



COVID-19's fear-uncertainty effect on green supply chain management and sustainability performances: the moderate effect of corporate social responsibility

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Abstract

Although the COVID-19 pandemic disrupted the global supply chains, it also provided opportunities that brought the concepts of sustainability and green practices back into the light. Based on the “stakeholders” and “social cognitive” theory, our study intends to empirically explore how fear-uncertainty towards COVID-19 relates positively to both green supply chain management (GSCM) and the firm’s sustainability performance (economic, environmental, and social). In addition, it examines the moderating effect of corporate social responsibility (CSR) (internal CSR and external CSR) on the association between fear-uncertainty towards COVID-19 and GSCM. In this study, we studied a sample of 300 manager-level employees in Egypt. We used partial least squares structural equation modeling (PLS-SEM) to analyze the data and test our hypotheses. Results showed that fear-uncertainty towards COVID-19 positively affect GSCM. Also, external CSR moderates the association among fear-uncertainty towards COVID-19 and GSCM. But it is not moderated by internal CSR. In addition, GSCM positively affects environmental and social performance. However, it has an insignificant effect on economic performance. Besides, GSCM has a significant mediation effect between fear-uncertainty towards COVID-19 and the firm’s environmental and social performance. However, this mediation relationship regarding economic performance is insignificant. Finally, we discussed the theoretical and practical implications at the end of this research.

Keywords Fear-uncertainty · COVID-19 · Green supply chain management · Corporate social responsibility · Sustainability performance

Introduction

The COVID-19 pandemic disrupted the global supply chains (SCs) worldwide (Grida et al. 2020). With the government-imposed lockdown and tight travel bans, the disruptions to the SCs grown at an alarming rate (De Vito and Gómez 2020; Wang and Zhang 2021). According to El Baz and Ruel (2020) and Jian et al. (2020), this pandemic created an environment of fear and uncertainty which triggered problems

of material deficits, late deliveries, fragile transportation networks, and other issues, making a lot of researchers and industry experts already pointed the extraordinary impact of COVID-19 on the global SCs’ shape and structure. Moreover, according to Alzgoool et al. (2021), the pandemic added challenges to governments and policymakers to take serious steps toward the SCs’ green practices to help to achieve sustainable performance (Babiak 2011). In the same vein, according to Aguinis et al. (2020) and Karmaker et al. (2020), the pandemic situation directs the firms’ focus toward adopting corporate social responsibility practices (CSR) to overcome economic, social, and environmental issues facing their sustainability performance (Channa et al. 2021), which leads to a successful implementation of green supply chain management (GSCM) (Sarkis et al. 2011; Wolf 2014).

Based on the social cognitive theory (Beck et al. 1979), recent studies like Ahorsu et al. (2020) and Qiu et al. (2020) defined fear-uncertainty towards COVID-19 as the negative

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emotional state that induces anxiety and depression due to not fully comprehending the COVID-19's potential consequences. For many people, COVID-19's high infectious potential and high death rates increased their fear and insecurity (Schimmenti et al. 2020). Recent studies like Britto et al. (2011) and Chan (2017) showed that people could change or adapt their attitudes and/or norms to deal with fear and uncertainty brought by environmental catastrophes or natural disasters. Consequently, Jian et al. (2020) argued that organizations' fear and uncertainty toward the pandemic led to rethinking the green and ecological practices toward SCs during the current crisis to capture the opportunities in the current situation to enhance the GSCM. Also, Govindan et al. (2020) and Wang and Zhang (2021) stated that COVID-19 stimulated people to behave more ethically and led them to reconsider the green and social practices toward SCs.

Social cognitive theory is a theory that explains human behavior by combining environmental, personal, and behavioral effects (Milaković 2021). According to Kholiaif and Ming (2022), the social cognitive theory is bringing new visions into the association between fear-uncertainty towards COVID-19 and the firms' green practices as it elaborates how the pandemic situation created a driving force towards obligating companies with the eco-friendly and green practices, including GSCM practices, to ensure the customers', employees', and society safety (Milaković 2021; Kholiaif et al. 2022).

Moreover, According to the stakeholders' theory, Sheehy (2014) defined CSR as worldwide business self-regulation that aims to contribute to humanitarian, activist, or philanthropic societal goals through volunteers or ethically oriented actions. Recent researchers like Aguinis et al. (2020), Karmaker et al. (2020), and (Channa et al. 2021) argued that substantial investment in CSR practices would foster the green and social practices and lead to solving the GSCM issues during the pandemic and enhance the firms' sustainability performance (economic, environmental, and social). Additionally, according to Breisinger et al. (2020), Koo and Ki (2020), and Spurr and Straub (2020), utilizing CSR practices during the pandemic leads to change the business managerial behavior toward green and sustainable practices and successful implementation of the GSCM.

According to Harrison and Freeman (2015), the stakeholder theory advocates a realistic, practical, efficient, effective, and ethical way to manage organizations in a highly complex and turbulent environment. Utilizing the stakeholders' theory brings new perceptions into the connection between CSR and GSCM by demonstrating the moderating effect of CSR on the association between fear-uncertainty towards COVID-19 and GSCM (Kholiaif and Ming 2022). Furthermore, earlier studies presented different theoretical approaches to examine and explain

GSCM, such as using the resource-based viewpoint theory and the Game theory (Tian et al. 2014; Zaid et al. 2018). These previous studies focus on the passive responses to stakeholder requirements (Wolf 2014; Foo et al. 2018). However, the stakeholder theory offers new understandings of effectively adopting CSR to meet stakeholder demands (Turker 2009). In a similar vein, our research will incorporate the stakeholder theory into the realm of GSCM research, revealing previously undiscovered findings on how CSR, internal and external, moderates GSCM relationships with the pandemic fear and uncertainty.

According to Malik et al. (2018), internal CSR refers to the practices related to employees and management activities. Internal CSR is closely associated with the GSCM as it directs the management and employees toward more green and eco-friendly practices (Wang et al. 2020a, b). Furthermore, external CSR denotes managerial practices for external investors (i.e., societies, governments, environments, and consumers) (Farooq and Rupp 2017). Previous studies showed that external CSR is related to the GSCM practices as the external stakeholders push the firms to adopt more green and ecological practices and ensure the safety of the society (Muller and Kolk 2009). Thus, The CSR (internal and external) constructs a framework with satisfactory capabilities to assemble, integrate, and deploy resources related to GSCM (Babiak 2011; Shabbir and Wisdom 2020).

A variety of studies have investigated the pandemic's detrimental negative economic impact. However, according to Grida et al. (2020) and Jian et al. (2020), few emphasized the positive side of the COVID-19, as it brings the concepts of social responsibility, sustainability, and green practices back into the light. Additionally, many scholars have identified the importance of the SC's green practices in balancing sustainable performance dimensions (Sarkis et al. 2011; Kim et al. 2016; Çankaya and Sezen 2019). However, there is a limitation of research that studied the usage of GSCM to evaluate the effectiveness of companies' efforts to achieve sustainability during the pandemic.

Therefore, this study investigates the GSCM practices' crucial role in affecting the three dimensions of firms' sustainability performance (economic, environmental, and social) in the Egyptian context (Kholiaif and Ming 2022), despite some existing studies showing similar relationships in China (Wang et al. 2020a, 2020b), the USA (Green et al. 2012), and Thailand (Çankaya and Sezen 2019). However, very few studies considered the pandemic effect and the Egyptian SMEs context. So, our research addresses the following questions:

RQ1: What are the direct and indirect relationships between fear-uncertainty of COVID-19 and the three dimensions of the firm/s sustainable performance (economic, environmental, and social)?

RQ2: Do GSCM practices mediate the link between the fear-uncertainty of COVID-19 and the firm's three dimensions of the firm/s sustainable performance?

RQ3: How do CSR (internal and external) moderate the relationship between fear-uncertainty of COVID-19 and GSCM practices?

Thus, the present study aims to profoundly investigate the relationship between fear-uncertainty towards COVID-19, GSCM practices, and the firms' sustainability performance and also to examine how CSR moderates the relationship among the variables. In order to achieve research aims, the researcher postulates a set of hypotheses to be tested. First, to test the relationship between fear-uncertainty of COVID-19 and the GSCM practice, this study set the H1 hypothesis "Fear-uncertainty towards COVID-19 positively affects GSCM." Second, to test CSR moderate relationship, this study set the H2 hypothesis "Internal CSR moderates the association between fear-uncertainty towards COVID-19 and GSCM" and the H3 hypothesis "External CSR moderates the association among fear-uncertainty towards COVID-19 and GSCM."

Third, to test the GSCM mediating relationships, this study sets the following hypothesis: for the economic performance hypothesis H4a, "GSCM positively affects the firm's economic performance," and for hypothesis H4b, "GSCM mediates the association between fear-uncertainty towards COVID-19 and the firm's economic performance." For the environmental performance hypothesis H5a, "GSCM positively affects the firm's environmental performance," and for hypothesis H5b, "GSCM mediates the association between fear-uncertainty towards COVID-19 and the firm's environmental performance." Finally, for the social performance hypothesis H6a, "GSCM positively affects the firm's social performance," and for hypothesis H6b, "GSCM mediates the association between fear-uncertainty towards COVID-19 and the firm's social performance."

The significance of this research derives from two main reasons. First, GSCM practices play a crucial role in affecting the three dimensions of the firm's sustainability performance. According to Çankaya and Sezen (2019), sustainability performance requires each company to accomplish a steady equilibrium in economic, social, and environmental processes and be successful in its efforts concerning these three dimensions. However, according to Diabat and Govindan (2011), Sarkis et al. (2011), and Green et al. (2012), because of these three dimensions' complex nature and their interrelationships with each other, achieving such balance and success is usually challenging. Second, the previous literature is limited to some aspects (Grida et al. 2020; Tzur et al. 2020); given that the outbreak is still new, there are limited studies so far on how managers and stakeholders' feelings and intellectual perceptions of COVID-19 affect

their environmental worries, and their green practices which emphasize the positive impact the fear-uncertainty towards COVID-19 has over GSCM (Grida et al. 2020; Jian et al. 2020). Furthermore, although researchers studied CSR's effect on the SCs' green practices, there is a lack of research about the CSR's moderate impact on the GSCM and the mediating role GSCM plays between fear-uncertainty and the firm's sustainability performance during the pandemic.

