Original Research

COVID-19 Milieu and Its Psychological Effects on the Environmental Performance

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Abstract

COVID-19 brought significant challenges that have ruined almost all segments of the economy and the environment. The present paper explores the COVID-19 milieu and its impacts the environmental performance (*EP*). We targeted managers of the Small and Medium-sized enterprises (SMEs) of Saudi Arabia to get online responses. Using the path analysis, the findings reveal a significant negative effect of the factors such as perception of COVID-19 (*PoCVD*), innovation capability (*IC*), environmental concern (*EC*) and the fear of COVID-19 (*FoCVD*) on *EP*. The study's findings would draw policymakers' and planners' attention to the need to enhance *EP* in light of the COVID-19 waves. Lastly, the study results would add to the literature on COVID-19, management and environmental science.

Keywords

COVID-19 milieu; environmental concern; innovation capability; environmental

performance; SMEs

1. Introduction

The outbreak of COVID-19 has strictly influenced the national and global economies, where several enterprises confront diverse problems with a certain extent of losses. The COVID-19 pandemic severely impacts small and medium-sized enterprises (SMEs) worldwide. Explicitly, the principal victims of the COVID-19 explosion are SMEs and large enterprises. [1] reveal that SMEs frequently need more financial and management resources. The constructs, i.e., environmental concern (*EC*), perception of COVID-19 (*PoCVD*), fear of COVID-19 (*FoCVD*) and innovation capability (*IC*) are the significant barriers in developing the *EP*. The COVID-19 situations diminish the production and functions in the economy. According to [2], *FoCVD* is a depressive and anxious emotional state. In 2020, practically all economies' GDP decreased due to this circumstance [3]. COVID-19 insight also caused many worries among business owners and entrepreneurs [4]. The *IC* is a significant predictor of *EP* during the pandemic [5, 6].

As a result, the COVID-19 outbreak is offered the indication and occurrence of upheavals [7]. Specifically, SMEs are out of stock and hardly still in business [8]. *EP's* of the enterprises have yet to be successful due to the *FoCVD* [5, 9]. This scenario collapsed the economy and the lives of the people of society and led to dramatic changes in low business accomplishments [3].

Hence, this study would overcome the gaps in the investigation of the effect of *FoCVD, IC, PoCVD* and *EC* on *EP* among the managers of Saudi Arabia. The outcomes of the study would assist the policymakers in knowing the depth and effect of *FoCVD, EC* and *IC* towards *EP*. The research conclusions would help the government and SMEs authorities design fear-free policies in pandemic situations to boost and make an effective environment without fear.

2. Aim and Objectives of the Study

The study aims to investigate the effect of *FoCVD, IC, PoCVD* and *EC* on *EP* among the managers of Saudi Arabia. Based on this aim, we proposed the following specific objectives:
Objective 1: To investigate the role of *PoCVD* in predicting *EP* during COVID-19.
Objective 2: To explore the role of *IC* in predicting *EP* during COVID-19.
Objective 3: To examine the role of *EC* in predicting *EP* during COVID-19.
Objective 4: To inspect the role of *FoCVD* in predicting *EP* during COVID-19.

3. Literature Review and Framework

The free spread of COVID-19 put millions of people into the mouth of death and significantly destroyed life and the industry's daily routine. The fact that businesses have shut down to stop the virus' spread has also changed people's lifestyles, led to significant job losses, and put millions of people's resources in peril [10]. The *EC* is strongly connected to energy-related issues [11]. The results of [12] highlighted the strong negative impact on *EP* that COVID-19 and employees' responses to adjustments had. *FoCVD* may consequence in refining job effects in frontline nurses. According to [13], these have increased work satisfaction, decreased stress, and decreased desire

to leave the business or their profession. In the perception of [14], contextual variables such as complexity, dynamism and generosity are negatively associated with *EP*. Besides, there is a negative correlation between *EP* and environmental risk. While environmental management capabilities significantly enhance the EP [15].

More specifically, *PoCVD* demonstrates individuals' feelings, anxiousness or nervousness about the coronavirus's arrival. It also shows the thinking of individuals on how companies may develop their strategies to deal with COVID-19 [4]. Likewise, the *IC* factor underlies the encouragement of SMEs for employees' facilitation of green innovation. This also highlights individuals thinking and creativity regarding the employees of SMEs [16]. Similarly, *EC* facilitates green innovation in which individual organizations promote a green culture among employees. This encourages developing a conducive environment that may promote *EP*, particularly in COVID-19 [16]. The final predictor (*FoCVD*) shows the fear individuals of SMEs confront during COVID-19. This also shows the extent of fearfulness during the pandemic [2]. Finally, *EP* demonstrates individuals' performance regarding the environment during COVID-19 in SMEs. The performance also includes the SMEs' energy/resource consumption [17].

