Pandemic and its effect on professional environment on the Kingdom of Saudi Arabia

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Abstract

The pandemic has affected the world from many different perspectives, including environmental change. This research study aims to investigate the pandemic and its associated effect on the professional environment by measuring some of the parameters that are likely to disclose the impact of the pandemic. A structural questionnaire elicits design to capture the effect of COVID-19, where 284 respondents participated and present their views on a different statement based on the Likert scale. The factor analysis reveals five factors, which were further tested by hypothesis testing and binary logistic regression—and found factors 2, 3, and 5 to be significant in both tests.

Keywords Pandemic · Factor analysis · Hypothesis testing · Binary logistic

Introduction

Though pandemic is not new to the world, its belongings differ as indicated by the world's circumstance. Before the COVID-19, there were other significant six pandemic and plague flare-ups that appeared on the planet in the last two decades, specifically severe acute respiratory syndrome (SARS) (2002–2004), H1N1 flu (2009), the Middle East

respiratory condition (MERS) (2012–2020), the West-African Ebola infection scourge (2013–2016), the Zika fever (2015–2016), and the Avian flu (2008–2014). Nevertheless, none of these accomplished the spatial degree and the novel coronavirus (Cheval et al. 2020). Since the survey is reliant on the most recent pandemic COVID-19, the examination illustrates its beginning as in December 2019, a progression of pneumonia instances of obscure reason rose in Wuhan, Hubei, China. Following the pneumonia cases revealed in Wuhan and shared history of exposure to seafood markets for all COVID-19 patients, an epidemiological alert and caution was delivered by the nearby well-being expert in Dec 2019. More than 50 suspected cases with fever and the dry hack were moved to a medical clinic beginning from December 31, 2019 (Chaolin Huang et al. 2020). The epic coronavirus illness (COVID-19) was announced a pandemic on March 11, 2020 (WHO 2020), and the ongoing flare-up of the COVID-19 has been recorded as a purpose behind a few changes in the worldwide condition, as it hindered the blast of the modern turn of events, while numbers of businesses are not working like previously.

Italy also is the second most affected country by the COVID-19 infection after China. The outbreak of the viral disease has become a global concern (WHO 2020). Stats have increased consistently, while no absolute solution for the outbreak has been discovered. Significant parts of the world face lockdown situations while affecting the world economically. As nations went into lockdown, the production supply

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shutdown all around. Among numerous different parts, transport is the most hard-hit area because of lockdown. All transportation methods like street and air transport stopped as individuals are not permitted or falter to travel. As indicated by the report, air travel dropped by 96% due to COVID-19, in 75 years (CNN 2020).

The prime cause of environmental alterations is usually the stimulus of human activities on ecology. However, some of the reasons are not avoidable due to the pace of development. Since the globe is improving economically while the nation's power depends on economic and development factors, the industrialists and the authorities neglect the long-term effects of damage to the environment (WHO 2020). Collective efforts are required to create a difference in a specific world. However, ongoing competency in the world almost made it impossible to work for the environment instead of making the economy secure. However, circumstances that lead the world in the same direction can be considered the only option of witnessing a change in the environment.

Due to the global pandemic, industrial functions have slowed down on the noteworthy scale, while the change has come globally. Due to its transmission rate, the only effective way to get less affected is the lockdown condition and avoiding social interaction. Since industrial areas and businesses or enterprises are commonplace for gathering a group of people, these were supposed to suspend as the initial step. There is a change in worldwide industries' functioning and the noticeable difference witnessed in the environment (Nicastri et al. 2020).

The pandemic has affected the world from many different perspectives, including environmental change, whereas this ecological change does not limit only to pollution, but it has its impact inside the industries, which leads to the professional environment change. Considering the necessity of time, enterprises have brought a significant difference in operations' traditional way.