Moreover, our research will contribute to the existing literature in two theoretical aspects; first, we add to the social cognitive theory research (Beck et al. 1979) by demonstrating how people can adapt their behavior and standards to deal with the concerns of fear and uncertainty caused by the pandemic, and how these feelings will affect the GSCM process. Second, we contribute to the stakeholder theory by introducing CSR as a moderator for the association between fear-uncertainty towards the pandemic and the GSCM. Furthermore, this paper will extend the studies that linked COVID-19 with GSCM and sustainability performance during the pandemic (Alzgoool et al. 2021; El Baz and Ruel 2020; Govindan et al. 2020; Karmaker et al. 2020) and attempt to fill the gap highlighted by Grida et al. (2020) and Jian et al. (2020). This paper will add to the GSCM aspect and provides empirical evidence from Egyptian companies on the effect of the COVID-19 on GSCM. Also, showing the mediating role GSCM plays between fear-uncertainty and sustainability performance during the pandemic. The findings of this study indoctrinate the practitioners and managers to give extensive consideration to social and green practices, which in turn solves the SCs issues during the pandemic.

We arranged our research paper as follows; the "Background and hypotheses development" section reviewed the previously published literature and showed the relationships' hypothesis development. Further in the "Methodology" section, we detailed the survey design, measurement scales, data collection, and analysis methods. The results and the discussion are presented in the "Discussion" section. We give the conclusion, theoretical and practical implications, limitations, and yet-to-come research ideas in the "Discussion" section.

Background and hypotheses development

Fear-uncertainty effect on GSCM

Based on the social cognitive theory, Ahorsu et al. (2020) and Qiu et al. (2020) defined fear of COVID-19 as an adverse emotional condition that causes distress and depression due to understanding the pandemic's possible consequences. According to Paek and Hove (2020), the pandemic's high contagious capacity and death rates increased fear and uncertainty and raised insecurity among many people.

On the other hand, Crowley et al. (2021) described uncertainty towards COVID-19 as a sensible intellectual reaction to the pandemic resulting in a feeling of anxiety and cognitive ambiguity. Schimmenti et al. (2020) stated that facing a highly infectious virus, with a lack of curative treatment and ever-changing numbers of infections and fatalities, triggered a multiplex and incalculable global health crisis, this, according to Wang et al. (2020a, 2020b), resulting in a situation of vulnerability and uncertainty.

Previous research had already provided consistent proof that fear of natural or artificial disasters could foster social commitment and unselfish behavior towards green practices (Beck et al. 1979; Vess and Arndt 2008; Alzayyat et al. 2016). According to a recent study by Crowley et al. (2021), people can adjust or adapt their attitude towards green practices to address worries or anxieties about environmental dangers or natural disasters. Chan (2017) argued that managers who are afraid of disasters, for instance, are more likely to improve their general well-being and develop a selfless attitude. In the same vein, according to Jian et al. (2020) and Song et al. (2021), COVID-19 uncertainty and fear improve environmental awareness among people, advocating the GSCM techniques. Thus, we propose the following hypothesis;

H1: Fear-uncertainty towards COVID-19 positively affects GSCM.

The moderate effect of internal and external CSR

CSR is the entrance gate for companies to combine business with ethics and is necessary to extend its focus beyond its profit line (Sharma 2019). For more than 50 years now, CSR has been an essential instrument for measuring and reporting a company's impact on the environment and providing social accountability to stakeholders and the public audience (Getele et al. 2020). According to Jian et al. (2020) and Channa et al. (2021), CSR activities encourage organizations to implement GSCM, focusing on environmental concerns and considering multiple investors' social and environmental needs. It also requires companies to accurately foresee their stakeholders' actions during COVID-19 and meet their requirements (Shabbir and Wisdom 2020). Our study divides CSR into internal and external CSR (Boulouta and Pitelis 2014).

Internal CSR

According to Malik et al. (2018), internal CSR refers to the practices related to employees and management activities. Internal CSR is closely associated with the GSCM (Wang et al. 2020a, 2020b). According to Channa et al. (2021), there is a synergic connection between GSCM and

employees where green practices affect employees, and efficient employees can improve the GSCM process. In the same vein, Foo et al. (2018) argued that employees could benefit from integrating internal CSR and the green initiatives in SCs management. Moreover, Sen et al. (2006) mentioned that internal CSR has a constructive effect on value foundation and employee work creativity. That ingenuity can encourage employees to embrace the green perspective in the SCs (Zaid et al. 2018). Thus, Internal CSR inspires personnel to adopt a positive attitude regarding the company's green performance, which results in effective GSCM implementation (Rajabion et al. 2019).

Furthermore, according to Karmaker et al. (2020) and Shabbir and Wisdom (2020), internal CSR helps employees perceive rapid changes in the external environment and expand their capability to recognize weaknesses in the existing business environment during the pandemic. In such a context, Koo and Ki (2020) and Spurk and Straub (2020) argued that companies with internal CSR have more constructive attitudes and more precise goals to implement GSCM during the uncertain situation of the COVID-19 pandemic. Similarly, Channa et al. (2021) and Chenxiao et al. (2020) showed how the fear and anxiety of the pandemic situation would push the need for using internal CSR practices among the managers and employees. In other words, the internal CSR will increase the positive impact of fear-uncertainty towards COVID-19 on the GSCM and promote the occurrence of GSCM (Rajabion et al. 2019; Jian et al. 2020; Alzgoool et al. 2021). Thus, we propose the following hypothesis:

H2: Internal CSR moderates the association between fear-uncertainty towards COVID-19 and GSCM.

External CSR

According to Farooq and Rupp (2017), external CSR denotes managerial practices for external investors (i.e., societies, governments, environments, and consumers). Studies like Muller and Kolk (2009) stated that external CSR is related to the environmental GSCM practices. Companies that carry out external CSR prioritize the environment and community as they consider them in their strategic decision-making process (Boulouta and Pitelis 2014). Meanwhile, according to Malik et al. (2018), companies with external CSR can overcome their cognitive uncertainty and re-think their existing business model. He and Harris (2020) argued that external CSR could make it easier for companies to change their cognitive perception and previous attitudes toward implementing GSCM practices during the pandemic. Also, Thong and Wong (2018) imply that companies implementing external CSR usually suffer more pressure from external stakeholders, which may force them to adopt suitable policies to meet

the external stakeholders' needs and thus lay the foundation for the GSCM during the pandemic (Paek and Hove 2020; Shabbir and Wisdom 2020). Thus, external CSR supports firms in meeting the external environment's needs. Thereby, based on Channa et al. (2021) and Jian et al. (2020), external CSR overcomes the uncertainty and fear of COVID-19 and facilitates the application of GSCM. Based on the previous, we propose the following hypothesis:

H3: External CSR moderates the association between fear-uncertainty towards COVID-19 and GSCM.

GSCM and sustainability performances

Economic performance

Zhu et al. (2008) defined sustainable economic performance as the performance related to reducing the cost of procured materials, energy consumption, waste disposal, and fines related to ecological accidents. According to Kim et al. (2016), a considerable debate is related to GSCM concerns about eco-friendly practices. Such practices impact the firm's economic performance, either positively or negatively (Schleper et al. 2021). According to Çankaya and Sezen (2019), GSCM practices will significantly benefit companies. GSCM can improve economic performance in two ways. First, companies can directly benefit by decreasing waste and energy expenses (Zhu et al. 2008). Second, firms can gain economic profits indirectly by increasing the customers' loyalty and enhancing the firm's image through green practices (Kros et al. 2019). Therefore; we propose the following hypotheses:

H4a: GSCM positively affects the firm's economic performance.

Recent studies showed that GSCM practices play an essential role during COVID-19 in enhancing firms' financial performance by reducing financial stress on the firm and customers (Jian et al. 2020; Schleper et al. 2021). The fear-uncertainty toward COVID-19 will likely raise managers' economic and financial worries (Song et al. 2021), hence, encouraging their preference for green, safe, and healthy products through GSCM practices (Schleper et al. 2021). Moreover, it increases customer loyalty by reducing consumer financial stress during the epidemic, resulting in financial benefits for the firms (Gao et al. 2021). Thus; we propose the following hypotheses

H4b: GSCM mediates the association between fear-uncertainty towards COVID-19 and the firm's economic performance.

Environmental performance

Eltayeb et al. (2011) defined sustainable environmental performance as the performance that measures the ability to reduce contamination, reduce waste, prevent harmful materials usage, and reduce the number of environmental accidents. Business firms consume limited resources while producing goods and services; these resources can cause environmental pollution in the atmosphere, water, and soil (Kim et al. 2016). According to Sarkis et al. (2011) and Govindan et al. (2020), GSCM practices include all attempts to mitigate the adverse effects of a firm's goods or services on the environment. Such attempts shall improve the sustainable environmental performance by minimizing solid/liquid waste, decreasing dangerous materials, reducing environmental accidents, and improving communities' well-being (Lee 2009; Eltayeb et al. 2011). Moreover, other studies like Rajeev et al. (2017), Çankaya and Sezen (2019), and Kros et al. (2019) argued that GSCM help reaches better sustainable environmental performance by reducing companies' production waste. Based on the previous, we propose the following hypothesis:

H5a: GSCM positively affects the firm's environmental performance.

