CORPORATE SOCIAL RESPONSIBILITY (CSR) ISSUES IN SUPPLY CHAIN：AN EMPIRICAL STUDY OF CHINA'S E-COMMERCE INDUSTRY

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ABSTRACT

Based on the supply chain social responsibility (SCC) theory, the purpose of this paper is to investigate the mediating effects of environmental uncertainty (market turbulence and technological turbulence) on the relationships between driving force and SCC for the Chinese e-commerce industry. Using questionnaires collected from 306 Chinese e-commerce companies (EC), hierarchical statistical results demonstrate the moderating effect for SCC practices. The results also show that the implementation of the reputation driving force and economic driving force in supply chain has a positive impact on the SCC in supply chain, but institutional driving force does not have a significant effect on the SCC for Chinese e-commerce industry. Furthermore, for the moderation of environmental uncertainty between driving force and CSR in supply chain, we find that the stronger the technological turbulence, the stronger relationship between driving force and SCC in supply chain; the more volatile the market, the weaker the relationship between driving force and SCC. In addition, when we comprehensively consider the overall role of driving factors and environmental uncertainty, the stronger the degree of environmental uncertainty, the stronger the SCC for Chinese EC is in the post-pandemic era. And we conclude with implications and suggestions for future research.

Keywords: Supply Chain Social Responsibility, Driving Force, Supply Chain Performance, Environmental Uncertainty, Chinese E-Commerce Industry, Post-Pandemic Era.

Conflict of Interest

The authors declare that they have no conflict of interest. This article does not contain any studies with human participants or animals performed by any of the authors. Informed consent was obtained from all individual participants included in the study.

INTRODUCTION

The global COVID-19 outbreak in 2020 hit aviation, tourism, manufacturing and other industries hard. For the retail industry, the epidemic has changed the business philosophy of merchants, traditional companies pay more attention to online operation and logistics advantages. Under the current epidemic, Chinese e-commerce companies represented by Alibaba and JD.com have performed an important role for residents' consumption. The continuous progress and iteration of the Internet has pushed e-commerce into a larger but less stable world. China's e-commerce industry has become a huge commercial economy, and it needs to shoulder more social responsibilities in the fight against uncertainty of economic environment. The idea of corporate social responsibility (CSR) has been widely concerned since its emergence in the 19th century, and the issue of whether companies should undertake social responsibility once has been controversial (Hałasik and

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Kulczycka, 2016). In recent years, the company as a member of society actively take social responsibility while realizing profits, which has been widely recognized (Jenkins, 2009). To implement CSR, a company must consider the interests of stakeholders other than shareholders, such as consumers, communities and the environment. In other words, the company should not solely pursuit profit, but emphasize on the contribution to the environment, consumers and society (Parra et al., 2018).

With the continuous development of economic globalization, companies have formed an interdependent supply chain, and the market competition mode has changed from the past competition between companies to the competition between supply chains (Antai, 2013). Hence, the problem of CSR goes beyond the scope of a single company and into the global supply chain management accordingly (Andersen, 2009). In the economic environment of post-pandemic era, individual companies are unable to implement CSR alone, it is closely related to the overall level of social responsibility in the whole supply chain, and CSR has even become a new parameter in the competitiveness of the supply chain (Quarshie, 2016). Especially the core companies of supply chain, the CSR governance should be strengthened (Williams et al., 2006). Supply chain CSR means that the core companies require to promote supply chain upstream and downstream partners' social responsibility, such as requiring companies to have a certain production capacity, safe production and labor social security system on the whole supply chain to cope with the environmental uncertainty.

Since the emergence of e-commerce in China at the end of the 20th century, it has achieved rapid development with internet information technology over the past two decades. According to the 32nd statistical report on the development of China's internet network released by China Internet Network Information Center (CNNIC), by the end of June 2019, the number of China's internet users had reached 85.4 billion, an increase of 25.98 million than the end of 2018, and the internet penetration rate is 61.2 percent. Among them, 63.9 million people participate in online shopping, 28.71 million more than the end of 2018, and the online shopping usage rate reaches 74.8 percent, indicating that more and more netizens are participating in online shopping (Figure 1).

