarding pre-COVID-19 time, March 2019 was also included. In Figure 3, there is a time series of the number of tweets related to remote work. The analysis includes only tweets in English.

The chart presented in Figure 3 shows the significant increase in the number of tweets related to remote work at the turn of February/March 2020 – their peak was

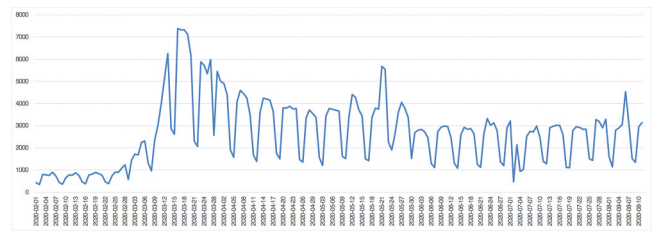


Figure 3. Time series of the number of tweets related to #remotework.

nearly 8 times higher than in the pre-COVID-19 phase (7382 on 16th of March in contrast to an average of 713 per day in February). This is the time when the lockdown and quarantine started in most countries worldwide. In general, the number of tweets on the topic of remote work is correlated to the rises and falls in COVID-19 cases. Then, from April to June, we can observe a minor decrease in the number of tweets, to an average of 2933, with an increase in the middle of May. In June, the situation is rather stable, and we can observe comparable amount of tweets every week. It is worth highlighting that the decrease in tweets every week is the result of the weekends, when Twitter users are less active.

To obtain more information of its changing use, the expression #remotework was investigated at different times of its use during pre-pandemic times and during selected periods of the pandemic, i.e., March 2019, February 2020, March 2020, and June 2020, as shown in Figure 4.

Figure 4 depicts more suggestively the differences in the number of tweets in the selected months. In particular, a large difference can be seen between March 2019 (about 500 tweets) and March 2020 (over 7000). Therefore, the interest in remote work between

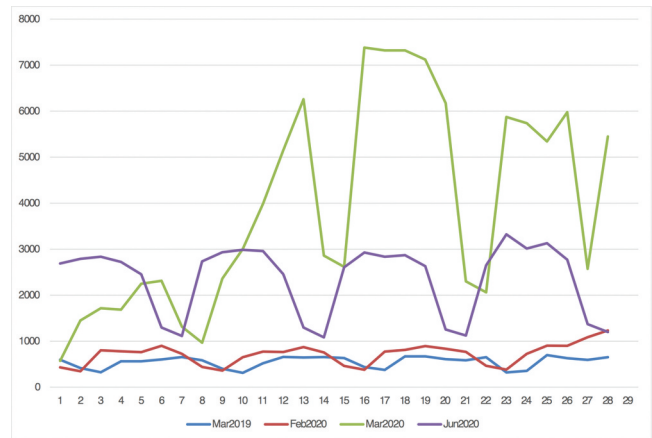


Figure 4. Comparison of the number of the tweets related to #remotework before and during the COVID-19 pandemic era.

March 2019 and February 2020 was stable, at a relatively low number of tweets. Both pictures confirm the expected interest of employees and Twitter users in remote work. Importantly, they also measure the level of interest and growth in this form of work in the specific numbers of tweets. So, radical changes in perceiving the role of remote work will have a fixed long-term influence on the work behavior of employees.

The data set was obtained via Twitter API. The hashtag “#remotework” was used to filter tweets. As a result, in the pilot phase, more than 500 thousand tweets were collected. The most common words that occurred in such tweets are presented in Figure 5, on its left side.

As shown in Figure 5, the most common words in tweets regarding remote work were *new job*, *team*, *hiring*, *digitalnomad*, *looking*, *engineer*, *developer* and *remotejobs*. It can be interpreted that during pandemic times, the change in the labor market made some people look for a new job, or enterprises to look for new remote employees.