Moreover, recent studies showed that GSCM practices play an essential role during COVID-19 in enhancing the firm's environmental practices by applying healthcare precautions and safety rules (Chenxiao et al., 2020; Govindan et al. 2020). Fear and uncertainty during the COVID-19 pandemic cause the business firms to become subjected to persisting pressure from stakeholders who desire to guarantee that the goods and services adequately meet environmental quality standards, thus achieving environmental resilience (Wang and Zhang 2021; Gao et al. 2021). Moreover, due to fear and uncertainty, this kind of pressure will direct firms to diminish their destructive influence on the environment and consider the environmental practices of GSCM (Govindan et al. 2020; He and Harris 2020), which in turn helps firms' environmental recovery (Aguinis et al. 2020). Based on the previous, we propose the following hypothesis:

H5b: GSCM mediates the association between fear-uncertainty towards COVID-19 and the firm's environmental performance.

Social performance

According to Çankaya and Sezen (2019), the social performance dimension represents the firm's practices towards its society, such as social programs, all parties' welfare, and all employees' training activities. Traditionally, previous studies

focused only on the effects of GSCM on economic performance (Kros et al. 2019), ignoring the social perspective of GSCM issues (Eltayeb et al. 2011). An eco-friendly GSCM will enable companies to have more positive images in the eyes of shareholders, the community, clients, employees, and the government by reducing environmental damage (Xie and Breen 2012). This positive image is crucial for the customers’ and the staff’s satisfaction and loyalty (Çankaya and Sezen 2019). Other studies stated that GSCM could improve the company’s image, stakeholder relations, and staff morale, which improves social performance (Green et al. 2012; Laosirihongthong et al. 2013; Zaid et al. 2018). So, based on the previous, we propose the following hypothesis.

H6a: GSCM positively affects the firm’s social performance.

Furthermore, recent studies showed that GSCM practices are essential during COVID-19 in enhancing the firm’s practices toward society’s welfare (Govindan et al. 2020). According to Koporcic et al. (2020) and Kros et al. (2019), GSCM would allow managers to enhance their capability in dealing with unfortunate and sad events. Fear-uncertainty resulting from ambiguity or unusualness of events and can negatively influence decision-making can be reduced, causing an enhancement in the firm’s social performance (Gao et al. 2021). For instance, Rew and Cha (2020) argued that

socially responsible production and marketing actions based on GSCM could help managers, employees, and consumers quickly return to their everyday lives through specialized production marketing plans that support life and take care of it those who have suffered the tragic events. Thus, based on the previous, we propose the following hypothesis.

H6b: GSCM mediates the association between fear-uncertainty towards COVID-19 and the firm’s social performance.

Thus, Fig. 1 shows the relationship between fear-uncertainty of COVID-19 as an independent variable, GSCM, and firms’ sustainability performance and examines how CSR (external and internal) moderates the relationship among the variables.

Methodology

Research structure and road map

Figure 2 shows the research structure and road map; as illustrated, the research started with the introduction and the research gap identification in the “Introduction” section and then in the research background and hypothesis development in the “Background and Hypotheses Development”

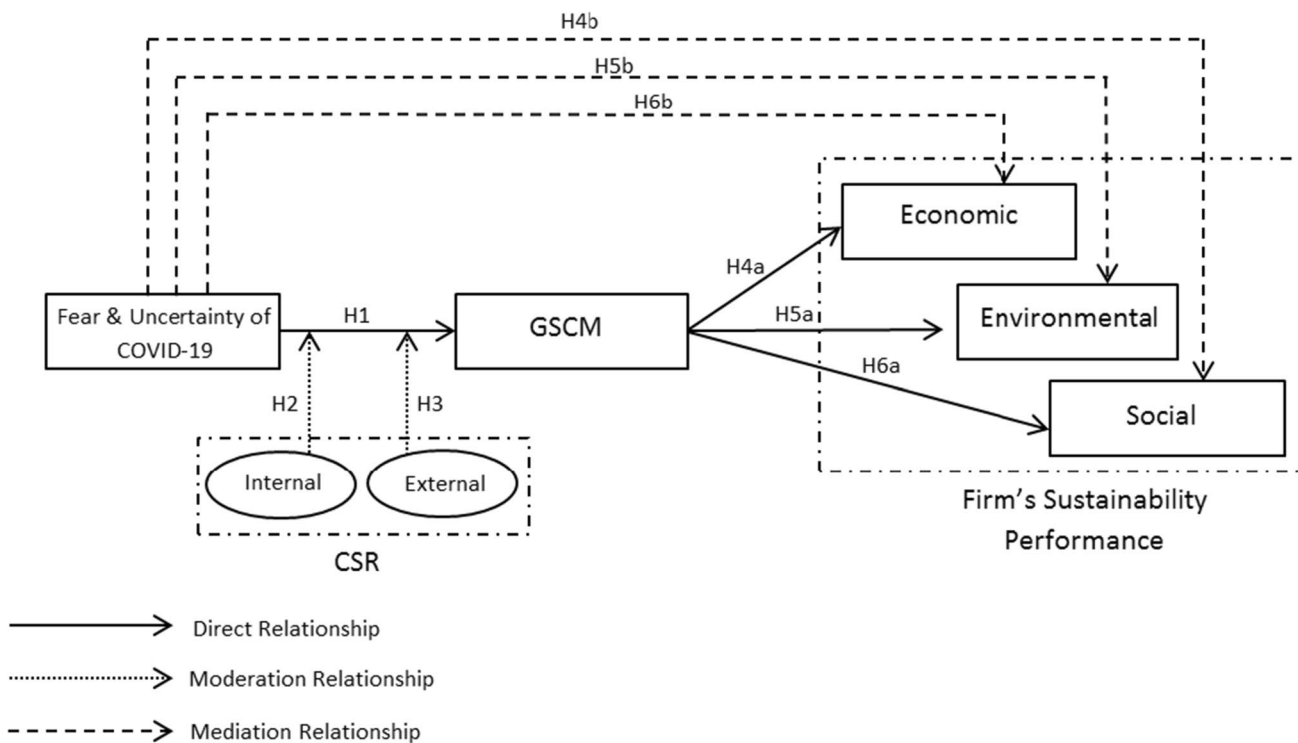


Fig. 1 The research framework and hypotheses development

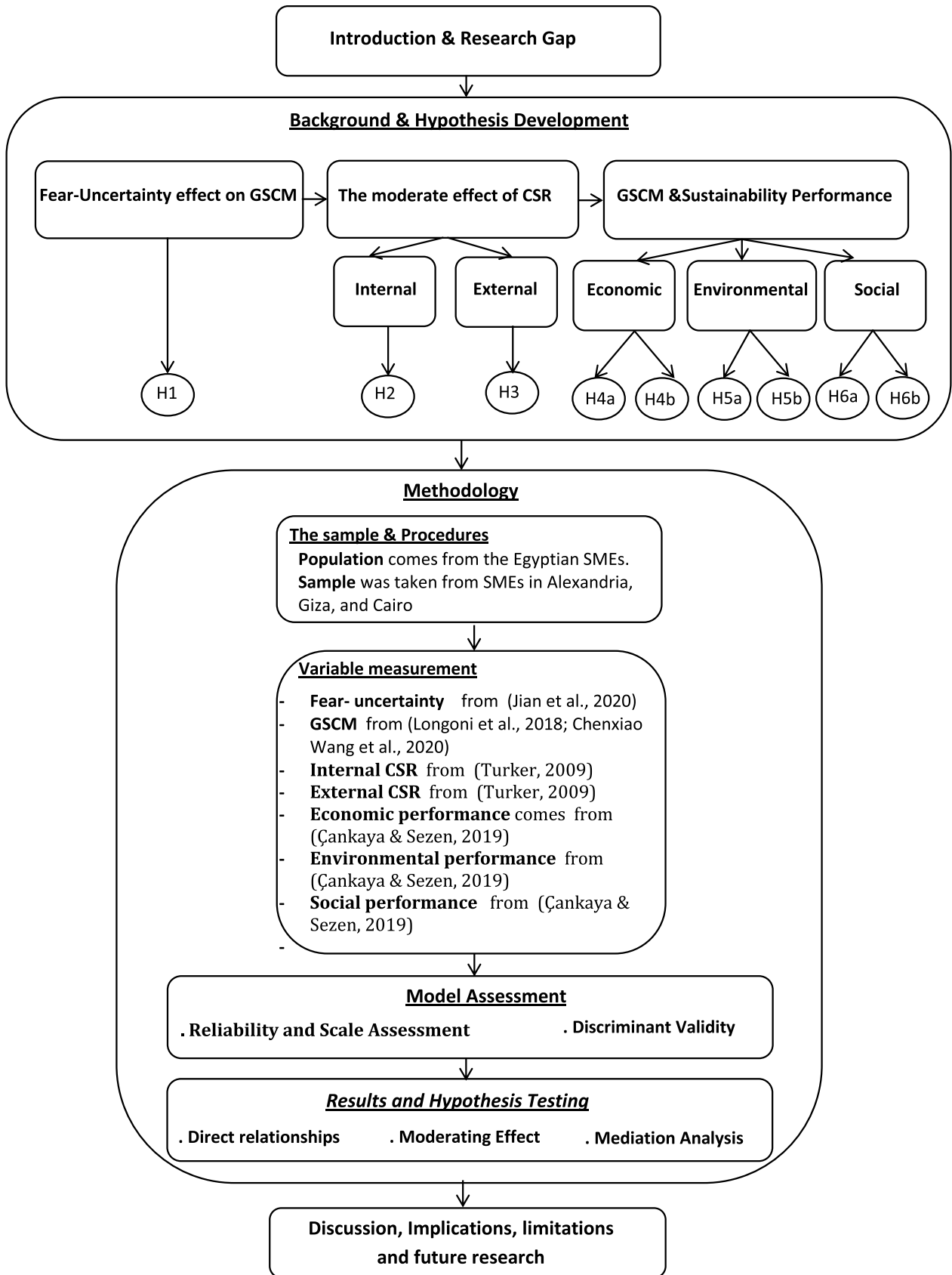


Fig. 2 The research structure and road map

section, where we postulated a set of nine hypotheses to reflect the direct, mediation, and moderation relationships. The “Methodology” section is the methodology where we discussed the sample selection and procedures, variable measurement, model assessment, and results and hypothesis testing. Finally, the “Discussion” section covers the discussion, implications, limitations, and future research.