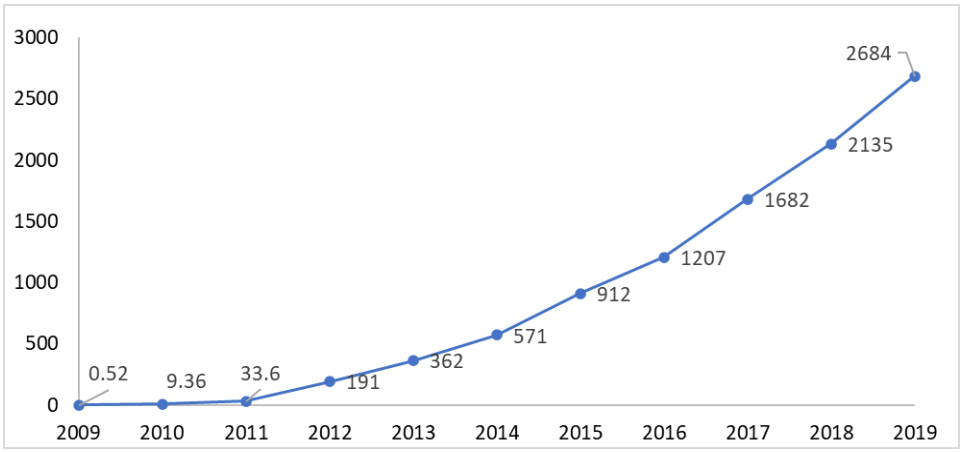

FIGURE 1
TMALL DOUBLE 11 SALES OVER THE YEARS
Source: http://www.southmoney.com/caijing/caijingyaowen/202011/7566600.html

In 2019 "*Singles Day*"[1], the promotional activities turnover of Taobao and Tmall reaches 268.4 billion yuan and creates new historical record of online daily sales. This shows

[1] "*Singles Day*" is an online shopping festival held each year on November 11 by Alibaba and its affiliated e-commerce operators in China. It has become worldwide online shopping and cultural phenomenon, with one-day sales exceeding $38 billion on November 11, 2019.

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the rapid development of e-commerce in China and its increasingly important market position in the commercial field. Behind the rapid development of e-commerce, some social responsibility problems appear: Chinese e-commerce companies (EC) are generally small - and medium-sized platform mode, the businesses tend to ignore the long-term interests to make short-term behaviour, making EC have serious deficiencies in business ethics and fulfilling social responsibilities. Even in the process of sales promotion that benefits consumers, a few EC may choose to cheat consumers by shoddy products or false publicity; the platform audit is not strict and the processing is delayed; New forms, such as live streaming and shopping in moments, have brought new challenges to consumer rights. The failure to fulfill CSR harm the interests of all stakeholders in the e-commerce supply chain and take a negative impact on the healthy development of the whole industry. Therefore, while encouraging e-commerce enterprises to innovate and develop, it is urgent to attach great importance to strengthen their sense of social responsibility. It is of certain theoretical and practical significance to study the CSR issue of EC and guide governance.

How to effectively carry out supply chain social responsibility, and more reasonably to improve the driving force of Chinese e-commerce in the post-pandemic era? Throughout understanding current status of CSR implementation, this paper empirically analyses driving factors of supply chain social responsibility (SCC), and examine the relationship between SCC and supply chain performance. This research provides theoretical entry point, which can provide some decision-making references for relevant government departments, so as to help China's e-commerce industry achieve sustainable development.

The remainder of this paper is organized as follows. Section 2 describes and analyzes the existing literature and theoretical hypothesis about SCC, driving force, environmental uncertainty, and SCP. Section 3 sets up research model and test results. Section 5 draws some research conclusions. And section 6 draws limitations and future prospects of this paper.

LITERATURE REVIEW AND THEORETICAL HYPOTHESIS

Supply chain social responsibility in Chinese e-commerce companies

The importance of supply chain social responsibility (SCC) has been recognized by scholars and practitioners (Murphy, 2002; Zhang, 2017; Feng, 2017). Poist (1989) first focuses on CSR issues in the supply chain and introduces employee training, philanthropy, environment, workplace diversity, health, safety, and other social issues. Carter and Jennings (2002) confirm the importance of SCC through case analysis and investigation research, and divide the SCC activities into six aspects: environment, ethics, diversity, human rights, philanthropy and safety. Gao (2006) analyzes the external impulse, ideological foundation and internal motivation to promote SCC. From the practical perspective, Ballou (2007) believes that the implementation of SCC is conceived in the activities such as procurement, transportation and warehousing, and puts forward the concept of social responsibility of procurement and transportation. Furthermore, Ciliberti et al. (2008) report some Italian companies by using 47 indicators to measure SCC: purchase social responsibility, transportation, packaging, sustainable warehousing and reverse logistics. Zhao (2008) divide the CSR of EC into three levels: core responsibility-shareholders, creditors, and employees; intermediate responsibilities-responsible for suppliers, distributors, financial institutions and community public; extended social responsibility-responsible for government and other stakeholders.