In brief, the lethal virus (COVID-19) destroyed the organizations due to lockdown and executed new thoughts to maintain their routine work from home. This phenomenon has given rise to several negative worries about stress, annoyance, digital inequality, and work-family conflict, which have a detrimental impact on the performance of employees [18, 19].

Consequently, the existing literature highlights the different constructs, i.e., employee reactions to changes, product innovations, *IC*, job satisfaction, green innovation, environmental regulation, stress, fear, frustration, work-family conflict, environmental risk, and environmental management capabilities positively or negatively affected the *EP* in the diverse regions [18-20]. Besides, these links have been investigated in the daily routines and the specific time of COVID-19. Nevertheless, this study finds the valid rationale that in the COVID-19 milieu, the previous literature did not focus on exploring the impacts of *FoCVD, EC, IC* and *PoCVD* on *EP*. Furthermore, the literature also provides empirical evidence that the *EP* is adversely affected by *PoCVD, IC, EC* and *FoCVD* during the pandemic [2, 4, 18, 16, 19]. Thus, researchers believe that *EP* may be negatively forecasted by *FoCVD, EC, IC* and *PoCVD* in SMEs of Saudi Arabia, particularly during the pandemic. Based on this argument and relationships in the literature, we formulated Figure 1 to explore SME managers in Saudi Arabia.
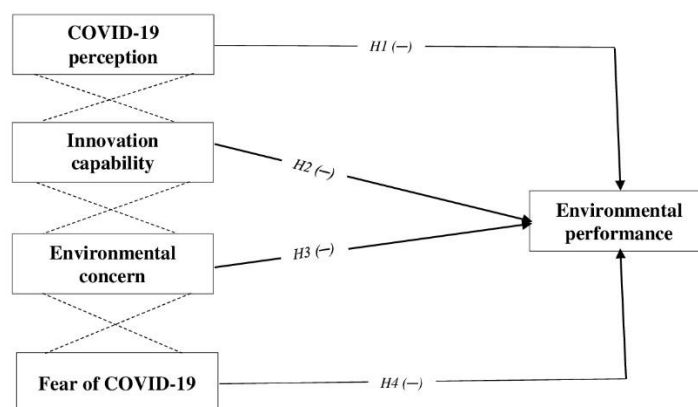
Figure 1 Model of the study. Source: Developed by the researchers.

4. Hypotheses Development

4.1 PoCVD, IC, EC, FoCVD and EP

SMEs confronted massive risks in the COVID-19 environment [21]. *PoCVD* brought a lot of fear, particularly for firm owners and entrepreneurs [20]. *PoCVD* has seriously affected the global economy of Saudi Arabia Micro, small, and medium-sized enterprises (MSMEs) have noticed the pandemic's significant victims. SMEs must still develop plans and strategies to address these commercial and environmental concerns [22, 23]. The technological and innovative capabilities, absorption, and productivity positively and significantly affect creative performance [24]. Rapidly changing and stable settings may be improved and built upon with an innovation strategy. A favorable and considerable impact of *IC* on corporate performance, environmental performance, and environmental sustainability performance has been documented in the literature [25, 26].

According to [27], *EC* and problems might result in various decision-making contexts. These, in turn, significantly impact the manufacturing strategy construction process. Adopting proactive environmental management, which promotes raising *EP*, is influenced by how severe the environmental issues are. According to [20], *EC* is frequently beneficial for adopting environmentally responsible behaviors and pro-environmental values. Individuals improve environmental quality mostly because they think living in a polluted environment is unhealthy. People worldwide are experiencing anxiety, uncertainty, and anxiety due to COVID-19 and its concerns [28]. [9] demonstrate the connection between COVID-19 uncertainty and customer worry. *FoCVD* and anxiety enhance uncertainty and environmental concerns, decreasing *EP*.