Modeling method

This research uses partial least squares structural equation modeling (PLS-SEM), a causal-predictive approach to SEM that emphasizes prediction when forecasting statistical models of structures designed (Hair et al. 2019). The Bootstrapping method, with 5000 replications, was used to estimate the population’s sampling distribution’s spread, shape, and bias (Chin 1998). As the study aims to develop and test a theoretical model, PLS is used as it is superior to the traditional covariance-based SEM (CBSEM) for estimating our model because PLS can effectively avoid the limitations on multivariate normality, measurement level, sample size, model complexity, and factor ambiguity (Hair et al. 2013).

The sample of the questionnaire and procedures

This study was conducted using the survey research method and the questionnaire tool. The population comes from the Egyptian SMEs, where its information is derived from the Central Agency for Public Mobilization and Statistics (CAPMAS). The sample was taken from SMEs in Alexandria, Giza, and Cairo, representing 38% of the SMEs workforce in Egypt (CAPMAS 2013). According to Kholaf and Ming (2022), SMEs are a general driving force for long-term economic growth and job creation, as well as an essential source of income for Egypt’s vast and rising population (El-Said et al. 2014), where more than 6.3 million people are employed, accounting for almost 70% of the labor force (Aboelmaged et al. 2018). As a result, it is critical to research the impact of COVID-19 on SMEs’ GSCM practices and how CSR influences this relationship. Moreover, SMEs are more likely to be affected by this epidemic since they are characterized by traditional SCs practices and labor-intensive sectors that rely primarily on daily wage workers (Zaazou and Abdou 2020). Similarly, according to Gourinchas et al. (2020) and Kholaf et al. (2022), COVID-19 has a massive impact on company failures and employment, where most of the jobs at risk are linked to SMEs’ failures.

The sample was drawn from SMEs in Alexandria, Giza, and Cairo, accounting for 38% of Egypt’s SMEs workforce (CAPMAS 2013). We collected data through a survey of a random sample of 512 Egyptian companies. We utilized the modified Cochran formula (Nanjundeswaraswamy and Divakar 2021), which can be shown by Equation (1).

$$n = \frac{n_0}{\left[1 + \left\{ \frac{(n_0-1)}{N} \right\} \right]}, \quad (1)$$

where n is the sample size and N is the population size. With a margin of error of 5%, and a confidence interval of 95%, where the t -value is considered to be 1.96, the minimum sample size should be around 278 (Nanjundeswaraswamy and Divakar 2021). The survey was sent to 573 managers. A total of 300 completed questionnaires were returned, resulting in a response rate of over 52%. Thus, the sample size of 300 in our research is deemed adequate.

The survey approach was used, and an online questionnaire was created and shared via personal email addresses and social networking apps such as WhatsApp, Viber, and Facebook. The data were obtained between March 8 and June 27, 2021. Before carrying out the survey, the questionnaire was subjected to a pretest from 7 academics and 5 SC practitioners who first tested the survey to confirm that all measurement criteria were understood and clear. Besides, the participants were evaluated as a focus group, which allowed us to get more in-depth feedback based on the items asked in the one-on-one interaction (e.g., comprehension of questions and terms, fluency, clarity of instructions and questions, provided absent choices, and period).

Moreover, vague phrases and items were modified, represented to those respondents, and included in the final survey version. After we made final improvements, the survey was sent to 573 managers. Respondents were managers (senior, middle, and operational managers) familiar with supply chain management work, procurement, warehousing, and inventory. A total of 300 completed questionnaires were returned, resulting in a response rate of over 52%, which we used for further analysis in this study. We illustrate more detailed demographic information about the sample in Table 1.

Measurement variables’ explanation and questionnaire design

We developed all the measures from validated scales in previous literature. Each construct used a 5-point Likert scale to evaluate the respondents’ answers ranging from 1 = very low to 5 = very high. Our study has seven constructs:

Our independent variable, fear-uncertainty, towards COVID-19 consists of 4 statements modified from Jian et al. (2020). The items measure the respondent’s degree of fear and uncomfotability towards COVID-19 and the degree to which respondents perceive COVID-19’s context as very complex or unpredictable. To test the resulting scale’s reliability, we used Cronbach’s alpha, resulting in a value of 0.866.

Table 1 Demographic Information of Respondents

Variable	Items	Frequency	Percentage
Gender	Male	216	0.72
	Female	84	0.28
Age	Less than 30	21	0.07
	30 to 40	64	0.213
	41 to 50	83	0.277
	51 to 60	109	0.363
	More than 60	23	0.077
Education	Below bachelor's degree	20	0.067
	Bachelor's degree	124	0.413
	Master's degree	114	0.38
	Above master's degree	42	0.14
Position	Senior manager	53	0.177
	Middle manager	154	0.513
	Operation manager	93	0.31
Years of experience	Less than 1 year	17	0.057
	1 to 5 years	74	0.247
	5 to 10 years	126	0.42
	More than 10 years	83	0.277
Firm size (employees)	Less than 50	14	0.047
	50 to 99	42	0.14
	100 to 299	51	0.17
	300 to 499	79	0.263
	More than 500	114	0.38
Firm age	Less than 3 years	57	0.19
	3 to 5 years	71	0.237
	5 to 10 years	92	0.307
	More than 10 years	80	0.267
Type of industry	Food and beverages	79	0.263
	Pharmaceutical and bioengineering	71	0.237
	Essential medical products	60	0.2
	Wood and furniture	31	0.103
	Information technology	49	0.163
	Other industries	10	0.033

The middle variables are GSCM and CSR. First, GSCM consists of 5 items developed from (Longoni et al. 2018). The items measure the degree respondent thinks their company collectively achieves a reduction in the variety of materials and components; design the products to avoid or reduce the use and/or production of hazardous substances; achieve a reduction in toxic material consumption; take the suppliers' selection decision based on environmental criteria; and the company cooperates with suppliers for achieving environmental objectives. We confirmed the reliability as Cronbach's alpha coefficient is 0.845.

Second, CSR includes two dimensions. Internal CSR consists of 4 items developed from Turker (2009) and Perez and del Bosque (2013). To what extent does your company, or the company you deal with, have well-trained employees who offer complete information about

corporate products/services. The company offers safety at the workplace and provides training and career opportunities to its employees to provide better products and services. The company offers a pleasant work environment. Cronbach's alpha coefficient was measured to confirm the reliability and was 0.805.

External CSR consists of 6 items developed from Turker (2009) and Perez and del Bosque (2013); measure the degree to which your company or the company you deal with establishes procedures to comply with customer complaints. The company treats its customers honestly and uses customer satisfaction as an indicator to improve product/service marketing. The company plays a role in society beyond the generation of economic benefits. The company is concerned with improving the general well-being of society and helps solve social problems. The company is concerned with respecting

and protecting the natural environment. For measuring reliability, Cronbach's alpha value was 0.88.

The independent variable is the firm's sustainability performance, consisting of three variables. First, the economic performance construct consists of 3 items from Çankaya and Sezen (2019). The items measured the degree the respondent thinks GSCM will decrease the cost of materials purchased and energy consumption during the pandemic, a decrease in fee for waste discharge, improvement in earnings per share, and sales and/or profits growth. For measuring reliability, Cronbach's alpha value was 0.722.

Second, the environmental performance consists of 4 items modified from Çankaya and Sezen (2019). The items measured the degree the respondent thinks that, during the pandemic, GSCM will lead to improvement of an enterprise's environmental situation, reduction in waste (water and/or solid), decrease of consumption of hazardous/harmful/toxic materials, and decrease of the environmental accidents frequency. We measured the reliability, and the value of Cronbach's alpha was 0.866.

Third, the social performance consists of 4 items modified from Çankaya and Sezen (2019). The items measured the degree the respondent thinks that during the pandemic, GSCM will lead to an improvement in image in the eyes of its customers and achieve their satisfaction; improvement in investments in social projects (education, culture, sports); improvement in relations with community stakeholders, e.g., nongovernmental organizations (NGOs) and community activists; and improvement in overall stakeholder welfare or betterment. Cronbach's alpha coefficient was measured to confirm the reliability and was 0.801. The following Table 2 shows the measurement items list for the latent variables. Also, Appendix 1 shows the questionnaire form for that research.

Statistical analysis methods' process

This study employs partial least squares structural equation modeling (PLS-SEM) for data analysis and hypothesis testing. We used a three-step procedure. The first step is the method bias assessment; the second step is model assessment and confirmatory factor analysis, which allows the researcher to approve the data reliability and validity. The third step is hypotheses testing. Figure 3 shows the main process of statistical analysis methods.

Step 1: method bias

Non-response bias

According to Kock (2015), non-response bias is a phenomenon that might lead to an erroneous assessment of the

construct components that are being measured. The *T*-test was used to examine if the first and last respondents' mean scores on the variables differed significantly. The lack of substantial differences led to the conclusion that this study had no non-response bias.

Common method bias

The researchers employed Harman's single-factor analysis to eliminate the biased approach to uncover common method bias (CMB) (Podsakoff et al. 2012). As a result, Harman's single-factor analysis was applied to all survey items. After limiting the number of factors to one, the researchers examined the factor loadings explanation. This study revealed no evidence of a single factor responsible for most of the variance, implying that the data are free of common biases. Moreover, we performed a full collinearity test as a comprehensive procedure for testing the CMB.

Step 2: model assessment and factor analysis

For model evaluation and hypothesis testing, the Smart-PLS 3.0 application was employed. There are two phases for model evaluation and confirmatory factor analysis: phase 1: reliability and scale assessment and phase 2: discriminant validity assessment.

