

THE EFFECTS OF COVID-19 PANDEMIC ON THE WORKFORCE IN TURKEY

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ABSTRACT

This paper seeks to understand the effects of the pandemic on employees' perceptions and performance during the lockdown in Turkey. The study is also conducted to determine if statistically significant differences are present between the perceptions before and during the pandemic on the scope of demographic features. This study applies a cross-sectional study design, and the obtained data are analyzed using nonparametric tests such as Wilcoxon's signed-rank test, Mann Whitney U test, and Kruskal-Wallis H test. The results of data analysis indicated that the wellbeing and performance of employees tend to be decreasing during the pandemic, and employee productivity is directly related to the employee wellbeing in this period. Meanwhile, the homeworking has negative correlations with the performance during the lockdown due to the Covid-19 anxiety and home conditions such as ergonomics, cohabitant, and preparedness. While the employees find their performance low during the pandemic, they see their productivity better than others.

Keywords: Covid-19, Emergency management, Homeworking, Performance, Wellbeing.

1. INTRODUCTION

Coronavirus disease 2019 (Covid-19) is defined as an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). This ongoing pandemic was first identified in December 2019 in Wuhan, China, while it is thought that the first case is traced back to November 2019 (Hui *et al.*, 2020). More than 7 million cases have been reported across 188 territories in the whole world, resulting in more than 403,110 deaths, as of the middle of June 2020 (CSSE, 2020). Since the developments were a global scale epidemic, the countries have to launch emergency action plans. The first measures for the Covid-19 began to appear at the airports. The temperature of the passengers from China was controlled, and then flight bans gradually started. After the installed thermal cameras at airports, some passengers showing symptoms of coronavirus infection are put in quarantine. The first case was confirmed on March 11, 2020, in Turkey (Çakmaklı *et al.*, 2020). After the first death from coronavirus on March 17, the lockdown policies started suddenly, and then it spread over time, including weekends and holidays. Fig. 1, shows a moment in the period when the first lockdown politics began and the rate of spread of the virus increased. The data of this research were also collected during this period. It is clearly seen on the map showed the province-level density, the riskiest city is only İstanbul on that date since the first case is seen quite late compared to other countries. Moreover, the development of the first case to the present is shown in Fig. 2.

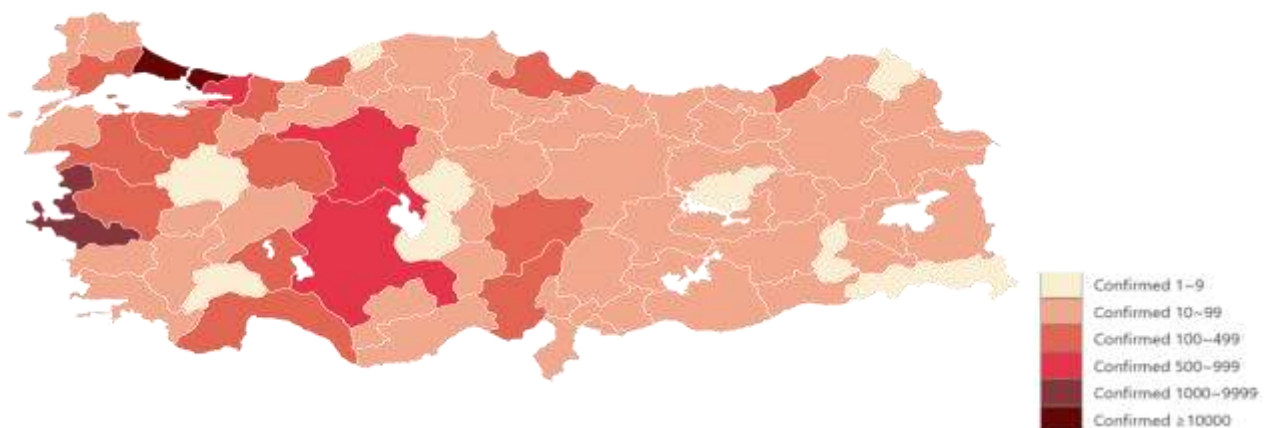


Fig. 1. Map of the COVID-19 cases in Turkey as April 3 (Wiki , 2020)