However, due to the differences in culture and company operation mode, SCC of Chinese e-commerce industry is not completely consistent. Overall, there are few literatures in academic directly on the research of e-commerce SCC. Zou (2008) distinguishes that

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Chinese e-commerce companies (EC) require downstream companies to be responsible for upstream producers, and reform the overall operation of the supply chain system through multi-party cooperation. At present, the SCC measurement of EC mainly focuses on a certain dimension, such as social responsibility of procurement. Although Ciliberti et al., (2008) put forward some theoretical modes, but their research has not carried out in-depth empirical test. Miao et al., (2015) provide empirical evidence for Chinese apparel companies to conduct SCC. According to the supply chain CSR theory, an EC three-dimensional evaluation of SCC, including: suppliers, customers and employees. This framework has been adopted to carry out empirical research (Mian and Wu, 2009). Liu et al., (2010) divides the retail CSR into economic responsibility, legal responsibility, environmental responsibility, ethical responsibility and social welfare responsibility according to the existing CSR theory. Based on the nature of the e-commerce industry, Sun et al., (2011) divides the CSR into four dimensions: economic, moral, environmental protection and public welfare. And Hung (2018) makes a discussion on the connotation of e-commerce CSR and the importance of fulfilling responsibility.

In consideration of China's e-commerce CSR, a restriction mechanism suitable is proposed from the government, company and social levels (Han, 2010). Alibaba releases the first "*Social Responsibility Report in the Internet Industry*"[2] in 2007, implying that as companies grow larger, the social responsibilities that are supposed to be undertaken. The responsibilities of customers, partners, employees, shareholders, society and the state include at least three levels: social welfare, environmental protection and universal service. This report takes impacts on the business development strategy of EC, only by making CSR as the core gene of the company, can it have permanence and sustainability.

Therefore, this paper believes that for China's e-commerce industry, the core of SCC consists of three parts: the first is the customer benefit, the second is employee benefit, and the third is the interests of shareholder benefit, and these three orders cannot be reversed.

Driving Force

Some scholars put forward the corresponding driving force model for CSR. Schwartz and Carroll (2003) illustrate three dynamic models to describe the causes of CSR, implying the motivation to undertake CSR comes from economic, institutional and moral motivation. Economic drive means striving to maximize profits, maintain the competitive operation. Institutional drive refers to the code formulated in accordance with laws and regulations. Moral drive refers to the company's adherence to a series of ethical standards. From the perspective of supply chain, Walker et al. (2008) point out that the driving factors influencing companies' implementation of supply chain management include internal driving factors within the organization and external driving factors including government, competitors, customers, suppliers and society, judging the main driving force are consumer influence and government involvement. Moreover, the company has prepared to implement the supply chain (Lee, 2008), but the driving force and practice performance of different industries vary (Zhu, Sarkis, 2006).

For the e-commerce industry, Wu (2013) believes that e-commerce to fulfill CSR means paying cost, if there is no internal or external motivation mechanism, EC fulfilling social responsibility spontaneously is not reality. And this analysis of performing SCC comes from four aspects: economic, public opinion, moral and institutional driving force. Under the condition of market economy, a company should consider in its management decision is how

[2] On December 5, 2007, Alibaba Group released the first corporate social responsibility report for the domestic Internet industry in Hangzhou: "Creating an Open, Collaborative, and Prosperous E-Commerce Ecosystem and Alibaba Group 2007 Social Responsibility Report