Phase 1: reliability and scale assessment

Table 3 shows that the reliability and validity test has been checked and reported. We assessed the scales' convergent validity based on three criteria for the model assessment and factor analysis. In the first stage, the researchers consider the formative indicator's absolute contribution to its construct, determined by the indicators' outer loadings, which were more than 0.60, as proposed by Kock (2015) and Sarstedt et al. (2014). Loadings above 0.60 indicate that the construct explains over 50% of the indicator's variance, thus, providing acceptable item reliability.

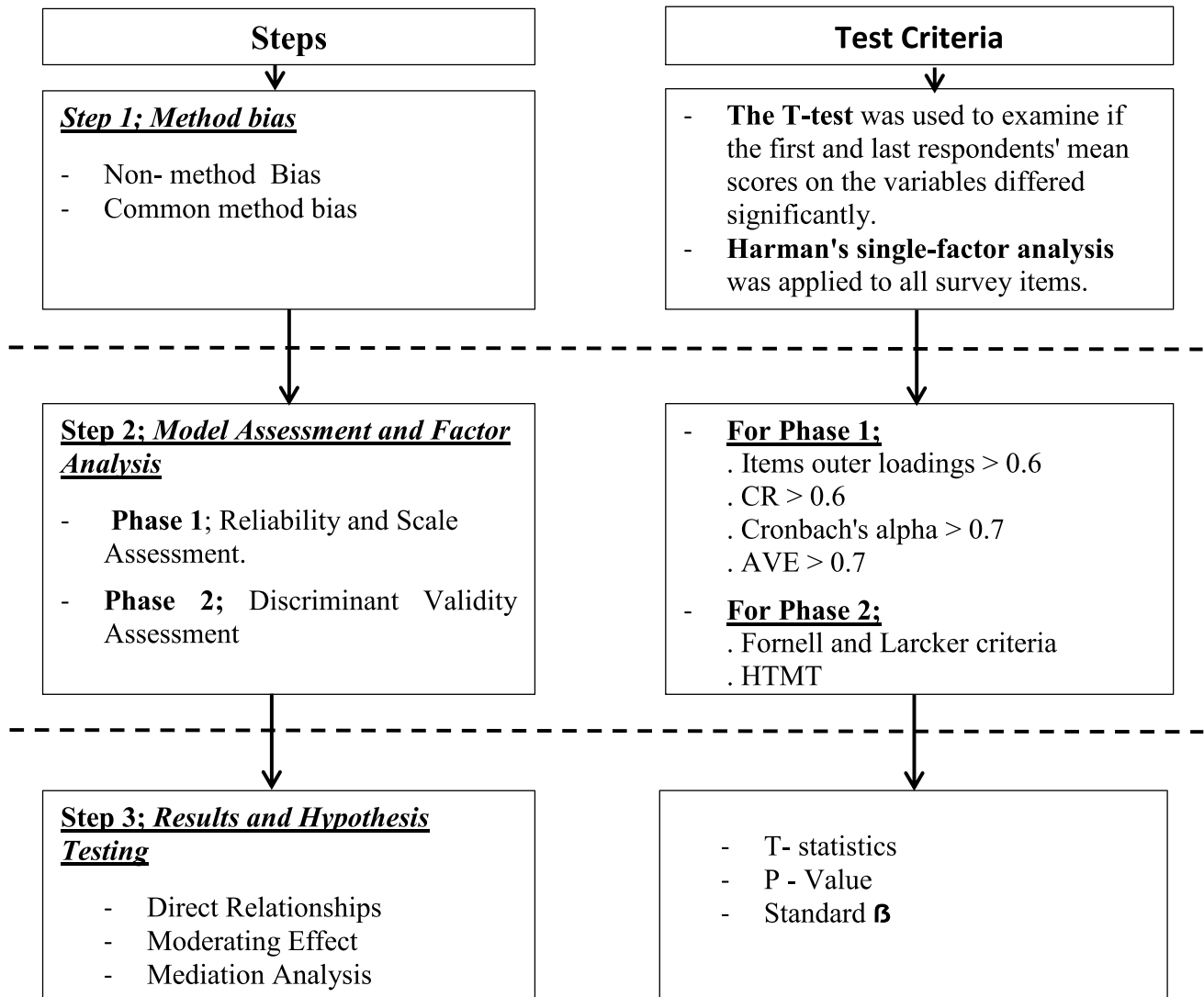
The second stage is to evaluate internal reliability, which is usually done using composite reliability (CR) score. Higher values indicate higher levels of reliability. For instance, in exploratory research, reliability levels between 0.60 and 0.70 are regarded as "acceptable," while values between 0.70 and 0.90 range from "adequate to good." the composite reliability (CR) is measured; all indicators' values are larger than 0.7, indicating internal consistency (Hair et al. 2019). As in Table 3, the "fear-uncertainty towards COVID-19" indicator has CR equals 0.908, indicating good internal consistency. For the "GSCM" indicator, the CR equals 0.89, indicating adequate internal consistency. For the "internal CSR" and "external CSR" indicators, the CR equals 0.869 and

Table 2 The constructs and measurement items

Constructs and items		Weight/ loading
COVID-19 Fear and uncertainty adapted from Jian et al. (2020)		
	To what extent	
COVID F&U 1	I am afraid of the coronavirus	0.853
COVID F&U 2	I am afraid of losing my life because of the coronavirus	0.833
COVID F&U 3	I perceive the context of COVID-19 as unpredictable	0.868
COVID F&U 4	I perceive the context of COVID-19 as changing rapidly	0.822
GSCM adapted from Longoni et al. (2018)		
	To what extent your company or the company/supplier you deal with	
GSCM 1	Collectively achieves reduction in the variety of materials and components	0.78
GSCM 2	Design of products to avoid or reduce the use and/or production of hazardous substances	0.866
GSCM 3	Achieve a reduction in toxic material consumption	0.768
GSCM 4	Take the suppliers selection decision based on environmental criteria	0.755
GSCM 5	Cooperate with suppliers for environmental objectives	0.759
Internal CSR adapted from Turker (2009) and Perez and del Bosque (2013)		
	To what extent your company or the company you deal with	
INCSR 1	Has well-trained employees that offer complete information about corporate products/services	0.741
INCSR 2	The company offer safety at the workplace.	0.832
INCSR 3	Provides training and career opportunities to its employees to provide better products and services	0.856
INCSR 4	The company offers a pleasant work environment	0.726
External CSR adapted from Turker (2009) and Perez and del Bosque (2013)		
	To what extent your company or the company you deal with	
EXCSR 1	Establishes procedures to comply with customer complaints	0.766
EXCSR 2	The company treats its customers honestly	0.762
EXCSR 3	Uses customer satisfaction as an indicator to improve product/service marketing	0.8
EXCSR 4	The company plays a role in society beyond the generation of economic benefits	0.815
EXCSR 5	The company is concerned with improving the general well-being of society and helps solve social problems	0.804
EXCSR 6	The company is concerned with respecting and protecting the natural environment	0.793
Economic performance adapted from Çankaya and Sezen (2019)		
	To what extent the company achieved	
ECP 1	Decrease in cost of materials purchased and energy consumption	0.788
ECP 2	Decrease in fee for waste discharge	0.743
ECP 3	Improve sales and earnings growth	0.84
Environmental performance adapted from Çankaya and Sezen (2019)		
	To what extent the company achieved	
ENP 1	Improvement of an enterprise's environmental situation	0.877
ENP 2	Reduction in waste (water and/or solid)	0.881
ENP 3	Decrease of consumption for hazardous/harmful/toxic materials	0.854
ENP 4	Decrease of frequency for environmental accidents	0.763
Social performance adapted from Çankaya and Sezen (2019)		
	To what extent the company achieved	

Table 2 (continued)

Constructs and items		Weight/ loading
SCP 1	Improvement in its image in the eyes of its customers and achieve their satisfaction	0.761
SCP 2	Improvement in investments on social projects (education, culture, sports)	0.83
SCP 3	Improvement in relations with community stakeholders, e.g., nongovernmental organizations (NGOs) and community activists	0.763
SCP 4	Improvement in overall stakeholder welfare or betterment	0.798

**Fig. 3** The main process of statistical analysis methods

0.909, respectively. The “economic performance” indicator has CR equals 0.834, indicating good internal consistency. As for the “environmental performance,” CR equals 0.909, indicating adequate internal consistency. Finally,

the “social performance” has CR equals 0.868, showing good internal consistency.

Also, the researchers used Cronbach’s alpha as another measure of internal consistency reliability that uses the same

Table 3 Measurement model

	Items	Loadings	AVE	CR	Rho A	Cronbach's alpha
COVID-19 fear and uncertainty	COVID F&U 1	0.853	0.712	0.908	0.873	0.866
	COVID F&U 2	0.833				
	COVID F&U 3	0.868				
	COVID F&U 4	0.822				
GSCM	GSCM 1	0.78	0.619	0.89	0.847	0.845
	GSCM 2	0.866				
	GSCM 3	0.768				
	GSCM 4	0.755				
	GSCM 5	0.759				
Internal CSR	INCSR 1	0.741	0.625	0.869	0.863	0.805
	INCSR 2	0.832				
	INCSR 3	0.856				
	INCSR 4	0.726				
External CSR	EXCSR 1	0.766	0.624	0.909	0.885	0.88
	EXCSR 2	0.762				
	EXCSR 3	0.8				
	EXCSR 4	0.815				
	EXCSR 5	0.804				
	EXCSR 6	0.793				
Economic performance	ECP 1	0.788	0.626	0.834	0.781	0.722
	ECP 2	0.743				
	ECP 3	0.84				
Environmental performance	ENP 1	0.877	0.715	0.909	0.874	0.866
	ENP 2	0.881				
	ENP 3	0.854				
	ENP 4	0.763				
Social performance	SCP 1	0.761	0.622	0.868	0.812	0.801
	SCP 2	0.83				
	SCP 3	0.763				
	SCP 4	0.798				

a. All item loadings > 0.5 indicate indicator reliability (Hair et al. 2012; Kock 2015)

b. All average variance extracted (AVE) > 0.5 indicates convergent reliability (Fornell and Larcker 1981; Gye-soo 2016)

c. All composite reliability (CR) > 0.7 indicates internal consistency (Hair et al. 2019)

d. All Cronbach's alpha > 0.7 indicates indicator reliability ((Hair et al. 2013)

criteria as composite reliability but yields lower results. As in Table 3, Cronbach's alpha resulting values were greater than 0.7, indicating acceptable indicator reliability for the indicators' measurement scales (Hair et al. 2013). Because the items are unweighted, Cronbach's alpha provides a less exact indicator for reliability. Instead, the researchers utilized rho A as a close approximation of construct reliability, which falls somewhere between Cronbach's alpha and composite reliability. As a result, if one accepts that the factor model is valid, rho A may be a good compromise. As in Table 3, fear-uncertainty of COVID-19 construct has rho A value equals 0.873; for the "GSCM," it equals 0.847; as for the "internal CSR" and "external CSR," it equals 0.863 and 0.885, respectively, while for "economic performance"

indicator, it has a rho A value equals to 0.781; for the "environmental performance," it equals to 0.874; finally, the "social performance" has value equals to 0.812.