More general information can be obtained by analyzing hashtags linked with #remotework. It is presented in Figure 5, on its right side. Regarding the hashtags shown in this word cloud, remote work is directly connected with *workfromhome*, *techjobs*, *workanywhere*, *remotejobs*, *remoteteam* as well as *digitalnomad*. This leads to the assumption that *workanywhere* or *workfromhome* will be a new phenomenon on labor market in the next few years. Lots of enterprises are now equipped with IT tools that allow employees to work remotely, and the cost of remote work for employees in most cases is less expensive.

To classify tweets regarding remote work, unsupervised Machine Learning was used. The method used was K-means. The algorithm was adjusted to classify tweets thematically into 10 different clusters. Then, the Machine Learning algorithm identified essential areas of these 10 clusters, giving the appropriate words to each of the identified clusters. The names of the topics have been proposed by the Authors. The results of filtering the data set of tweets regarding remote work are presented in Table 1. In its second column “Most frequent words in cluster,” the main keywords were automatically selected by the unsupervised Machine

Learning algorithm. The names of the clusters (column “Cluster topic”) were proposed by the authors of this article, by generalizing the meaning of the specific keywords set. The percentages of tweets for each cluster were included in the last column.

Cluster 1 is concerned with general pandemic and coronavirus discussions. The second cluster groups tweets in which the authors are looking for or offering new remote jobs in pandemic times. The next cluster regards the assessment of remote working productivity. Cluster 4 is related to teamwork and collaboration regarding the remote work, including virtual needs. The next cluster is connected with technical jobs in course of digital transformation; cluster 5 is strongly related to cluster 2, but is oriented more toward technical jobs. Cluster 6 concerns the best practices of remote work. In cluster 7, Twitter users discuss webinars as support for remote work. The communication of employees in companies is discussed in the tweets making up cluster 8. The issues of business managing and changing business needs are the central matter of cluster 9. The last cluster is mostly related to the discussion on remote work skills.

With respect to Table 1, the most typical tweets were extracted from each specified cluster and contained in Table 2.

After the thematic analysis, the next step was to identify the sentiment analysis of the tweets collected in the previous phase. Its goal was to detect how social media users are perceiving the remote work – positively, negatively, or neutrally.

In pre-COVID-19 times (March 2019), already over 50% of opinions on remote work were positive. However, at the same time, there was also quite a substantial number of neutral opinions – almost 40%, while only 7.5% of opinions were negative. This may be since the use of remote work tools was then not so common, rather optional, and user knowledge and skills in using remote tools were not very high in this time.

Figure 6 shows that during the COVID-19 period, Twitter users, in general, had a positive opinion of remote work, up to 62.2% in April 2020, in the course of the widespread implementation and real use of the remote work tools. Later, the positive opinions stabilized at a level of 57%. Interestingly, in comparison to pre-COVID times – the number of negative opinions during the pandemic increased, especially in March 2020, apparently as the result of the obligatory, day-to-day use of remote tools in firms and institutions. In parallel with growing the competence of employees, the number of neutral opinions was, on average, at a level of 10%.



Figure 5. Word count analysis of the tweets with the hashtag #remotework.

Table 1. Clusters of the tweets related to remote work.