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to "*use its own resources for economic activities and make profits under the premise of complying with the law*" (Friedman, 1970). Some scholars believe that moral driving force is an internal drive for companies to assume SCC, while others believe that it includes pressure from stakeholders (Yang, 2009). This paper mainly refers to the driving force classification of Schwartz (2003), which defines the economic driving force as the company's implementation of SCC under the requirements of shareholders and business partners in order to obtain profits (Sun, 2009). For Chinese e-commerce enterprises studied, the institutional driving force is in compliance with national laws and regulations, national policies and organizational requirements of relevant departments. There is a difference in the classification of moral drive among researchers. In addition to considering the institutional and economic factors in the existing mature CSR driving force structure (Minor, 2011; Lii et al., 2012), we consider the impact of corporate reputation. Online e-commerce companies are sensitive to consumers' perception and evaluation. For example, Taobao "*7-day no reason to return*" and "*five-star praise*" are formed against the background of establishing reputation. This paper concerns the concept of reputation driving force, and defines the reputation driving force is conducive to establish its SCC in the society. Thus, this paper proposes the following assumptions:

***H_1**: The institutional driving force has a significant positive impact on the implementation of supply chain social responsibility in Chinese e-commerce industry;*

***H_2**: The economic driving force has a significant positive impact on the implementation of supply chain social responsibility in Chinese e-commerce industry;*

***H_3**: The reputation driving force has a significant positive impact on the implementation of supply chain social responsibility in Chinese e-commerce industry.*

Environmental Uncertainty

Environmental uncertainty, that is, due to the variable and unpredictability of the business operating environment, requires an appropriate strategic vision and allocation of resources to ensure expected performance (Farooq, 2019). In the post covid-19 era, China's e-commerce industry has experienced huge fluctuations in the market and technology environment. This paper argues that environmental uncertainty has a certain impact on the relationship between driving force and SCC. We explore two dimensions of EC uncertainty: technological volatility and market volatility. Technological turbulence refers to the rate of change in production, processing, and service technologies. Strong technical turbulence refers to rapid changes in the products and services and frequent shifts in dominant designs and IT standards (Liu, 2011). Market turbulence, on the other hand, is the extent to which markets are heterogeneous and customer preferences change (Zhao, 2012). High levels of market volatility affect an inability to accurately predict customer trends in e-commerce demand (Papanagnou, 2018).

This paper predicts that these two uncertain variables will influence the driving force-SCC relationship in completely different directions. In an unpredictable market environment, for example, EC may not invest capital and resources to promote SCC coordination activities in the supply chain because they believe that excessive focus on social responsibility will affect business performance. However, high volatility and the negative impact on customer delivery requirements may indicate the development of a driving mechanism for CSR in the supply chain. In addition, the regulating effect of environmental uncertainty takes effects on SCC of EC. Technology and market fluctuations, therefore, may affect the implementation of CSR behavior and the results produced. As more attention is paid to SCC, companies may value the role of drivers in responding to the changing new environment. Due to dramatic changes of technology turbulence in EC processes and high fluctuations in customer delivery schedules, in this form, adversely affect operations and ultimately lead to reduced customer

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service levels. To offset the negative impact, the EC may reinforce SCC driving force. Also, market turbulence can trigger unexpected changes in EC channel distribution and customer, which reduce the use of driving force. Market volatility may undermine the positive correlation between driving force and SCC. Therefore:

H_{4a}: *The stronger the technical turbulence, the stronger relationship between driving force and supply chain social responsibility in Chinese e-commerce industry.*

H_{4b}: *The more volatile the market, the weaker the relationship between driving force and supply chain social responsibility in in Chinese e-commerce industry.*

Supply Chain Performance

SCC allows suppliers, manufacturer, and retailers of EC to improve forecasts, synchronize production and delivery, coordinate inventory-related decisions, and develop a shared understanding of their performance impact (Lee and Whang, 2017; Simch et al., 2000). SCC supports two levels of integration in improving supply chain activities, operational and strategic (Prajogo and Olhager, 2012). Supply chain performance level considers the improvements of supply chain activities, including inventory level, production and delivery schedule, utilization of capacity, order status, and sale data. Strategic level of SCC exceeds rudimentary supply chain activities, expanding to include the improvements of product, customer, supplier, and competition. Some studies contend that SCC can effectively improve finance performance for participants such as cost and revenue, and non-finance performance such as customer service and commercializing to market (Mentzer et al., 2008; Frohlich and Westbrook, 2011). Consistent with these arguments, two hypotheses are thus proposed between information sharing and collaboration, and supply chain performance. Thus, the proposed relationships are depicted in Figure 2.