Overall, oil demands declined unquestionably, and costs cleave down unequivocally, as production supply and transport divisions by and large halted. COVID-19 had an amazingly negative impact on human prosperity and the world economy. Moreover, it achieves sully decline due to confined social and monetary activities (Dutheil et al. 2020). The setback rate is not higher than various contaminations; its pandemic nature has made basic uproar worldwide (Chaolin Huang et al. 2020). Amid a worldwide pandemic, the principal approach towards controlling the circumstance is to proclaim a lockdown that contains the outburst. Be that as it may, it does irreversible harm to the overall economy. The lockdown incorporates the closing down all industries and supply chains, the cost of which is evident in the form of the country's sinking production. However, changes are prominent in lower industrial pollution due to the lockdown of industrialized countries like China, and the USA is the sole wellspring of

product supply for different nations. The developed and undeveloped nations get imperiled in light of lockdown (Business Insider 2020).

Shutting down transportation as a precaution against the viral outbreak further contributes to the economy's deterioration as it leads to the limited transportation of goods across and within the countries. Simultaneously, the drastic change in public transport has also affected the environmental change. The potential economic damage that is likely to be caused by COVID-19 is to a great extent. Hence, eliminating the outbreak in every possible way is vital despite some of the environment's positive aspects. It is the authorities' sole duty to take the safety measure by every means (WHO 2020), whereas if. Unfortunately, the government worldwide fails to take action regarding the pandemic, and the economy will collapse, leading to a rise in poverty and chaos.

Accordingly, before the finish of June 2020, the COVID-19 pandemic has prompted various natural effects, both positive and negative. Hence, the investigation is based on a measure for controlling the expert ecological change caused by the COVID-19 pandemic. The investigation plans to distinguish the sensitivity identified with the overall population and representatives of the various businesses that components are extensively influencing because of the pandemic circumstance.

Since the outbreak, specialists have been investigating different ways to deal with anticipate the country's unruly conditions. The study depends on the professional's adjustment, and the overall environment is also coming to attention. Thus, this investigation is based on measures for controlling pandemic impact in an expert domain, and for that, our examination's central goal is:

- To determine the factor influences in controlling pandemic in a professional environment.
- To determine the level of awareness in each factor.
- To determine whether factors obtained from the first objective differs based on selected demographic variables.
- To predict the model for the study based on the factors obtained from the first objective.

Methodology

A structured survey questionnaire designed to elicit necessary information on measures for controlling pandemic effect in a professional environment under two broad categories, viz.;

- Demographic profile and includes a general profile of respondents like nationality and gender.

Table 1 KMO, Bartlett's tests, and communalities for each research variable

KMO	Bartlett's test of sphericity	df	P-value
0.809	1226.425	120	0
No.	Statements	Initial	Extraction
1	Did your company/organization inform you about preventive measures that should be taken in COVID-19?	1	0.517
2	It is acceptable to work in small groups of people	1	0.649
3	Small businesses are supposed to be open during the lockdown	1	0.606
4	Staff is getting checked for fever now and then	1	0.584
5	Is your company/organization taking the necessary steps to ensure the safety of their employee's health	1	0.664
6	Did your company/organization provide all the necessary actions to avoid the spread of COVID-19?	1	0.734
7	Unnecessary meeting and professional gathering are avoiding	1	0.584
9	Company is taking the health measures on priority and providing every possible convenience	1	0.588
10	COVID-19 affected the rate of the professional environment in a positive manner	1	0.621
13	The rate of unemployment is increasing due to COVID-19	1	0.589
14	Absence of public transport is making it difficult to go to the workplace	1	0.59
15	The workplace is considering the influencing factors like transport issues and providing leniency	1	0.635
16	Company is providing the essentials such as masks, sanitizers, etc. as for safety measures	1	0.64
18	The company rather than staff members recommend work from home	1	0.611
19	Company is willing to help the employees in worse case scenarios	1	0.528
20	The professional environment has been positively affected due to COVID-19	1	0.651

- Measures for controlling the pandemic effect in a professional environment include twenty statements on pandemic and its effect on the environment.