Consequently, in the literature, factors such *as FoCVD, IC, EC* and *PoCVD* have appeared to be negative predictors of EP in regular routines [2, 4, 18, 19]. However, the literature still needs their confirmation in an integrated way, particularly during the COVID-19 period [16, 20, 21, 29]. Furthermore, contextually, the previous literature did not focus on conducting empirical studies in such domain in SMEs generally and predominantly in Saudi Arab's context, despite their massive and negative effect on environmental ruins and *EP* [29]. Thus, based on the knowledge gaps of the disappearance of integrated approach containing *CVD, IC, EC* and *PoCVD* towards *EP;* and contextual gaps which need further confirmation of these associations*,* we proposed the following hypotheses for validation among managers of SMEs in Saudi Arabia:

H1. *PoCVD* is a negative predictor of the *EP* during COVID-19.
H2. *IC* is a negative predictor of the *EP* during COVID-19.
H3. *EC* is a negative predictor of the *EP* during COVID-19.
H4. F*oCVD* is a negative predictor of the *EP* during COVID-19.

5. Methods

5.1 Approach, Context and Units of Analysis

We applied the quantitative approach due to a valid process as it deals with statistical tests and provides authentic results. Several scholars, such as [22-28], applied the same techniques to explore the *EP* with diverse factors in the same dimension. Unambiguously, the SME sector in Saudi Arabia is accountable for the quick development of technology and the availability of a worldwide manufacturing network [22, 23]. We gathered data from the managers of the

manufacturing industries of Saudi Arabia because managers who examine all of an organization's problems are termed managers [30]. They also play a vital role in economic stability by stimulating SMEs [31]. The researchers conducted an online survey responding to Saudi Arabia's SOPs and stay-at-home policies.

5.2 Data Collection Methods and Sample Size

The entire poll was conducted using convenience sampling. We applied the sampling techniques as it is easy to trace respondents and accessible to the researchers. In the time of the pandemic, several scholars like [1], [3], [8] and [9] also applied a similar approach to conduct their empirical online assessment. As long as there were rules and recommendations regarding the survey, we adhered to the necessary ethical standards to protect the participants' human rights [32]. We asked them to offer their time to take part in the study. After getting the consent, we have attached and mailed 400 mail questionnaires. We also sent the links to WhatsApp groups of managers. These groups are mainly developed during the pandemic to make their routine activities via an online learning management system (LMS). Finally, we collected 218 usable cases with a 54% response rate.

We used the G*Power (version 3) test, a virtuous freeware program to ensure the required sample size. This test controls statistical power for the most popular statistical tests used to analyze sample size in behavioral research [33, 34]. To conduct this test, we applied the four predictors (independent variables) to ensure a sufficient sample size. As a result, G*Power suggested 100 samples as enough to conduct the SEM analysis and to fulfill the AMOS software's requirement.

5.3 Non-response Bias

We conducted an online through convenience sampling; thus, it is necessary to confirm data for potential non-response bias (NRB). NRB is viewed as a significant restriction of the inquiry, and to produce consistent results, the sample must be adequate and objective. To tackle this critical issue, we pursued the suggestions of [35] by comparing the first thirty returned surveys as early responses and the final thirty returned as late responses. We employed three demographic factors, i.e., gender, age and experience, for measuring the assumption of NRB. We applied an analysis of variance (ANOVA) statistical test to confirm NRB. As a result, a statistically non-significant ANOVA score guarantees no discernible difference between the first and last responses. Thus, the findings support a sufficiently impartial sample.

5.4 Measurement Scales

We measured *PoCVD* with seven items borrowed from [4], with the sample item as "I feel anxious or nervous about the coronavirus." The researchers assessed the *IC* factor with three items from [16]. The sample item of the scale is "To facilitate green innovation; our organization encourages employees to think creatively" Likewise, the *EC* predictor is assessed on three items adopted from [16]. The sample content for *EC* is "To facilitate green innovation; our organization cultivates a green culture among employees." Furthermore, *FoCVD* was assessed on the ten-item scale of [2], with the content item as "I am most afraid of COVID-19" Finally, we measured *EP*

construct on three items borrowed from the study of [36]. We modified this factor in the COVID-19 perspectives. The sample item is "COVID-19 environment reduces our organization's energy/resource consumption" We measured all the items with a five-point Likert scale (strongly disagree = 1 to strongly agree = 5).