H_5: *The implementation of supply chain social responsibility has a significant positive impact on the supply chain performance in Chinese e-commerce industry.*

H_6: *supply chain social responsibility plays an intermediary role in the relationship between driving force and supply chain performance in Chinese e-commerce industry.*

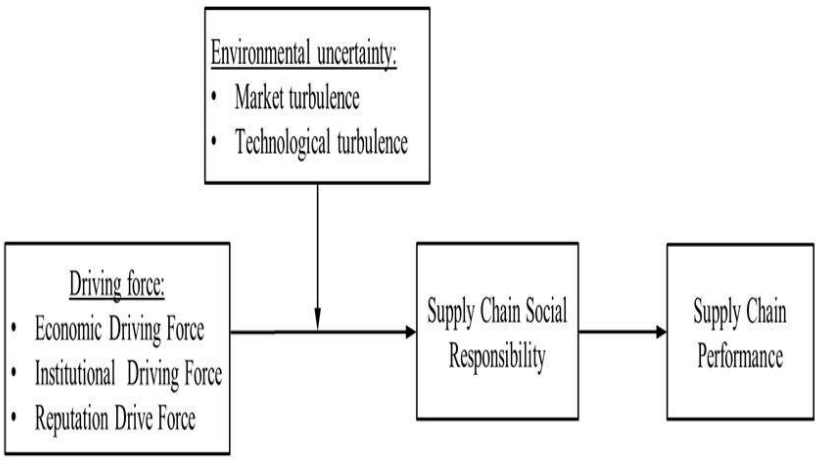

FIGURE 2
THEORETICAL MODEL

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RESEARCH METHODS

Research Design

This paper adopts empirical investigation to collect data. Firstly, the preliminary design questionnaire is revised through semi-structured interviews with e-commerce experts and EC senior executives to ensure the validity of the questionnaire. Likert-type seven scale is used for all the questions. After that, questionnaire survey is conducted on the 1000 EC engaged, and a total of 306 valid questionnaires are collected (see Table 1). More than 35.2 percent of the companies surveyed have more than 1,000 full-time employees and annual sales of more than 7 billion yuan.

Table 1
RESPONDENTS AND ORGANIZATION SAMPLE PROFILE

		(N=306)
Respondent titles	Chief executive officer	2.4%
	Vice president	4.8%
	IT director	11.0%
	Supply chain director	41.9%
	Operation director	26.7%
	Marketing director	13.3%
The length of relationship	>10	9.0%
	5-10	21.4%
	<5	69.5%
Working years	>10	26.2%
	5-10	41.0%
	3-5	32.9%
Firm scale (Number of employees)	＜300	22.9%
	300-500	13.8%
	500-1000	28.1%
	1000-2000	19.5%
	>2000	15.7%
Firm age	>10	40.0%
	5-10	44.3%
	<5	15.7%

Reliability and Validity Analysis

In this paper, we use Cronbach α to measure the reliability of the latent variables in the model. The coefficient of economy-driven, institution-driven and reputation-driven is 0.82, 0.87 and 0.86 respectively, and the reliability of questionnaires is good. The supply chain social responsibility and supply chain performance scale mainly refer to the research of Miao and Wu (2009). In order to test the construct validity, a series of confirmatory factor analysis are conducted to test the constructs (see Table 2). All questions of the corresponding factor in the factor loadings were greater than 0.5. The assessment of reliability involves calculating Cronbach's α, the composite reliability (CR) index and the average extracted variance. We test the reliability by comparing each correlation coefficient between the latent variables and their average variance extracted (AVE) values. If the value is greater than the AVE shared variance (the square of the correlation between each pair of factors) of the latent variable and other latent variables, then it would indicate that the latent variable has good discriminant validity.

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As shown in Table 2, all variables' Cronbach's α coefficients are greater than 0.70, indicating that the scale has good internal consistency. Composite reliability coefficients of all latent variables are greater than 0.70. The scale has confirming construct validity. ($\chi 2[384]=667.93$, $p<0.001$; CFI=0.95, IFI=0.95, TLI=0.94, RMSEA=0.05), wherein the correlation coefficients are shown in the lower half of the matrix, and the diagonal is the square root of AVE. Although RMSEA index is only close to the critical value of good fitting effect, they all reach an acceptable level. From the perspective of overall indexes, the model results are acceptable.