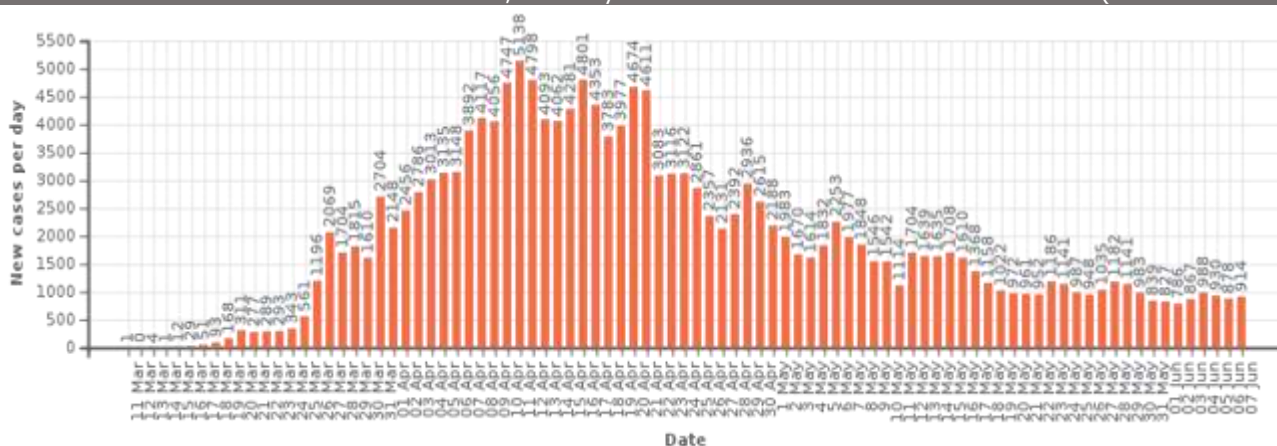


Fig. 2. New cases per day from March, 11 to June, 7 (Wiki, 2020)

Fig. 2 can be used to track the per day, number of new confirmed coronavirus cases in Turkey. The number of daily cases appearing at the top level on April, 11, and then increased again on April, 16 and April, 20. The important thing to remember is that when examining the number of daily cases, it should be taken into consideration in the number of daily tests. After the lockdown politics and other measures, the number of cases is seen as decreasing, but the graphic ends at the beginning of the tourism season. Thusly, the effect of the holiday season will be seen in the autumn. Unfortunately, the second wave is expected to spread in September 2020 by showing the effect of the normalization process that started in early June (Çamlıbel, 2020). That is because the shopping malls and tourism centers were opened in order to avoid the economical bottleneck. In this process, the employees have to go to work, after homeworking in a risky environment.

The pandemics in history can be looked at to understand how global virus disasters changed the workforce and the way they do business as well as daily life (Dahiya, 2020). 1918 influenza pandemic known as the Spanish flu killed more than 50 million people and caused social and economic transformation (Duncan, 2007). The male shortage that emerged with the effect of the world war in this period caused the change of gender roles, permanently (Hogg, 1967). This period has resulted in women taking more part in business life (Baas and Shamsfakhr, 2017). Looking at the earlier dates, it is seen that the Black Death epidemic in the 14th century also caused permanent changes by causing social transformation (DeWitte and Wood, 2008). Since the Covid-19 pandemic is a shock to the utility of contact-intensive services (Faria-e-Castro, 2020), so it is thought that Covid-19 will encourage the working at home or other distance (Engle *et al.*, 2020). It is thought that people will not be comfortable with close contact as before, and this new habit will be permanent in the way of life (Hupkau and Petrongolo, 2020). Of course, there may be more measures for health and protection nowadays, but this does not mean that the virus does not affect people in various way.