6. Analysis

6.1 Descriptive Statistics and Correlation

To determine the representation of data of the entire population, we conducted descriptive statistics. We observed the highest mean scores for *FoCVD* (3.521) and the lowest for *EC* (2.453). About the values of standard deviation, we found the highest values for *IC* (1.369) and the lowest for 1.129 (*FoCVD*) (see Table 1). Moreover, the correlation matrix also ensured good strength of the relationship. Subsequently, the results show that all the constructs, such as *PoCVD, IC, EC* and *FoCVD*, have links with EP (Table 1).

Table 1 Descriptive statistics and correlation matrix.

Variables	Mean	Std. deviation	1	2	3	4	5
EP	3.012	1.142	---				
PoCVD	3.418	1.172	−0.031	---			
IC	2.904	1.369	−0.039	0.077	---		
EC	2.453	1.273	−0.090	−0.123	0.172*	---	
FoCVD	3.521	1.129	−0.231*	−0.298*	0.213*	−0.319	---

Source: Authors' own estimation

*. Correlation is significant at the 0.05 level (2-tailed).

6.2 Measurement of the Model

To observe the relationship among items, we conducted factor loading and noted its values above 0.70 [37], except for items pocvd4, focvd3, focvd6, focvd8 and focvd10 did not appear with acceptable values. Consequently, low-loaded items were deleted [37]. Moreover, the composite reliability (CR) values were observed to be in-between 0.813 (*EP*) to 0.846 (*EC*) or >0.70 [37]. We assessed the factors' uniqueness, an average variance extracted values (AVE) and noticed the values of AVE in-between 0.799 (*EC*) to 0.845 (*EP*) for all factors (>0.50) [37]. Last, of all, we ensured Cronbach's alpha (α) for all factors within adequate edges (>70) [38] (Table 2).

Table 2 Measurement model.

Factor	Item	Loadings	CR	AVE	α
	pocvd1	0.889			
	pocvd2	0.867			
PoCVD	pocvd3	0.855	0.827	0.815	0.866
	pocvd5	0.819			
	pocvd6	0.787			
	pocvd7	0.798			

	ic1	0.867			
IC	ic3	0.858	0.819	0.800	0.825
	ic2	0.822			
	ec1	0.878			
EC	ec2	0.861	0.846	0.799	0.798
	ec3	0.859			
	focvd1	0.892			
	focvd2	0.866			
	focvd5	0.859			
FoCVD	focvd4	0.840	0.807	0.827	0.766
	focvd7	0.825			
	f198	0.818			
	focvd9	0.809			
	ep2	0.876			
EP	ep1	0.846	0.813	0.845	0.821
	ep3	0.812			

Source: Authors' own estimation

Notes: IC = innovation capability; PoCVD = perception of COVID-19; FoCVD = fear of COVID-19; EP = environmental performance; EC = environmental concern; AVE = average variance extracted values; CR = composite reliability; α = Cronbach's alpha

6.2.1 Discriminant Validity

We assessed discriminant validity (DV) to assess the extent of association between constructs [37]. We used the [39] measure where all the correlation of factors appeared between –0.021 to –0.333, which is lesser than the square root of the AVE estimates, in the score of 0.772 to 0.799. This demonstrates how strongly the components are related to their relevant indicators compared to other constructs. Therefore, it suggests a good DV [37]. According to [40], the correlation between exogenous components is less than 0.85. (Table 3). As a result, the DV of the whole model constructs is met.

Table 3 Discriminant validity.

F	PoCVD	IC	EC	FoCVD	EP
PoCVD	**0.782**				
IC	−0.262	**0.799**			
EC	−0.321	−0.262	**0.819**		
FoCVD	−0.304	0.333	0.208	**0.826**	
EP	−0.021	−0.083	−0.321	−0.200	**0.772**

Source: Authors' own estimation

Note: PoCVD = perception of COVID-19, EC = environmental concern, IC = innovation capability, FoCVD = fear of COVID-19, EP = environmental performance

6.3 Structural Model

We used path analysis to evaluate hypotheses. About the results of H1, we found negative and insignificant effects of *PoCVD* on EP (H1 = SE = 0.034; CR = –1.001; p > 0.01) and accepted the H1. Likewise, we found the negative and insignificant impact of *IC* on EP (H2 = SE = 0.020; CR = –0.109; p > 0.01). Hence, H2 is supported. Moreover, the SEM scores accepted *EC's* negative and insignificant effects on *EP* (H3 = SE = 0.059; CR = –1.128; p > 0.01). As a result, H3 is supported. Lastly, as expected, we found negative and insignificant effects of *FoCVD* on *EP* (H4 = SE = 0.077; CR = –1.779; p > 0.01). Thus, the analysis accepts the final hypothesis (H4) (Table 4 and Figure 2).