The third stage evaluates the convergent validity of each construct measure by evaluating the average variance extracted (AVE) for each latent variable; the AVE is computed by squaring the loading of each indicator on a construct and computing the mean value. A value of 0.50 or higher indicates that the concept explains at least 50% of the variance among its elements (Fornell and Larcker 1981; Sarstedt et al. 2014). The researchers found that all the AVE values were acceptable and greater than 0.5, as shown in Table 3. Fear-uncertainty of COVID-19 construct has an AVE value equals 0.712; for the "GSCM," it equals 0.619;

as for the “internal CSR” and “external CSR,” it equals 0.625 and 0.624, respectively, while for “economic performance” indicator, it has an AVE value equals to 0.626; for the “environmental performance,” it equals to 0.715; finally, the “social performance and work conditions” have value equals to 0.622.

Phase 2: discriminant validity assessment

Discriminant validity indicates the degree to which a construct is empirically distinct from other constructs in the path model, both in terms of how strongly it connects with other constructs and how clearly the indicators indicate only this one construct. First, the indicator items cross-loadings are developed in Table 4 to determine the discriminant validity.

According to Hair et al. (2013), the recommended guideline for this method is that an indicator variable should have a higher loading on its construct than any other construct in the structural model, the recommended guideline for this method. The construct has discriminant validity if the loadings of the indicators are consistently highest on the construct with which they are related. Second, the traditional metrics (Fornell and Larcker 1981) are shown in Table 5. The Fornell and Larcker (1981) criterion is the most conservative criterion for evaluating discriminant validity. This method compares the AVE value of each construct to its squared inter-construct correlation (a measure of shared variance) with all other constructs in the structural model, shown in Table 5. The recommended guideline is that a construct should not exhibit shared variance with any other

Table 4 Indicator items cross loading

	COVID-19 fear and uncertainty	Economic performance	Environmental performance	External CSR	GSCM	Internal CSR	Social performance
COVID F&U 1	0.853	0.035	0.313	0.447	0.329	−0.05	0.457
COVID F&U 2	0.833	−0.032	0.253	0.334	0.25	−0.039	0.387
COVID F&U 3	0.868	−0.026	0.269	0.419	0.319	−0.043	0.43
COVID F&U 4	0.822	−0.018	0.218	0.397	0.274	−0.077	0.368
ECP 1	−0.013	0.788	−0.018	0.021	0.036	0.004	−0.026
ECP 2	0.016	0.743	−0.016	0.023	0.04	0.112	0.013
ECP 3	−0.017	0.84	−0.053	0.059	0.056	0.23	0.03
ENP 1	0.272	−0.055	0.877	0.374	0.43	−0.037	0.567
ENP 2	0.31	−0.028	0.881	0.423	0.439	−0.105	0.553
ENP 3	0.256	−0.09	0.854	0.384	0.43	−0.114	0.544
ENP 4	0.22	0.042	0.763	0.303	0.358	−0.067	0.5
EXCSR 1	0.348	0.031	0.361	0.766	0.408	−0.087	0.46
EXCSR 2	0.323	0.06	0.336	0.762	0.323	−0.092	0.368
EXCSR 3	0.388	0.036	0.304	0.8	0.355	−0.087	0.47
EXCSR 4	0.422	0.012	0.36	0.815	0.426	−0.037	0.492
EXCSR 5	0.353	0.058	0.31	0.804	0.398	−0.112	0.472
EXCSR 6	0.407	0.041	0.406	0.793	0.469	−0.088	0.567
GSCM 1	0.256	0.03	0.376	0.418	0.78	0.002	0.477
GSCM 2	0.272	0.025	0.409	0.436	0.866	−0.082	0.55
GSCM 3	0.326	0.035	0.33	0.427	0.768	−0.101	0.495
GSCM 4	0.259	0.069	0.452	0.324	0.755	−0.099	0.659
GSCM 5	0.265	0.065	0.353	0.403	0.759	−0.102	0.512
INCSR 1	−0.016	0.132	−0.053	−0.063	−0.051	0.741	−0.033
INCSR 2	−0.026	0.061	−0.088	−0.076	−0.096	0.832	−0.075
INCSR 3	−0.094	0.207	−0.108	−0.097	−0.093	0.856	−0.056
INCSR 4	−0.046	0.141	−0.023	−0.101	−0.048	0.726	−0.03
SCP 1	0.439	−0.019	0.403	0.487	0.456	0.026	0.761
SCP 2	0.394	0.015	0.555	0.525	0.467	−0.047	0.83
SCP 3	0.329	0.092	0.517	0.421	0.751	−0.097	0.763
SCP 4	0.397	−0.096	0.538	0.487	0.399	−0.08	0.798

COVID F&U; COVID-19 fear and uncertainty, GSCM green supply chain management, INCSR internal corporate social responsibility, EXCSR external corporate social responsibility, ECP economic performance, ENP environmental performance, SCP social performance

Table 5 Discriminant validity (Fornell and Larcker criteria)

	COVID-19 Fear & Uncertainty	Economic performance	Environmental performance	External CSR	GSCM	Internal CSR	Social performance
COVID-19 Fear & Uncertainty	0.844						
Economic performance	-0.01	0.791					
Environmental performance	0.315	-0.042	0.845				
External CSR	0.476	0.049	0.442	0.79			
GSCM	0.35	0.057	0.492	0.509	0.787		
Internal CSR	-0.061	0.166	-0.096	-0.105	-0.098	0.791	
Social performance	0.49	0.011	0.641	0.604	0.69	-0.067	0.788

The diagonal is the square root of the AVE of the latent variables and indicates the highest in any column or row (Fornell and Larcker 1981)

construct greater than its AVE value. Finally, as a criterion, the heterotrait-monotrait (HTMT) ratio need to be lower than the conservative threshold of 0.85 for conceptually different constructs, while less than the threshold of 0.90 for conceptually similar constructs (Hair et al. 2019), which we show in the Table 6.

Step 3: results and hypothesis testing

Direct relationships effect

This study uses partial least squares structural equation modeling (PLS-SEM), a causal-predictive approach to SEM that focuses on prediction when forecasting statistical models of structures designed to provide a causal explanation (Hair et al. 2019). The PLS program employs a technique known as bootstrapping, which generates T-statistics for both the inner and outer models, allowing for significance testing. This method extracts a large number of sub-samples (e.g., 5000) from the original sample and replaces them with bootstrap standard errors, producing approximate T-values for structural path significance testing. The bootstrap result provides a reasonable approximation of data normality.

Furthermore, the bootstrapping method calculates the population’s sampling distribution’s spread, shape, and bias (Chin 1998). Table 7 summarizes the results, which are also illustrated in Fig. 4.

For testing the H1 hypothesis, the T-statistics value is 2.381, which is larger than the threshold of 1.96, showing a significant positive relationship; this means that the H1 hypothesis is supported. This means a significant positive relationship between COVID-19 fear-uncertainty and GSCM. As for testing the H2 hypothesis, the T-statistics value is 0.348, indicating an insignificant relationship. Thus, hypothesis H2 is not supported. This means that internal CSR has no significant moderation effect on the association between fear-uncertainty towards COVID-19 and GSCM. For the H3 hypothesis, the T-statistics value is 2.193, reflecting a significant positive relationship; therefore, the H3 hypothesis is supported. This means that external CSR has a moderation effect on the association between fear-uncertainty towards COVID-19 and GSCM.