Understanding employees, especially such extraordinary situations will increase the success of the emergency action plans. There are many studies on the importance of taking into account the psychological status of employees during times of crisis or disease (Lee, 2020; Unadkat and Farquhar, 2020). In one of these studies, it is emphasized that the psychological stressors necessitate a strong well-being support model for staff (Ripp *et al.*, 2020). Herewith, the emergency management of businesses should include psychological support that is required to address the needs of its workforce, as well as economic packages. The studies emphasize organizational outcomes such as performance, efficiency, and productivity, which have a direct impact on the sustainability and creativity level of the business, as well as financial indicators (Huselid, 1995). Productivity is seen as a kind of measure of the efficiency of employees and their outcomes, and it emerges depending on many situational variables. It is also thought that the way of working and workplace conditions are effective in productivity and performance. Simply because, the relationships between work, workplace, and the tools of work are seen as an integral part of the

work itself (Chandrasekar, 2011). For this reason, it is quite predictable that homeworking practices that come with a sudden decision in a risky environment have psychological consequences. As it can not be sure whether the environmental and physical factors of each house include useful conditions for remote working during the pandemic, the employees may not reach the goal aimed at after executing the determined actions. Even if the features are convenient, the fear and anxiety of the disease can also affect the attributes and preparation process (Fardin, 2020). Thereof, the conditions are more severe than the crisis situation, personal requirements need to be taken into account, since the success of all measures depends on the degree of compatibility of people.

2. MATERIALS AND METHODS

The aim of the study to understand the effects of the pandemic on employees' perceptions and performance during the lockdown. It is also conducted to determine if statistically significant differences are present between the perceptions before and during the pandemic on the scope of demographic features. To perform the spreading effects of the pandemic, data is collected from zenodo.org which includes a comprehensive replication package including the anonymous dataset created by Torkar and Baltes (2020). After the ethic board permission for the survey, the data are collected from March 27 to April 17 and launched in May 3, 2020. This Zenodo open archive has questionnaire data received 2225 usable responses from 53 countries. For this study, this data undergoes various steps of pre-processing such as inverse statements, recoding, debugging, and so on. After the cleaning and reorganization process, overall data is divided into the parts and then only responses from Turkey are considered. In summary, the data of the study are collected via an online survey from Turkey software developers in March and April 2020. Therefore, this study applied a cross-sectional study design with the number of samples is 73 software developers from Turkey. The scales used in the survey are the WHO's five-item wellbeing index (WHO-5), and the WHO's Health at Work Performance Questionnaire (HPQ). Also, the Yong *et al.*'s (2017) individual disaster preparedness scale and the Bracha-Burkle's (2006) Fear and Resilience (FR) checklist are adapted for the Covid-19. Furthermore, there are some statements and questions about the performance, homeworking, ergonomics, organizational support, and demographic features (Kessler *et al.*, 2003; Topp *et al.*, 2015; Ralph *et al.*, 2020). Some scales are adapted for both before the pandemic and during the lockdown to analyze the differences. To test for changes, Wilcoxon's signed-rank test for paired samples is used as well as the Mann Whitney U test, and Kruskal-Wallis H test. Furthermore, a five-step normality analysis is performed to understand the distribution of the data. Although, Pearson's correlation is considered one of the most common measures for examining the degree of correlation between two variables, the Spearman's correlation rank-order test, a nonparametric alternative, is chosen in this study due to the assumptions to use the test are met because it is the most precise estimate of correlation for data deviate from normality. The graphical abstract developed based on the research model to analyze the hypotheses can be shown as in Fig. 3.



Fig. 3. Graphical abstract of the research model

All analyses are used to test the following research hypotheses;

Hypothesis H1: There is a significant differences in the employees’ wellbeing between before and during the pandemic.

Hypothesis H2: There is a significant differences in the employees’ performance between before and during the pandemic.

Hypothesis H3: There is a significant differences in the perceived effects of the pandemic according to demographic features.