Cluster no.	Most frequent words in cluster	Cluster topic	Percentage
1	pandemic, coronavirus, COVID19, COVID-19, new, home, office, companies, employees, need, tech, think, business, world, things, time, post-pandemic, people, amp, help	General COVID'19 pandemic issues	3.1%
2	new, job, jobs, remotejobs, workfromhome, COVID19, listing, remotework, details, remoteworkmarket, fullremote, home, developer, premium, engineer, amp, future, secure, senior, make	Remote job market	2.6%
3	home, tips, remotely, office, employees, productivity, help, new, COVID19, time, make, coronavirus, workingfromhome, stay, productive, people, need, companies, check, tools	Productivity of remote working	6.2%
4	team, tips, help, website, new, remotely, teams, tools, good, experience, time, leadership, virtual, needs, make, happy, collaboration, business, collaborate, amp	Remote team collaboration and tools	4.2%
5	remotejobs, digitalnomad, looking, techjobs, nomad, job, jobs, engineer, manager, senior, developer, software, bairesdev, specialist, sales, new, customer, product, analyst, home	Technical job recruitment, digital transformation	3.3%
6	best, practices, check, design, freelance, solution, fiverr, new, post, blog, looking, latest, day, link, days, nice, gigs, engineer, profile, travel	Best practices	2.0%
7	new, help, business, employees, learn, COVID19, tips, amp, teams, coronavirus, webinar, home, productivity, read, companies, security, check, COVID-19, remotely, time	Help, webinars	12.6%
8	new, companies, people, time, employees, home, office, like, just, help, need, coronavirus, amp, make, future, business, COVID-19, think, company, tech	Companies and employees	34.8%
9	new, job, remotejobs, engineer, senior, developer, home, software, medium, employees, time, manager, people, check, product, companies, business, needs, changing, company	Business management and changes	4.7%
10	hiring, remotejobs, new, COVID19, remotely, business, job, help, apply, looking, remotework, amp, coronavirus, time, engineer, jobs, office, tips, home, employees	Remote work skills discussion	26.6%

Table 2. The typical tweets for the specified clusters.

Cluster	Tweet examples
1. General COVID'19 pandemic issues	The coronavirus pandemic is affecting small businesses in a variety of ways. From the loss of business to remote work, things are changing fast during the COVID-19 pandemic. Discover how you can help small businesses in your area The #COVID19 pandemic changed how businesses operate. Find out how the outbreak accelerated the remote work movement and what the #futureofwork may look like. Indeed! "Remote work, study, event are becoming the new norm during pandemic for every fabrics of our society" #NewNormal
2. New job possibilities and ads	Remote Job Remote Customer Support Technician New Remote Job Listing Javascript Full Stack Developer at iFit New Premium Remote Job "Developer – Comms and Payments – Community Brands – Remote"
3. Productivity of remote working	Being productive from home doesn't mean working 24 hours. Tips for working productivity from home. #WFH #workfromhome #remotework #productivity #coach #burnout #stress #leadershipcoach #RemoteWork: 7 Ways to Increase #Productivity When #WorkingFromHome READ Do you ""dress up"" while working from home? "According to a 2012 study from the @KelloggSchool, clothing may have an impact on personal performance." #productivity #productivitytips #remotework #workfromhome
4. Teamwork	How are you taking care of your team? #wfh #remotework Managing a remote workforce and concerned about employee well-being? One way we're taking action is by staying connected as a team – and as a community – thanks to @strtgivinglocal's virtual #charity wellness challenge. https://buff.ly/2RPW72f #remotework #workplacewellness Managing a team remotely is so much more than hopping on a video conference call. Here are some tips for adjusting your #management tactics to the new ""normal"": https://www.cirrusinsight.com/blog/manage-remote-sales-team #remotework #salestips
5. Technical job recruitment, digital transformation	2020 Companies is looking for a remote Remote Recruiting Coordinator #workathome #remotework #digitalnomad #remotejobs #remoteworking #techjobs #remote #nomad #jobs #job X-Team is looking for a remote UI/UX Developer (Remote) #workathome #remotework #digitalnomad #remotejobs #remoteworking #techjobs #remote #nomad #jobs #job Built In is looking for a remote Senior Full Stack Engineer #workathome #remotework #digitalnomad #remotejobs #remoteworking #techjobs #remote #nomad #jobs #job

(Continued)

Table 2. (Continued).