The H4a and H4b hypothesis had T-statistics values equal to 0.931 and 0.768, respectively, indicating an insignificant relationship. Therefore, both H4a and H4b hypotheses are not supported. This means that GSCM has no significant

Table 6 Discriminant validity (HTMT)

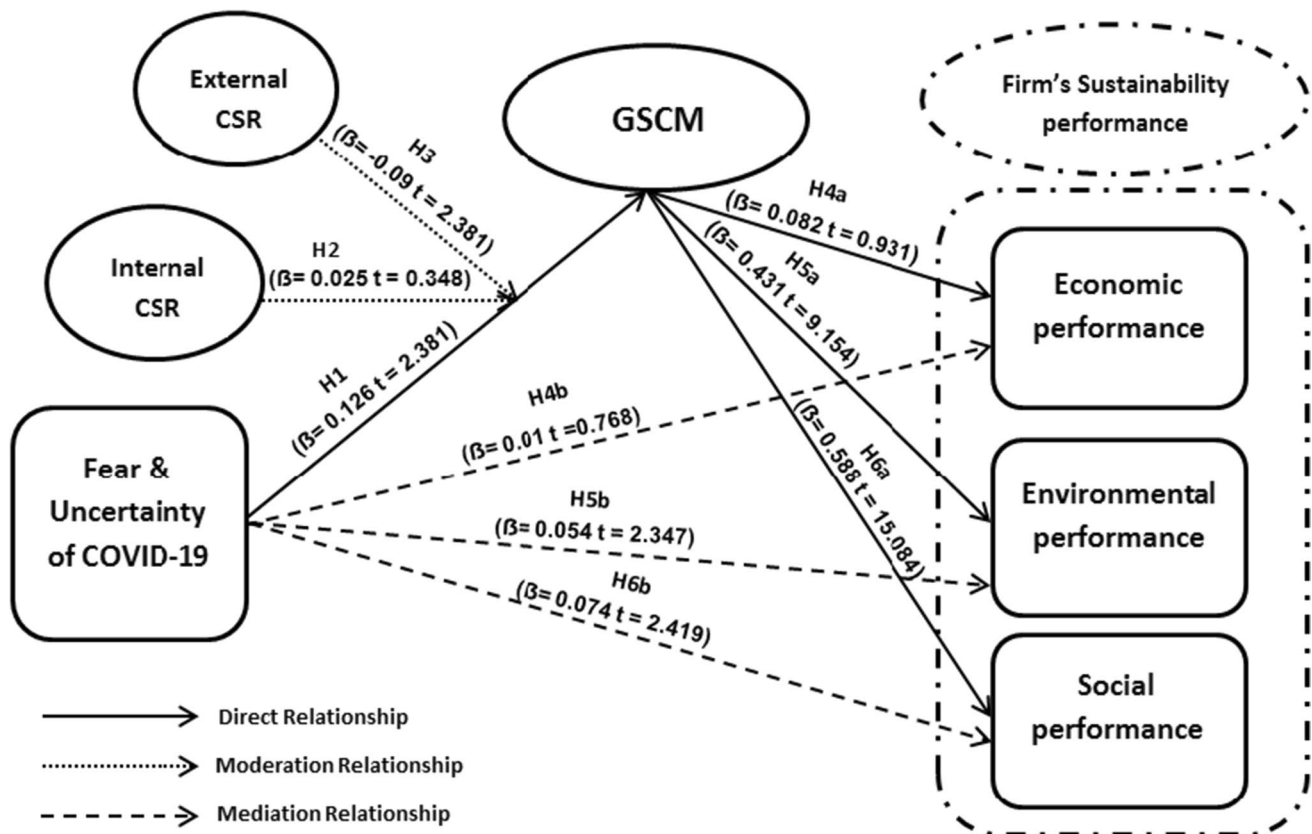
	COVID-19 Fear & Uncertainty	Economic performance	Environmental performance	External CSR	GLOBAL GSCM	Internal CSR	Social performance
COVID-19 Fear & Uncertainty	1						
Economic performance	0.051	1					
Environmental performance	0.358	0.082	1				
External CSR	0.538	0.055	0.499	1			
GSCM	0.407	0.072	0.57	0.584	1		
Internal CSR	0.074	0.239	0.106	0.127	0.122	1	
Social performance	0.588	0.095	0.764	0.713	0.792	0.1	1

For conceptually similar constructs: HTMT < 0.90. For conceptually different constructs: HTMT < 0.85 (Hair et al. 2019)

Table 7 Direct relationships hypothesis testing

Hypothesis	Relationship	Std. beta	Std. error	t-value ^	Decision	95% CI LL	95% CI UL
H1	COVID-19 fear-uncertainty -> GSCM	0.126	0.053	2.381**	Supported	0.034	0.21
H2	COVID-19 fear-uncertainty * internal CSR -> GSCM	0.025	0.122	0.348**	Not supported	-0.223	0.183
H3	COVID-19 fear-uncertainty * external CSR -> GSCM	-0.09	0.035	2.193**	Supported	-0.15	-0.034
H4a	GSCM -> economic performance	0.082	0.075	0.931**	Not supported	-0.064	0.194
H5a	GSCM -> environmental performance	0.431	0.047	9.154**	Supported	0.352	0.51
H6a	GSCM -> social performance	0.588	0.039	15.084**	Supported	0.518	0.645

** p < 0.01, *p < 0.05

**Fig. 4** Hypothesis testing, bootstrapping, and direct and indirect effect results.

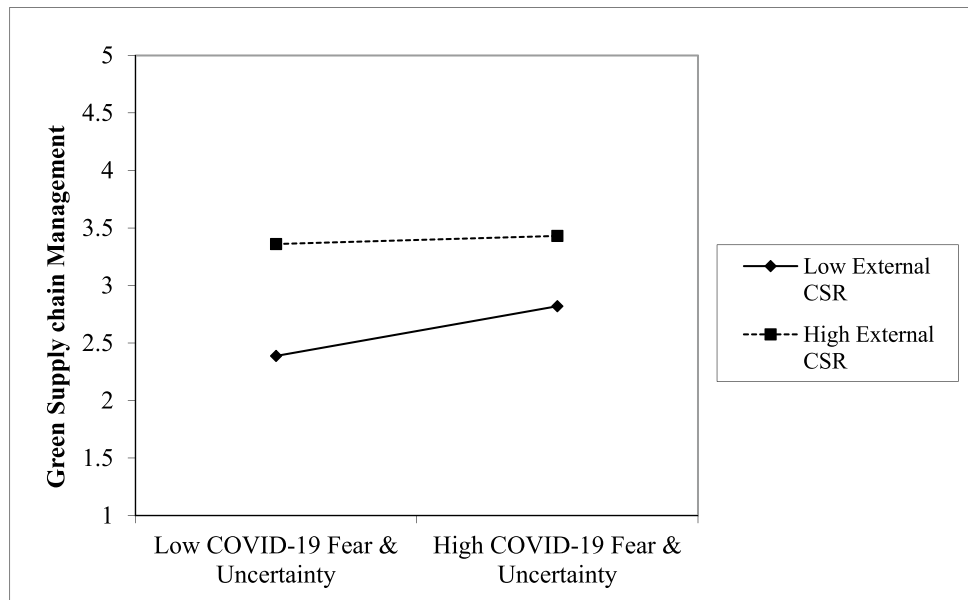
effect on the firm's economic performance; also, GSCM has no mediation effect on the relationship between the COVID-19 fear-uncertainty and the firm's economic performance. H5a and H5b hypotheses had T-statistics values equal to 9.154 and 2.347, respectively, demonstrating a significant relationship. Thus, both H5a and H5b hypotheses are supported. This means that GSCM has a significant effect on the firm's environmental performance; also, GSCM has a mediation effect on the relationship between the COVID-19 fear-uncertainty and the firm's environmental performance. The H6a and H6b hypothesis had T-statistics values equal to 15.084 and 2.419, respectively, showing a significant

relationship. So, both of H6a and H6b hypotheses are supported. This means that GSCM has a significant effect on the firm's social performance; also, GSCM has a mediation effect on the relationship between the COVID-19 fear-uncertainty and the firm's social performance.

Moderating effect

Moderating analysis was performed to assess CSR's moderate effect (external, internal) on the association between fear-uncertainty towards COVID-19 and GSCM. Table 7 and Fig. 5 demonstrate the results, which reveal that:

Fig. 5 External CSR’s moderating effect on the association among fear-uncertainty towards COVID-19 and GSCM.



First, hypothesis H2 sought to ascertain internal CSR’s moderating role between fear-uncertainty towards COVID-19 and GSCM. However, the results indicated that internal CSR does not moderate the association between fear-uncertainty towards COVID-19 and GSCM ($B=0.025, t=0.348, p=0.728$).

Second, hypothesis H3 sought to ascertain external CSR’s moderating role between fear-uncertainty towards COVID-19 and GSCM. The results revealed that external CSR moderates the association between fear-uncertainty towards COVID-19 and GSCM ($B=-0.09, t=2.193, p < 0.05$). However, the results show that (see Fig. 4), at higher external CSR, the fear-uncertainty towards COVID-19 was found to have a lower impact on GSCM. The results also revealed that at lower external CSR, fear-uncertainty towards COVID-19 was found to have a more substantial effect on GSCM.

Mediation analysis

We performed a mediation analysis to assess the mediating effect of GSCM on the linkage between fear-uncertainty towards COVID-19 and sustainability performance (economic, environmental, and social). The results (see Table 8) revealed that:

First, for hypothesis H4b, the total effect of fear-uncertainty towards COVID-19 on economic performance was insignificant ($B = -0.033, t=0.309, p = 0.757$). With the inclusion of the mediating variable (GSCM), the impact of fear-uncertainty towards COVID-19 on economic performance remains insignificant ($B = -0.043, t = 0.408, p = 0.684$). The indirect effect of fear-uncertainty towards COVID-19 on the economic performance through GSCM was found insignificant ($B = 0.01, t = 0.768, p = 0.443$), indicating that GSCM has no mediating effect on the association among fear-uncertainty towards COVID-19 and economic performance.

Table 8 Mediation relationships hypothesis testing

Total effect		Direct effect		Indirect effects					
β	p value	β	p value	Hypothesis	β	SD	T value	p value	Decision
-0.033	0.757	-0.043	0.684	H4b : COVID-19 fear and uncertainty -> GSCM -> economic performance	0.01	0.011	0.768	0.443	Not supported
0.219	0	0.165	0.002	H5b : COVID-19 fear and uncertainty -> GSCM -> environmental performance	0.054	0.023	2.347	0.02	Supported
0.361	0	0.287	0	H6b : COVID-19 fear and uncertainty -> GSCM -> social performance	0.074	0.031	2.419	0.016	Supported

** $p < 0.01$

* $p < 0.05$

Second, for hypothesis H5b, the total effect of fear-uncertainty towards COVID-19 on environmental performance was significant ($B = 0.219$, $t = 4.086$, $p < 0.001$). With the inclusion of the mediating variable (GSCM), the impact of fear-uncertainty towards COVID-19 on environmental performance remains significant ($B = 0.165$, $t = 3.113$, $p = 0.002$). Also, we found that the indirect effect of fear-uncertainty towards COVID-19 on environmental performance through GSCM is significant ($B = 0.054$, $t = 2.347$, $p = 0.02$), showing a partial mediation for the association between fear-uncertainty toward COVID-19 and environmental performance.