3. RESULTS AND DISCUSSION

The sample of the study is 73 software developers or professionals, including business analysis, designers, quality assurance specialists, product managers, and architects from Turkey. 66 of them are living in Turkey, while others are living abroad like UK, USA, Austria and so on. Most of all employees are male (%86), and between 25 and 40 years old. Furthermore, the work experiences of developers are about 10 years, while the experiences of working from home are about 1 year.

Table 1. Demographic information of participants

Variables	Groups	Frequency	Percent (%)
Gender	Male	63	86,3
	Female	10	13,7
Age	20-24 years old	6	8,2
	25-29 years old	24	32,9
	30-34 years old	11	15,1
	35-39 years old	20	27,4
	40-44 years old	9	12,3
	45-49 years old	2	2,7
	50-54 years old	1	1,4
Work Experience	0-10 years	46	63
	11-21 years	27	37
Homeworking Experience	0-1 year	38	52,1
	Over 1 year	35	47,9
Total	N / Percent	73	100

The education levels of the participants in this study can be seen in Fig. 3 which shows that the research is including all higher education employees and some of them are working for large and huge global businesses.

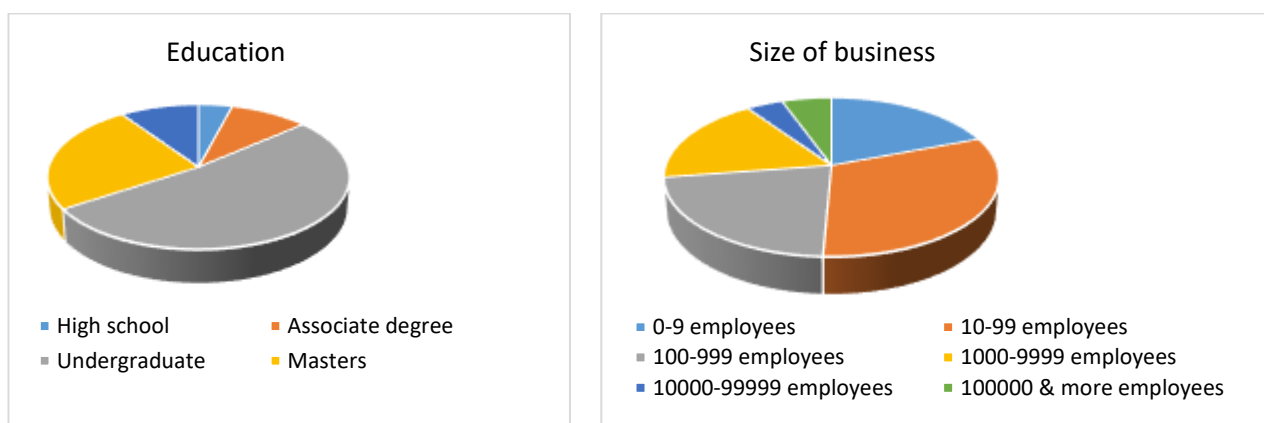


Fig. 4. Participants information : a) Education levels b) The size of businesses

The percentage distribution of education is 4,1% of high school; 9,6% of associate degree; 52,1% of undergraduate; 24,7% of masters, and finally 9,6% of PhD. In additionally, the size of businesses are 19,2% of micro enterprises which is less than 10 employees; 31,5% for between 10-99 employees; 21,9% for between 100-999 employees; 17,8% for between 1000-9.999 employees,

4,1% for between 10.000-99.999 employees, and lastly 5,5% for more than 100.000 employees. Besides this information, there are other valuable information collected via demographic questions to understand the homeworking conditions of employees. 76,7% of the employees are living alone during the pandemic, so the others 23,3% are living with one-four persons. Moreover, %20,5 of them have a child in the house. The Covid-19 situation of the employees includes 6 statements from “I have tested positive for Covid-19” to “I was recently quarantined”, and “none of above”. The frequency of this can be seen in Table 2.