Kaiser-Meyer-Olkin (KMO) proportion of sampling adequacy/Bartlett's test of sphericity uses to extricate the elements that are anything but difficult to evaluate and reasonable to the respondent information for factor investigation. Specifically, the KMO list is prescribed when the cases to variable proportion are under 1:5. The KMO record esteem ranges between zeros to one, with 0.50 thought about reasonable for factor investigation. Bartlett's test of sphericity ought to be huge ($p < .05$) for the proper investigation. At that point, descriptive examination is utilized to analyze the mean among the variables obtained from factor investigation.

The independent sample *t*-test was used to identify the difference between the selected demographic variable among the factors obtained. Finally, the logistic regression model

used for the study was represented as:

$$\ln \left[\frac{\pi}{1-\pi} \right] = \alpha + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5$$

where π is probability of measures for controlling pandemic effect in a professional environment; α is intercepts; x_1, x_2, x_3, x_4, x_5 are independent variables, which are likely to affect the measures for controlling pandemic in a professional environment; and $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ are coefficient of regression.

Results and interpretations

Extraction method: Principal component analysis (SPSS output)

Table 1 delineates about then Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, having a rough estimation of 81%, and Bartlett's Test of sphericity is critical. A survey requests around 20 articulations separated from the segment questions are requests about the measures for controlling the pandemic impact in an expert domain. Out of these 20 explanations, four remarks dropped because of its low estimations of communalities, for example, under half. Table 2 presents the total variance clarified by and by in exploratory factor examination for the elements. Factor 1 shows the rough 23% of the distinction, for thought two, it is 10.863% of the variance, for factor 3 it is 9.905% of the variance, for factor 4 it is 9.213% of the distinction, and for last thought five, it speaks to

Table 2 Total variance explained

Factor no.	% of variance	Cumulative %
1	22.977	22.977
2	10.863	33.84
3	9.905	43.745
4	9.213	52.958
5	8.234	61.192

Table 3 Rotated component matrix^a

Factor title	Question	Statements	Factor loading
Is your workplace ready for COVID-19	6	Did your company/organization provide all the necessary actions to avoid the spread of COVID-19?	.837
	5	Is your company/organization taking the necessary steps to ensure the safety of their employee's health	.774
	9	Company is taking the health measures on priority and providing every possible convenience	.738
	7	Avoid unnecessary meetings and professional gatherings.	.691
	4	Staff is getting checked for fever now and then	.557
	1	Did your company/organization inform you about preventive measures that should be taken in Covid-19?	.532
	19	Company is willing to help the employees in worse case scenarios	.456
COVID-19 causes devastating losses in working hours, employment and transportation patterns	20	The professional environment has been positively affected due to COVID-19	.744
	13	The rate of unemployment is increasing due to COVID-19	.724
	14	Absence of public transport is making it difficult to go to the workplace	.673
The economic impact of COVID-19 on micro and small business	2	It is acceptable to work in small groups of people	.792
	3	Small businesses are supposed to be open during the lockdown	.732
Safety measures to fight COVID-19	15	The workplace is considering the influencing factors like transport issues and providing leniency	.736
	16	Company is providing the essentials such as masks, sanitizers, etc. as for safety measures	.614
Strategies on COVID-19	10	COVID-19 affected the rate of the professional environment in a positive manner	.734
	18	The company rather than staff members recommend work from home	.596

Extraction method: Principal component analysis

Rotation method: Varimax with Kaiser normalization

^a Rotation converged in 7 iterations

the 8.234% of the variance, with the complete aggregate at 61.192%.