Third, for hypothesis H6b, the total effect of fear-uncertainty towards COVID-19 on social performance was significant ($B = 0.361$, $t = 6.718$, $p < 0.001$). With the inclusion of the mediating variable (GSCM), the impact of fear-uncertainty towards COVID-19 on social performance remains significant ($B = 0.287$, $t = 5.837$, $p < 0.001$). We found that the indirect effect of fear-uncertainty towards COVID-19 on social performance through GSCM is significant ($B = 0.074$, $t = 2.419$, $p = 0.016$), indicating that GSCM partially mediates the association between fear-uncertainty towards COVID-19 and social performance.

Discussion

This research developed and empirically tested a model that reflects the association between fear-uncertainty towards COVID-19, GSCM, and the firm's sustainability performance (economic, environmental, and social) and examines the moderating effect of CSR (internal and external) on the association among fear-uncertainty towards COVID-19 and GSCM, built on a sample of 300 manager-level personnel.

Our results revealed that fear-uncertainty towards COVID-19 positively affect GSCM. This finding is in line with Jian et al. (2020). Likewise, according to Ahorsu et al. (2020) and Qiu et al. (2020), people who fear disasters tend to improve their general well-being and strengthen their selfless behavioral attitudes. Furthermore, our results reveal that GSCM positively impacts firm sustainability performance (environmental and social performance) and mediates the relationship between fear-uncertainty against COVID-19 and these sustainability performance dimensions. These findings align with Rew and Cha (2020) and Gao et al. (2021). Likewise, according to Rajeev et al. (2017) and Çankaya and Sezen (2019), adapting the GSCM improves the environmental and social general well-being and strengthens the companies' environmental and social sustainability performance.

However, GSCM has an insignificant effect on economic performance and an insignificant mediation effect on the association between fear-uncertainty towards COVID-19 and

a firm's economic performance. These findings align with Choi et al. (2020) and Herbes et al. (2020). One reason is that applying GSCM practices usually incurs costs related to environmental activities, which have no significant impact on short-term sales and profitability (Çankaya and Sezen 2019). In the same vein, Song and Yu (2017) argued that green operations are extra expensive; for instance, the green purchasing process increases costs, which affects the company's financial performance. Another possible reason is the pandemic's negative impact on most businesses' economic performance in developing economies (Alzgoool et al. 2021). According to Breisinger et al. (2020), the government's sanctions and lockdown have also triggered a significant shock for many Egyptian economic sectors and businesses. Similarly, Grida et al. (2020) argued that the governments' preventive policies to limit the virus spread and try to control the situation lead to disruptions in the SCs and negatively affect the economic performance of the business firms.

Moreover, our study shows that external CSR moderates the association between fear-uncertainty towards COVID-19 and GSCM. This finding is in line with Thong and Wong (2018), as companies implementing external CSR usually suffer more pressure from external stakeholders, forcing them to adopt appropriate policies to meet their needs and thus lay the foundation for implementing GSCM. However, this relationship is not moderated by internal CSR. One likely reason is that internal CSR focuses mainly on the employees' needs (Farooq and Rupp 2017) rather than the ecological requirements for SCs. Also, according to Kayaly (2014), the work environment in Egypt leads CSR activities to have a limited impact on job conditions. The essence of Egypt's industries is labor-intensive, where the labor force consists mainly of informal, irregular-level jobs (Assaad and Kraff 2013). Also, the lack of knowledge among Egyptian employees of the labor conditions code of ethics (Aboe-Imaged et al. 2018) creates a disparity between internal CSR activities during the pandemic and its effects on the green SCs practices. This reason is similar to that of Séhier (2019), which states that the labor-intensive factories in developing countries failed to comply with the work conditions code of conduct related to the firm's GSCM operations.

Theoretical contribution

This study is academically significant given the epidemic's novelty; there has been limited research on how managers' and stakeholders' intellectual and cognitive views of COVID-19 influence their environmental concerns and green practices. This research contributes to Grida et al. (2020) and Jian et al. (2020) by highlighting the positive impact fear-uncertainty has on GSCM. Moreover, while academics have examined CSR's impact on SCs' green practices, there has been little research into CSR's moderate

effect on the GSCM and the mediating function the GSCM plays between fear-uncertainty and a firm's sustainability performance during COVID-19. Furthermore, this study investigates the GSCM practices' crucial role in affecting the three dimensions of the firm's sustainability performance (economic, environmental, and social) in the Egyptian context. Some existing studies showed the relationship mentioned above in China (Chenxiao Wang et al., 2020), the USA (Green et al. 2012), and Thailand (Çankaya and Sezen 2019). However, very few studies considered the pandemic effect and the Egyptian context. Also, this study adds to Sarkis et al.'s (2011) and Green et al.'s (2012) argument that achieving the balance among the three dimensions of sustainability is challenging since their complex nature and complex interrelationships.

Moreover, this study contributes to the existing theories as follows. First, this study adds to the social cognitive theory (Beck et al. 1979) in GSCM by bringing new visions into the association between fear-uncertainty towards COVID-19 and GSCM. Unlike previous studies showing the negative impact of COVID-19 on SCs, our research contributes to the studies of Alzgoool et al. (2021), El Baz and Ruel (2020), Govindan et al. (2020), and Karmaker et al. (2020) by pointing out the positive side of the COVID-19 pandemic as it brings back the concepts of sustainability and green practices into the spotlight. Also, it shows how fear-uncertainty towards the pandemic leads to re-thinking the green practices towards SCs to capture the current situation's opportunities to enhance the GSCM process. Thus, this research successfully bridges the gap highlighted by Grida et al. (2020) and Jian et al. (2020).

Second, this research expands stakeholder theory in GSCM by bringing new perceptions into the connection between CSR and GSCM by demonstrating the moderating effect of CSR on the association between fear-uncertainty towards COVID-19 and GSCM. Furthermore, earlier studies presented different theoretical approaches to examine and explain GSCM, such as using the resource-based viewpoint theory and the Game theory (Tian et al. 2014; Zaid et al. 2018). These previous studies focus on the passive responses to stakeholder requirements (Wolf 2014; Foo et al. 2018). However, the stakeholder theory offers new understandings of effectively adopting CSR to meet stakeholder demands (Turker 2009). In a similar vein, our research incorporates stakeholder theory into GSCM research, revealing previously undiscovered findings on how CSR, especially external CSR, moderates GSCM. Although previous scholars discuss little the moderating effect of CSR on the relationship of fear-uncertainty towards COVID-19 and GSCM, this study contributes to Chenxiao, Zhang, and Zhang (2020) by showing how CSR lays the groundwork for understanding the demands of external stakeholders, allowing enterprises with external CSR to apply GSCM and overcome the

pandemic's fear and uncertainty problems. Thereby, this study contributes to the literature on CSR and GSCM by empirically testing CSR's moderating effect on the relationship of fear-uncertainty toward COVID-19 and GSCM.

Practical implications

This study has the following practical implications. First, the research's results come consistent with El Baz and Ruel's (2020) and Govindan et al.'s (2020) argument, which shows that managers should devote significant time and effort to establish a consistent approach for understanding the green practices of SCs during the pandemic. Managers are responsible for environmental, economic, and social performance throughout the SC, not just within their own company. Supporting Aguinis et al. (2020) and Karmaker et al. (2020), applying GSCM practices during the pandemic can help managers address environmental challenges and internal and external stakeholders' needs, thereby improving business sustainability performance.

Also, through GSCM practices, managers will answer questions about how the company can ensure raw materials' safety? How the production process and the product itself are environmentally friendly? How are the marketing process and goods transportation to the end consumer safe for both the carrier and customer? Finally, how are the disposal of the product and production waste safe and environmentally friendly? Answering all these questions is essential in this pandemic period, and it will ensure the safety of both internal and external stakeholders. So, supporting the results of this research and the studies of Sarkis et al. (2011) and Wolf (2014), managers need to have the correct view of GSCM and put GSCM into practice. For instance, managers could consider energy conservation and emission reduction in their supply chain operations. Also, consider the source of raw materials used in the production process and the product's safe delivery to the end-users.

Second, this research's results, for instance, contribute to Breisinger et al.'s (2020) and Koo and Ki's (2020) argument, which shows managers should develop a consistent strategy to apply CSR practices, especially during the pandemic period. Companies should effectively participate in CSR activities. This research results comply with Spurk and Straub (2020), showing that managers should foster CSR implementation for internal and external stakeholders. Managers should develop a consistent strategy to apply CSR practices to solve labor issues, especially during the pandemic. Supporting Machokoto's (2020) study, managers should implement employee-friendly techniques in the workplace to lessen the outbreak's adverse effects and boost employee satisfaction and productivity.

Moreover, managers must provide precise information. They must not focus only on the positive words but also

on the steps they took to protect their employees during COVID-19 and strengthen the consistency of CSR and sustainability performance. Companies should also ensure safe practices in the workplace by providing exceptional training about the correct hygiene and cleaning procedures and precautions the workers should take during COVID-19.

Limitations and future research

First, our research studies the context of Egyptian firms. Thus, future studies in other countries could provide data on the similarities and/or differences with other environments. Second, we collected data at a single point in time and did not have access to longitudinal data to examine the causal effects over a more extended period. Hence, a longitudinal study could offer a beneficial understanding of the interaction between fear-uncertainty towards COVID-19, GSCM, CSR practices, and corporate sustainability performance in the long run. Third, this study only considers CSR only as a moderator to examine the effect of fear-uncertainty towards COVID-19 on GSCM. Future studies may also consider other factors, such as big data analytics and institutional support, to further explore these issues.

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Author contribution Mr. Moustafa Mohamed Nazief Haggag Kotb Kholaif: conceptualization, methodology, software, data curation, writing-original draft preparation, investigation, and visualization

Professor Xiao Ming: visualization, investigation, and supervision

Data availability Datasets are available from the corresponding author on request.

Declarations

Ethics approval and consent to participate Not applicable

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