Table 2. Covid-19 situation of participants

Covid-19 situation	Frequency	Percent (%)
1. I have tested positive for COVID-19	0	0
2. Someone else in my home has tested positive for COVID-19	0	0
3. A member of my family has tested positive for COVID-19	2	2,7
4. A close friend of mine has tested positive for COVID-19	5	6,8
5. I am currently or was recently quarantined	10	13,7
6. None of the above	56	76,8
Total	73	100

It is seen that 23,2% of the employees are dealing with the Covid-19, and most of them are in an effort to recover under quarantine in the research period. After understanding the Covid status of the participants, that is reflecting the conditions they are in, it is necessary to analyze the variables before testing the differences.

Table 3. Tests of normality and descriptive statistics

No.	Name of the variables	Kolmogorov-Smirnov		Numerical measures of shape		Descriptives		
		Statistic	P-value	Skewness	Kurtosis	Standard Deviation	Mean	Coefficient of variation
1	Covid situation	0,481	0,000	-1,386	-0,081	0,416	0,780	0,533
2	Isolation	0,461	0,000	0,972	0,340	0,439	3,205	0,136
3	Preparedness	0,122	0,009	-0,711	0,501	0,801	3,394	0,236
4	Homeworking	0,083	0,200	-0,172	-0,798	0,951	4,534	0,209
5	Wellbeing_Before	0,150	0,000	-1,040	1,415	1,147	4,183	0,274
6	Wellbeing_During	0,118	0,013	-0,499	0,129	1,239	3,780	0,327
7	Work performance (Before pandemic)	0,113	0,021	0,043	2,554	0,730	2,598	0,280
8	Work performance (During pandemic)	0,095	0,171	0,146	2,706	0,721	2,782	0,259
9	Perceived performance (Before pandemic)	0,233	0,000	-1,191	2,733	1,313	5,465	0,240
10	Perceived performance (During pandemic)	0,498	0,000	-1,625	12,396	0,493	3,917	0,125
11	Perceived productivity	0,138	0,001	-2,624	15,697	1,215	7,132	0,170

The coefficient of variation (CV) is a measure of the dispersion of data points around the mean in a series. As it is a measure of relative variability, it is the ratio of the standard deviation to the mean (average). Basically, if the coefficient of variation <10% is very good, 10-20% is good, 20-30% is acceptable, and lastly CV>30% is not acceptable. It means that if the variation level is bigger than 30%, it can be assumed that data are not normally distributed (Gomez and Gomez, 1984). It is also evidenced by the presence of skewness in the sampled data. Furthermore, if the absolute value of the skewness for the data is more than twice the standard error this indicates that the data are not symmetric, and therefore the data are not normal. Similarly, since the skewness and kurtosis of the normal distribution are zero, values for these two parameters should be close to zero for data to follow a normal distribution. A positively skewed distribution has relatively few large values and tails off to the right, and a negatively skewed distribution has relatively few small values and tails off to the left. Skewness values falling outside the range of -1 to +1 indicate a substantially skewed distribution (Kraska-Miller, 2019). Moreover, the Histogram and Detrended normal Q-Q plot of

variables are viewed to understand the normality. As a result, a five-step normality analysis is performed with the graphics review, and it is determined that the data are not normal according to the requirement to meet at least three of the specified criteria (Stamatis, 2019). Therefore, it can be said that all variables deviate significantly from a normal distribution except homeworking, so the distributions are compared using the Wilcoxon signed-rank test which is a nonparametric test that can be used to determine whether two dependent samples are selected from populations having the same distribution.

Table 4. Result of Wilcoxon signed rank test

No	Variables	Group	n	Mean rank	Z	p-value
1	Wellbeing	Negative ranks	45	33,89	-2,414	0,016
		Positive ranks	22	34,23		
		Ties	6	---		
2	Perceived performance	Negative ranks	56	31,17	-6,194	0,000
		Positive ranks	4	21,13		
		Ties	13	---		
Total		---	73	---	---	---