Cluster	Tweet examples
6. Best practices	Can you balance remote work and security needs? Absolutely, but you need to know what you're doing! Here are six best practices to apply. ITSM best practices for remote work – Work Life by Atlassian If you missed our recent webinar on virtual onboarding best practices, don't worry. We've got the highlights. Check out our blog for 5 key insights to improve your virtual onboarding approach. #remotework #workforcemanagment
7. Help, webinars	Have you been struggling to deal with toxic employees in a remote work world? Join Fierce tomorrow for SHRM certified webinar, How to Address and Prevent Toxic Employees. Register now! Detect. Determine. Correct. Prevent. This time of uncertainty, is highlighting the importance of being able to monitor buildings' operations and performance remotely. Join us a free webinar. When your team works remotely, coaching and feedback are even more stressful as a lack of information leads to paranoia or panic. Join us this Friday to learn how to deliver feedback and coach remote employees.
8. Companies and employees	The transformation to remote work has been a transition for nearly every company over the past several weeks. Remote @McAfee employees have shared some extremely valuable insights on how to make the most of your #WFH experience, no matter where you are. As the world comes together to combat COVID-19, and remote work becomes a critical capability for many companies, it's extremely important to maintain the security posture of your cloud assets while enabling more remote workers to access. Having a flexible, remote work policy allows employees to build a personal and professional framework on their own terms.
9. Business management and changes	Remote #work is becoming a new norm. But with this new organization comes new #challenges: how can a business secure identity, access, and attendance remotely? Learn more about our solution. COVID-19: remote work and "home business" for the IT sphere The Ultimate Marketing Stack to Build Agile Remote Teams – Business 2 Community #ultimatemarketingstack #way #zapier #everyone #world #remotework

(Continued)

Conclusions and future work

The study regarding remote work in social media investigation during COVID-19 pandemic allows to draw a number of interesting conclusions. By the use of the

Table 2. (Continued).

Cluster	Tweet examples
10. Remote work skills discussion	Getting back to work after a COVID-19 layoff is going to require positivity, persistence, patience, and people skills. It will be a grind and numbers game. Stay in the game! #laidoff #employee #remotework #WFH #rehire #jobseeker #gethired #furlough #job 5 skills you need to demonstrate to land a remote job https://www.fastcompany.com/90490491/5-skills-you-need-to-demonstrate-to-land-a-remote-job #remotework #workfromhome #skills #4traveljobs Hi friends, If someone reached out to you last week looking for a job, please circle back with them this week. Even if you can't help directly, ask them how they're doing today. We all need each other right now. #hiring #remotework #jobs #economy #technology

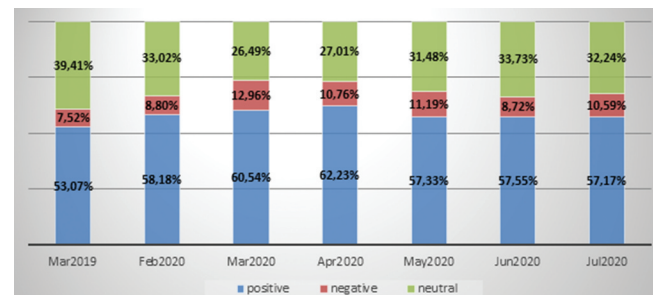


Figure 6. Sentiment analysis of the tweets related to #remotework.

descriptive analysis – one of the leading social analytics methods, it turned out that during the peak of the pandemic in March 2020 when the lockdown started – the number of tweets concerning remote work was 15 times higher than in March 2019. In the period from April till July 2020, the number of thematic tweets is subjected to fluctuations, but on average is still on meaningfully lower level.

By application of text mining analysis, it is possible to identify and observe new topics related to remote work, discussed in social media. Firstly, it rendered that during the COVID-19 pandemic, social media was widely used by IT companies to promote their products for remote working (34.8% of total number of tweets related to remote work). The second most popular topic was remote work skills discussion (26.6%). In turn, the third topic mostly discussed was help and webinars regarding remote work (12.6%).

According to sentiment analysis, one of the methods used in social media analytics, it emerged that most of

the posts related to remote work are positive – up to 62.23% with negative comments no more than 12.96%.

The wordcloud analysis used in this investigation shows, that remote work has an impact on the creation of new trends, such as techjobs (technical jobs), remote team as well as workanywhere or workfromhome.

The research shows important conclusions for the post-COVID period. It turns out that most of the solutions, methods, software tools used in the pandemic will remain in heavy use in the post-COVID period.

The research inspired Authors to continue the studies on the impact of COVID-19 on regular activities of firms and institutions in the post-COVID era.

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