Table 4 SEM coefficients.

H.No.	Relationships	Est:	SE	CR	*P*	Decision
H1	PoCVD → EP	–0.029	0.034	–1.001	0.212	*Supported*
H2	IC → EP	–0.018	0.020	–0.109	0.259	*Supported*
H3	EC → EP	0.013	0.059	–1.128	0.628	*Supported*
H4	FoCVD → EP	–0.016	0.077	–1.779	0.380	*Supported*

Source: Authors' own estimation

Note: SE = standard error; CR = critical ratio; p = significance level ***p < 0.05

PoCVD = perception of COVID-19, *FoCVD* = fear of COVID-19, *EC* = environmental concern, *IC* = innovation capability, *EP* = environmental performance
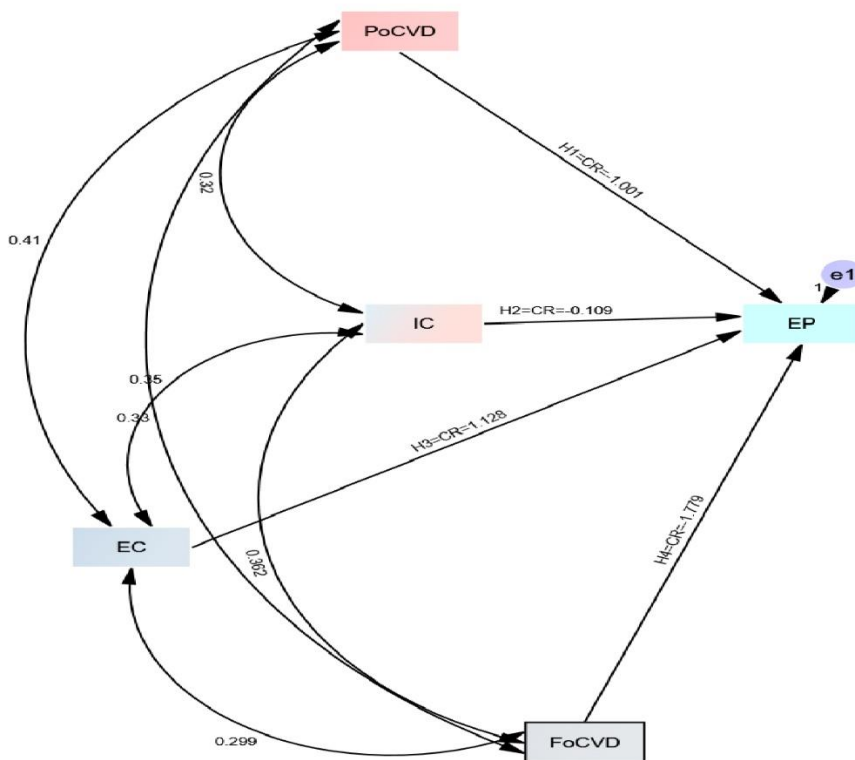
Figure 2 Path model. Source: Authors' own estimation. Note: CR = critical ratio, *FoCVD* = fear of COVID-19, *PoCVD* = perception of COVID-19, *EC* = environmental concern, *IC* = innovation capability, *EP* = environmental performance.

7. Discussion and Conclusion

The COVID-19 outbreak not only affected the business, the environment and the economy but also devastated all segments of human lives. More importantly, this situation also severely affected the SMEs, where most firms remained unsuccessful due to the *FoCVD, EC, PoCVD* and unsatisfactory *EP*. The literature demonstrated the several constructs which affected the *EP* among several factors. However, the domain researchers needed to focus more on investigating the effect of *FoCVD, IC, PoCVD* and *EC* on *EP* among the managers of Saudi Arabia. Hence, to fill these gaps, the study aimed to investigate the effect of factors such as *PoCVD, IC, EC* and *FoCVD* on *EP* among the SME managers of Saudi Arabia during COVID-19.