Additionally, the variable of work performance has 41 negative ranks; 24 positive ranks; 8 ties but significant (2-tailed) level is 0,049, so it is so close to 0,05 accepted level. As seen in Table 4, when employees work at home the levels of wellbeing and perceived performance decrease as well as the work performance during the pandemic. This result can also be observed by the means of the variables; the wellbeing level before the pandemic is 4,183, but during the pandemic, it is 3,780. Also, before the pandemic, the mean of work performance is 2,782, but during the pandemic, it is seen as 2,598. Similarly, the mean of perceived performance decreases from 5,465 to 3,917 level. This decline may be due to negative psychological conditions such as anxiety and stress, as well as the change in the way of doing business. Because it is preferred to work at home instead of going to work, suddenly. In order to analyze the change in the performance and productivity more clearly, the employees are asked to compare their general performance to others on a scale from 1 (the worst) to 10 (the most). According to this comparison result, the mean of perceived productivity before the pandemic is 8,013 with 1,688 standard deviation, while the productivity mean during the pandemic at home is 6,767 with 1,874 standard deviation. Thusly, it is clearly seen to have decreased productivity as well as performance, over the same period. In addition to all these, the Mann Whitney and Kruskal–Wallis multiple comparison methods, and Wilcoxon signed-rank sum test are used to analyze differences in the isolation, preparedness, wellbeing, homeworking, performance and productivity scores by subject demographics. Since the sample width is limited, no significant differences are found in terms of demographic features. For example, the test result of the preparedness show that the chi-square scores are not statistically accepted for the gender (chi-square: 0,952; p:0,309), education (chi-square: 6,616; p:0,157), age (chi-square: 7,397; p:0,286), and the number of people in the house (chi-square: 5,722; p:0,334). Similarly, other variables have not significant scores above 0.05, so it can be said that the values of the groups do not provide significant differences according to demographic characteristics. Lastly, Spearman's rho correlation tests are conducted for each of the variables with the assumption that the variables are at least ordinal and the scores of one variable are related monotonically to the other variable. When the relationships between variables are analyzed, it is seen that there are significant relationships at the level of 0.05 and 0.01. First of all, the perceived productivity and wellbeing are positively correlated ($r: 0,241$; $p:0,040$), among the participants. The results show that the perceived general performance has significant positive correlations with demographic features as well as wellbeing. The moderately positive correlations can be shown as below:

- ✓ Age ($r:0,235$; $p:0,045$),
- ✓ Wellbeing ($r:0,442$; $p:0,000$),
- ✓ Child cohabitant ($r:0,231$; $p:0,05$),

- ✓ Education level (r:0,322; p:0,005),
- ✓ Work experiment (r:0,233; p:0,047),
- ✓ Homeworking experiment (r:0,306; p:0,008).

During the pandemic, the perceived performance at home has also positive correlations with the homeworking (r: 0,431) and wellbeing (r:0,417) at the level of 0.01. The size of business is seen as one of the most important factors of opportunities for employees has a positive correlation with the wellbeing (r: 0,365; p:0,002), and has not significant with others. While the employees find their performance low during the pandemic, they see their productivity better than other employees. As a result of this perception, the homeworking has negative correlations with the performance during the lockdown (r:-0,368; p:0,001), while it has positive correlations with the perceived productivity compared to others (r: 0,248; r:0,034). As a result of all these analyses, Hypotheses 1 and 2 are supported, while Hypotheses 3 is not, due to the limited sample width. It means that there is a significant differences in the employees' wellbeing and performance between before and during the pandemic, but these differences cannot associate with the demographic features directly, in this sample and research model. While the pandemic continues to be experienced, it is seen that the obtained results are consistent with the literature. In addition to the decrease in productivity, Ralph *et al.*, (2020) found that the effects of pandemic vary according to demographic factors. And they highlight that the women, parents and disabled persons need extra support in this difficult process. Out of this study used the common data classes, there are also studies emphasizing that pandemics experienced in the past have negative effects, especially in service areas such as tourism (Bahar and Çelik-İlal, 2020). Furthermore, Nicola *et al.*, (2020) draw attention to social impacts such as the changing family dynamics, increased video games, and domestic violence as well as economic impacts in all sectors. "The coronavirus pandemic is not just a medical crisis, but a social and economic one too" declaration of International Labour Organization (ILO, 2020) supports these researches.