Table 3 represents the rotation component matrix of the statements and reveals that out of these statements, five factors can retain and their possible names are mentioned along with the statements. The first factor that comprises seven statements is named as “Is your workplace ready for COVID-19.” The second factor having three statements is called as “COVID-19 causes devastating losses in working hours, employment and transportation patterns”; the third factor having two statements is named as “The economic impact of COVID-

19 on micro & small business”; the fourth factor having two statements is named as “Safety measures to fight COVID-19.” The last factor with two statements is called as “Strategies on COVID-19.”

To adjudge the level of awareness among the factors, we have to compare the mean values of the elements presented in Table 4, which predict that the mean score value of factor 1, i.e., Is your workplace ready for COVID-19, is the highest among all. In contrast, factor 3, i.e., the economic impact of COVID-19 on micro and small business, has the lowest value but the highest standard deviation among the elements.

Table 4 Descriptive statistics

	N	Minimum	Maximum	Mean	Std. deviation	Rank
Factor 1	284	2.00	5.00	4.2465	.63438	1
Factor 2	284	1.00	5.00	3.9624	.79318	2
Factor 3	284	1.00	5.00	3.2746	1.00014	5
Factor 4	284	1.00	5.00	3.6496	.90618	4
Factor 5	284	1.00	5.00	3.7165	.82353	3
Valid N (listwise)	284					

Table 5 Group statistics on gender and Levene's test for equality of variance

	1.2 Gender	N	Mean	Std. deviation	Std. error mean	F	Sig.	T	df	Sig. (2-tailed)
REGR factor score 1 for analysis 1	Male	133	− 0.103	0.93	0.081	1.52	0.22	− 1.63	282.00	0.10
	Female	151	0.09	1.052	0.086			− 1.64	282.00	0.10
REGR factor score 2 for analysis 1	Male	133	− 0.079	0.972	0.084	1.78	0.18	− 1.26	282.00	0.21
	Female	151	0.07	1.022	0.083			− 1.26	280.29	0.21
REGR factor score 3 for analysis 1	Male	133	0.222	0.98	0.085	0.04	0.85	3.59	282.00	0.00
	Female	151	− 0.196	0.979	0.08			3.59	277.38	0.00
REGR factor score 4 for analysis 1	Male	133	0.059	1.039	0.09	0.09	0.76	0.93	282.00	0.36
	Female	151	− 0.052	0.965	0.078			0.92	271.00	0.36
REGR factor score 5 for analysis 1	Male	133	0.166	0.956	0.083	2.38	0.12	2.66	282.00	0.01
	Female	151	− 0.146	1.018	0.083			2.67	280.80	0.01

Our goal is to explore whether the variables obtained from the goal are equivalent or not founded on gender, for example (male and female) and nationality (Saudi and non-Saudi). In light of Levene's test, change of variables is the equivalent among gender, yet there is a striking contrast in mean estimations of gender for factors 3 and 5, i.e., the economic impact of COVID-19 on micro and small business and strategies on COVID-19, where male agree while the female is in disagreement as portrayed in Table 5. Likewise, for the nationality, there is a considerable distinction in mean estimations of nationality for COVID-19 causes devastating losses in working hours, employment, and transportation patterns (factor 2). In the economic impact of COVID-19 on micro and small business (factor 3), non-Saudi agree while Saudi are in disagreement. For factor 5, i.e., strategies on COVID-19, non-Saudi agree while Saudi are in disagreement, but their variance is not the same as delineated in Table 6.

Based on the variables used in this study, the regression equation is mentioned as below:

$$\ln \left[\frac{\pi}{1-\pi} \right] = \alpha + \beta_1 fac_1 + \beta_2 fac_2 + \beta_3 fac_3 + \beta_4 fac_4 + \beta_5 fac_5$$

where fac_1 represents your workplace ready for COVID-19; fac_2 represents COVID-19 causes devastating losses in working hours, employment, and transportation patterns; fac_3 represents the economic impact of COVID-19 on micro and small business; fac_4 represents safety measures to fight COVID-19; and fac_5 represents strategies on COVID-19.