Table 2
RELIABILITY AND CONSTRUCT VALIDITY

	Cronbach's α	Composite reliability	AVE
Reputation Drive Force	0.86	0.87	0.63
Economic Driving Force	0.82	0.83	0.56
Institutional Driving Force	0.87	0.88	0.71
Market turbulence	0.88	0.88	0.65
Technological turbulence	0.92	0.92	0.73
Supply Chain CSR	0.90	0.90	0.61
Supply Chain Performance	0.89	0.87	0.58

To determine satisfactory discriminant validity based on Fornell and Larcker's (1981) criteria, each construct should be more highly correlated with its own construct than with other constructs. The results show that the diagonal elements (the square root of the AVE extracted between the constructs and their measures) are greater than the off-diagonal elements (correlations among constructs), suggesting a reasonable degree of discriminant validity. The square root of AVE is greater than the correlation coefficient of each pair of factors, indicating that the scale has a good discriminate validity (see Table 3).

Table 3
MEASUREMENT ITEMS

Construct and source	Scale items	Load
Economic driving force (Hoang, 2020)	For the supply chain of our company (including the suppliers and customers), the economic factors of implementing CSR are as follows:	
	EDF1 Pressure from competitors	0.80
	EDF2 Supplier requirements	0.81
	EDF3 Requirements of shareholders	0.65
	EDF4 Requirements of customer	0.71
Intuitional driving force (Ratten, 2013)	For the supply chain of our firm (including the suppliers and customers), the intuitional factors of implementing CSR are as follows:	
	IDF1 Requirements of national laws	0.92
	IDF2 Requirements of government regulations	0.85
	IDF3 Requirements of trade associations	0.74
Reputation driving force (Liu, 2011).	For the supply chain of our firm (including the suppliers and customers), the reputation factors of implementing CSR are as follows:	
	RDF1 Staff requirements	0.75
	RDF2 Requirements of environmental protection organizations	0.86
	RDF3 Consumer requirements	0.77
	RDF4 Supplier requirements	0.78
Market turbulence (Iyer, 2011)	In the current market environment of firm development,	
	MT1 Sales forecasts are likely to be accurate . . . inaccurate	0.76
	MT2 Market trends are easy to monitor . . . difficult to monitor	0.86
	MT3 Sales predictable . . . unpredictable	0.79
	MT4 Customer demand predictable . . . unpredictable	0.81

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Technical turbulence (Iyer, 2011)	In the current technical environment of firm development,	
	TT1 Products become obsolete slowly . . . quickly	0.85
	TT2 Core production processes change slowly . . . rapidly	0.87
	TT3 New products are introduced infrequently . . . frequently	0.88
	TT4 IT tools are introduced infrequently . . . frequently	0.82
Supply Chain CSR (Miu et al., 2015)	Compared with main competitors, our firm's supply chain can help:	
	SCC1 Meet the special needs of key customers	0.71
	SCC2 Provide the required quantity to customer's order requirements	0.98
	SCC3 Delivery social responsibility	0.71
	SCC4 Purchasing social responsibility	0.78
	SCC5 Warehousing social responsibility	0.72
	SCC6 Reverse logistics social responsibility	0.74
Supply Chain Performance (Wu, 2014)	Compared with main competitors, our firm's supply chain can help:	
	SCP1 Meet the special needs of key customers	0.84
	SCP2 Provide the required quantity according to the key customer's order requirements	0.90
	SCP3 Shorten delivery lead time	0.74
	SCP4 Inform in advance of shortage or delay of delivery	0.66
	SCP5 Shorten delivery lead time	0.64
	SCP6 Good customer satisfaction (e)	

The results of confirmatory factor analysis (Marsh, 1989) show that the fitting indexes were good and the scale had good validity. Our results of confirmatory factor analysis showed that the fitting indexes are good and the scale had good validity. Table 4 reports the statistical evidence of the established model: (1) the Cronbach's α value for each construct was over 0.80; (2) all the factor loadings were over 0.700 and statistically significant; (3) the calculated CR value for each construct was greater than 0.800; (4) the calculated AVE value for each construct was greater than 0.50. Thus, the newly established model was prepared for hypotheses testing.

The discriminant validity was confirmed by comparing the square root of the AVE value for each construct with the correlations between the paired constructs (Fornell & Larcker, 1981). The results presented in Table 4 show that the square root of the AVE values on the diagonal were greater than the correlations between the respective construct and the other constructs. Therefore, discriminant validity was ensured in our study (Table 4).