4. CONCLUSION

Since the new political and social realities are awaiting the world, the countries have to deal with the current Covid- 19 crisis themselves, and they launch emergency action plans. After the first case was confirmed in Turkey, the disaster is tried to be taken under control with the lockdown, and other measures. At the beginning of the measures taken, it was recommended that the businesses were called to not gather their employees at the workplace and to work from home if it is possible. For this reason, the researches on continuous improvement emergency management are seen very valuable. Thusly, this study, which includes the perceptions of the employees from Turkey, during the first lockdown, is expected to contribute, and successfully helps the professionals to keep the pace. The results show that the productivity of employees is directly related to the wellbeing of them. Furthermore, employee performance has significant positive correlations with demographic features such as age, education level, child cohabitant, and work experiment. And also, the homeworking has negative correlations with the performance during the lockdown. The level of perceived performance and wellbeing tends to be decreasing during the pandemic. This tendency can be caused by emotions like fear and anxiety as well as new working conditions because every house does not provide the necessary ergonomic conditions for working. To achieve the outcomes they want, business professionals should start by thinking about the emotions and perceptions of employees in these special times more than any other year must be taken into consideration. In addition to the coronavirus anxiety, there are also indirect health effects, such as re-opening of the ventilation and air conditioning systems of the business centers that are not used during the lockdown or the severe consequences of the non-virus treatments that are on hold. Similarly, measuring the sociological and psychological effects of the pandemic on employees includes some long term effects that will be more clearly understood in the future. Therefore, it is recommended to conduct extensive research in different cultures, various sectors, and business size. Simply because the socioeconomic studies conducted in other sectors, as well as the health, will be of great benefit

to the economic prospects by providing a competitive advantage. Failure to prepare an appropriate ecosystem for entrepreneurship soon may be the beginning of unemployment and social collapse. Of course, despite the negative economic conditions such as a sudden decrease in export opportunities and market share, while the exchange rates are increasing, the organizational support perceptions of employees during the pandemic will contribute positively to the sustainability of the business in the long term. Because after the sharp recession due to the quarantine, the global economy will increase rapidly in the normalization process and offer new opportunities for some sectors such as the food sector, and artificial intelligence products. Since the work-life balance is a very important issue, the workload increasing in the quarantine may also create employee backlash. It is critical to strike a balance between the psychological effects of difficult situations that employees experience and the economic goals of the businesses. Although the effect of the pandemic on the employees varies from sector to sector, it should be considered that exhibiting a management approach that cares about employees is one of the indispensable elements of global competition. Therefore, studies examining the direct and indirect effects of the pandemic on employees are very valuable as they contain information that gives direction to the businesses, professionals, and other decision-makers. The new way of doing business that is now used as a necessity will perhaps cause permanent perspective changes in the future and will take their place among the action plans of the organizations that want to reduce their costs. Based on this point, it can be said that proactive approaches that understand the employees, especially in extraordinary conditions, will make serious contributions to the decisions that shape the future.

ABBREVIATIONS (NOMENCLATURE)

<i>COVID-19</i>	Coronavirus-2019
<i>CSSE</i>	Center for Systems Science and Engineering
<i>CV</i>	Coefficient of variation
<i>Fig.</i>	Figure
<i>FR</i>	Fear and Resilience
<i>H</i>	Hypothesis
<i>HPQ</i>	Health at Work Performance Questionnaire
<i>ILO</i>	International Labour Organization
<i>n</i>	Sample size
<i>N</i>	Total sample size
<i>PhD</i>	Doctor of philosophy
<i>p-p plot</i>	Probability-probability plot
<i>p-value</i>	Probability value
<i>Q-Q plot</i>	Quantile-quantile plot
<i>r</i>	Correlation coefficient
<i>rho</i>	Rank correlation coefficient
<i>SARS-CoV</i>	Severe acute respiratory syndrome coronavirus
<i>UK</i>	United Kingdom
<i>WHO</i>	World Health Organization
<i>WHO-5</i>	WHO's five-item wellbeing index

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