A logistic regression analysis is conducted on measures for controlling pandemic in a professional environment for 284 respondents, using their demographic and knowledge details as predictors. The coefficient estimate results, standard errors, Wald statistics, significance levels, and odds ratio for the parameters of the logistics regression model are measures for controlling pandemic in a professional environment. A full model test against a constant only model was statistically significant, indicating that the predictors as a set are reliably distinguished between male and female (chi-square = 25.474, $p < 0.00$ with $df = 5$). Nagelkerke's R^2 of 0.115 indicated a weak relationship between prediction and grouping. Cox and Snell R^2 is 0.86, and 2 log-likelihood is 367.092. Overall correct prediction success was 60.2% (54.1% for male and 65.6% for female). Similarly, the full model test indicates that the predictors are a set reliably distinguished among nationalities (chi-square = 37.116, $p < 0.00$ with $df = 5$).

Table 6 Group statistics on nationality and Levene's test for equality of variance

	0. 1 Nationality	N	Mean	Std. deviation	Std. error mean	F	Sig.	T	df	Sig. (2-tailed)
REGR factor score 1 for analysis 1	Non-Saudi	107	0.01	0.94	0.09	3.22	0.07	0.16	282.00	0.87
	Saudi	177	− 0.01	1.04	0.08			0.17	241.74	0.87
REGR factor score 2 for analysis 1	Non-Saudi	107	0.25	0.90	0.09	1.79	0.18	3.38	282.00	0.00
	Saudi	177	− 0.15	1.03	0.08			3.49	245.81	0.00
REGR factor score 3 for analysis 1	Non-Saudi	107	0.28	0.92	0.09	1.35	0.25	3.76	282.00	0.00
	Saudi	177	− 0.17	1.01	0.08			3.85	240.10	0.00
REGR factor score 4 for analysis 1	Non-Saudi	107	0.10	0.98	0.09	0.44	0.51	1.34	282.00	0.18
	Saudi	177	− 0.06	1.01	0.08			1.35	229.85	0.18
REGR factor score 5 for analysis 1	Non-Saudi	107	0.22	0.89	0.09	6.93	0.01	2.89	282.00	0.00
	Saudi	177	− 0.13	1.04	0.08			3.00	249.92	0.00

Table 7 Logistic regression

Dependent	Independent		B	S.E.	Wald	df	Sig.	Exp(B)	Inference
Gender	Step 1 ^a	REGR factor score 1 for analysis 1	0.21	0.12	2.81	1	0.09	1.23	Insignificant
		REGR factor score 2 for analysis 1	0.16	0.13	1.70	1	0.19	1.18	Insignificant
		REGR factor score 3 for analysis 1	− 0.46	0.13	12.28	1	0.00	0.63	Significant
		REGR factor score 4 for analysis 1	− 0.12	0.13	0.93	1	0.34	0.89	Insignificant
		REGR factor score 5 for analysis 1	− 0.34	0.13	7.04	1	0.01	0.71	Significant
		Constant	0.14	0.13	1.31	1	0.25	1.15	
Nationality	Step 1 ^a	REGR factor score 1 for analysis 1	− 0.01	0.13	0.01	1	0.93	0.99	Insignificant
		REGR factor score 2 for analysis 1	− 0.48	0.14	11.66	1	0.00	0.62	Significant
		REGR factor score 3 for analysis 1	− 0.51	0.14	13.94	1	0.00	0.60	Significant
		REGR factor score 4 for analysis 1	− 0.17	0.13	1.74	1	0.19	0.84	Insignificant
		REGR factor score 5 for analysis 1	− 0.40	0.14	8.44	1	0.00	0.67	Significant
		Constant	0.58	0.13	19.08	1	0.00	1.79	

^a Variable(s) entered on step 1: REGR factor score 1 for analysis 1, REGR factor score 2 for analysis 1, REGR factor score 3 for analysis 1, REGR factor score 4 for analysis 1, REGR factor score 5 for analysis 1

Nagelkerke's R^2 of 0.167 indicated a weak relationship between prediction and grouping. Cox and Snell R^2 is 0.123, and 2 log-likelihood is 339.159. Overall correct prediction success was 62.3% (0.00% for non-Saudi and 100% for Saudi).