The study developed a robust conceptual framework based on existing relationships and gaps in the study. We applied path analysis through analysis of moment structures (AMOS). In the study, path analysis underlines an insignificant negative effect of *PoCVD* on *EP*. These results are supported by numerous scholars like [3], [4] and [41], who found the incompetence of *EP* during the pandemic. According to the findings, COVID-19 was more dangerous than in previous waves because it resulted in a sharp decline in economic gains, uncertainty, anxiety, and fear, particularly among business owners, entrepreneurs, and managers [20, 41]. More specifically, SMEs of Saudi Arabia remained under negative performance in terms of environment and business. The managers of SMEs massively failed to create strategies and policies to address problems [8]. Besides, some managers' report having problems falling asleep when considering the epidemic. In a simple sense, *PoCVD* had left negative effects, adversely affecting the *EP* in SMEs.

Likewise, the results for H2 revealed an insignificant and negative effect of *IC* on *EP*, which concurred with [5], who found both the financial and non-financial performance in the service firms are severely affected by *IC*. However, the results are also not supported by [24], who claimed the positive role of *IC* as significant and positive towards *EP* in regular routines. However, present results showed a negative correlation between *IC* and *EP* during a pandemic. In these circumstances, the responders may want assistance refining their *IC* to offer quality *EP*. These undesirable outcomes require management to encourage green innovation while discouraging people from exercising their creative faculties. Due to COVID-19, they cannot provide management assistance to the organization. In their perception, SMEs need to be able to organize the available resources appropriately.

Furthermore, the path coefficients provided in-significant and adverse effects of *EC* on *EP*. These outcomes also align with the findings of [27] and [42], who came to the same conclusion about the negative effects of environmental issues and the lack of a substantial performance difference between manufacturing and service organizations. These problems might result in a wide range of decision-making circumstances. However, [43] find that environmental concerns are the driving force behind organizations' achievements, contradicting these findings. The negative relationships might imitate the managers' need to cultivate a green culture among the employees. They also need to pay attention to protecting the environment in daily operations. Finally, the managers must prepare to bring sustainable development to SMEs due to COVID-19 concerns.

Finally, the *FoCVD* factor also appeared as the insignificant negative predictor of *EP*. Likewise, these results are accorded with several scholars who provided empirical evidence of the negative connection between *FoCVD* and *EP* [2, 23, 44]. The results demonstrated that managers' emotional states are affected by *FoCVD*, resulting in despair and anxiety. The life danger posed by

COVID-19 has SME managers terrified. As a result, EP was devastated [44].

To sum it up, overall results claimed a significant negative impact of *PoCVD, IC, EC,* and *FoCVD* on *EP*. The green innovation lowers the energy and resource usage of our company. Our company produces less trash and emits fewer pollutants thanks to green innovation. Green innovation lessens the environmental effect of our company's product lifecycle throughout the epidemic in Saudi Arabian SMEs.

8. Contribution, Limitations and Future Research Paths

Due to the study's completion during the unpleasant and terrible obstacles of the pandemic waves, its findings had a tremendous impact. The study's findings would give decision-makers and planners the information they need to improve *EP*. The study will help SMEs and environmental management understand the effects of fear, *EC*, and *PoCVD*, which eventually negatively influence *EP*. The study's findings offer ways to manage business worries and potentially damaging elements for various businesses during the COVID-19 pandemic. If the COVID-19 waves do persist, the research advises facing the difficulties. Due to the testing of a recently created corporate strategy model and the environmental viewpoint, particularly during the pandemic's waves, the research would also provide a unique contribution. Finally, the study's results would add to the body of knowledge in business, management, and environmental science, especially from the viewpoints of COVID-19.

There are several research limitations in the study. Only quantitative approaches that primarily rely on cross-sectional data are permitted for this study. The study used a single instrument (a survey questionnaire) to gather responses from Saudi Arabian SMEs online, utilizing a convenience sample technique. We did not use a relevant theory to support our conceptual framework. To deduce the results, we used SEM analysis. Finally, the data collection for our investigation was limited to COVID-19.

More longitudinal studies comparing the outcomes of the several COVID-19 waves must be conducted in the future. Future research should concentrate on the drive, entrepreneurial attitudes and intentions, lockdown results, and staying home to study *EP*. For examining the commercial and environmental problems during a pandemic, the forthcoming researchers may apply combined technique research (qualitative and quantitative) in the future. Future research should concentrate on large samples of business owners, workers, and employees to know the pandemic's additional consequences.

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Author Contributions

Abdelwahed NAA developed the conceptualization framework and hypotheses of the study. Mohammed A. Al Doghan, MA developed the methods and write-up of the manuscript. Soomro

BA analyzed the data and discussed the results in the light of literature. All authors accepted the final version after revisions.

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Competing Interests

The authors have declared that no competing interests exist.

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