The logistic regression result, as presented in Table 7, reveals the factors for measures for controlling pandemic effect in a professional environment on gender and nationality. The associate p -value of the Wald's test indicates that out of these five factors, only two factors are significant for gender, and three factors are significant for nationality as the associated p -values are lower than 0.095. The two factors for genders are the economic impact of COVID-19 on micro and small business and strategies on COVID-19. Similarly, the three factors for nationality are COVID-19 causes devastating losses in working hours, employment, and transportation patterns; the economic impact of COVID-19 on micro and small business; and strategies on COVID-19.

Discussion

The research study based on COVID-19 impacts the environment, while many of the changes are undoubtedly visible and do not need to prove. A survey was conducted to evaluate the environmental measure's perspective for controlling the pandemic effect in the Kingdom of Saudi Arabia, and the data was collected and analyzed to concise the outcomes. A total of 284 participants actively participated in the study of which 10% of the participants were not aware of the pandemic terminology, so they could not answer all the questions efficiently. Apart from this, the majority of the participants responded accordingly. The study results exhibit that most participants agree

that there is a noticeable change in the environment due to the pandemic.

The other part of the research discussed the professional environment and its measures to ensure its health safety. According to the results, the professional environment is also profoundly affected by the pandemic, while most organizations are taking necessary measures to avoid adverse effects. The survey also shows that work from home is suggested for many organizations, while productivity has been profoundly affected. It also shows that the rate of unemployment has also increased.

The impact on the general and professional environment is prominent, while the factors impact it in both ways, positive and negative—the public's perspective is considered to be the broad perspective of the nation. In comparison, this survey helps determine how the public perceives the current situation and predicts its future.

The coronavirus pandemic has produced a dynamic inclusion of worldwide researchers, including universal, national, and local. Since the trials are continuing and the end is still challenging to predict, we shall refer only to initial results and probable lessons.

Conclusion

The environment is a fundamental element not only for humans but for all the creation on the earth. COVID-19 is a worldwide trial in the twenty-first century affecting more than 210 countries worldwide (El Zowalaty et al. 2020). However, it is also considered a “blessing in disguise,” where pollution is reducing, and Mother Nature retrieves itself (Muhammad et al. 2020). The study is summarizing that the pandemic had

put a significant effect on the environment. At the same time, the community has been suffering due to the number of applied changes mentioned in derived factors. The factors 3 and 5, i.e., the economic impact of COVID-19 on micro and small business and strategies on COVID-19, show a mean difference for gender and have the odd values of 0.63 and 0.71, respectively, meaning that males are having 0.63 times greater odds than females for the economic impact of COVID-19 on micro and small business (factor 3) and the males have 0.71 times greater odds against females for strategies on COVID-19. Likewise, factors 2, 3, and 5, i.e., COVID-19 causes devastating losses in working hours, employment, and transportation patterns; the economic impact of COVID-19 on micro and small business; and strategies on COVID-19, show a mean difference for nationality and the non-Saudi have 0.62, 0.60, 0.67 times greater odds value against Saudi.

Author contribution Uzma Khan is the main author who drafted the outline as well as compiled the study. Aarif Mohammad Khan did the analysis, results, and conclusion. Nouf Alkathery collected the primary survey data. Urooja Khan helped in analyzing the data.

Data availability The datasets used and/or analyzed during the current study are available from the corresponding authors on reasonable request.

Declarations

Ethics approval and consent to participate Not applicable.

Consent for publication Not applicable.

Competing interests The authors declare no competing interest.

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