Table 4
Descriptive statistics, correlations and square root of AVE values

Construct	Mean	1	2	3	4	5	6	7
1.Reputation driving Force	4.83	0.87						
2.Economic driving force	4.64	0.59	0.83					
3.Institutional driving force	3.54	0.01	0.46	0.88				
4.Market turbulence	4.79	0.41	0.56	0.60	0.88			
5.Technological turbulence	4.89	0.46	0.70	0.67	0.81	0.92		
6. Supply chain CSR	4.75	0.09	0.66	0.76	0.73	0.67	0.90	
7.Supply chain performance	3.97	0.75	0.78	0.78	0.70	0.66	0.69	0.87

Note: Square root of AVE on the diagonal in bold.

Hypothesis Test Results

SPSS 26.0 and AMOS 26.0 are used to analyze the data, and the reliability and validity of the questionnaire data is analyzed, and the structural equation model (SEM) is established for hypothesis test.

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Mediating Effect of Supply Chain Social Responsibility

In this paper, we use bootstrap method to test the intermediate variables, and the results are shown in Table 5. From the table, we take the upper and lower limits of each path of driving force, SCC and supply chain performance with environmental uncertainty (technological turbulence and market turbulence as the moderating variable. Therefore, environmental uncertainty as a regulatory potential variable is significantly related to driving force potential variable and SCC variable.

Following the procedures suggested by Li et al., (2018), the mediating effects of SCC in the hypothesized model are tested for significance using the bootstrapping approach (5,000 replications). The bootstrapping procedure enhances the statistical power of mediation analysis, especially for a small or moderate sample size (Preacher and Hayes, 2008). After analyzing the specific path of the influence relationship between the internal and external latent variables in the structural equation model, whether there is a significant correlation between the potential variables and the strength of the relationship is obtained.

Table 5
STRUCTURAL MODEL ASSESSMENT

	β	t-value	p	Test result
Direct effects				
H_1 Institutional driving force→Supply chain CSR	0.61	20.19	0.32	Not Supported
H_2 Economic driving force→Supply chain CSR	0.31	18.34**	0.00	Supported
H_3 Reputation driving force→Supply chain CSR	0.17	19.01**	0.00	Supported
H_4 Supply chain CSR →Supply chain performance	0. 51	14.61***	0.00	Supported
Indirect effects				95% CI[a]
H_5 Economic driving →supply chain CSR→SCP	0. 47			[0.23, 0.37]
H_6 Reputation driving →supply chain CSR→SCP	0. 29			[0.11, -0.24]

As shown in Table 5, based on the structural model assessment results, economic driving force positively relates with SCC (β=0.31; t=20.19; p=0.00), reputation driving force positively relates with SCC (β=0.17; t=19.01; p=0.00), SCC positively relates with supply chain performance (β=0.51; t=14.61; p=0.00). Therefore, H_2, H_3 and H_5 are supported. Evidently, EC can facilitate their SCC activities by developing economic and reputation driving force. It is found that institutional driving force and SCC are not directly and significantly related. In addition, other paths from driving force to supply chain performance by SCC are significantly correlated.

Moderating Effects of Environmental Uncertainty

To test H_4, we conduct a series of moderated multiple regression analyses. First, we enter the predictors to reduce multicollinearity when examining the interacting effect (Cohen, 1978). In Model 1 (SPSS Process), we enter independent variables of driving force and dependent variables of SCC into the regression. The results are presented in Table 6. The results of Table 6 show that access to resources moderates the relationship between driving force and supply CSR (β=0.18, t=4.57, p=0.00). This interaction term accounts for 4.23 percent of the explained variance in supply chain CSR (ΔR^2=0.04, F=20.88, p=0.00).

Figure 2 depicts the significant interaction and suggests that the moderating effect is in the predicted positive direction. In line with H_{4a}, the stronger the technical turbulence, the stronger relationship between driving force and supply chain CSR. Table 6 shows the descriptive statistical variables and Pearson correlation coefficients of the variables in this study. Pearson correlation coefficient was used in this paper to reflect the degree of

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correlation among driving force, social responsibility of supply chain and operation variables. The correlation significance test is conducted by Bilateral test (Choi, 2004). By observing the correlation analysis results, the correlation between each potential variable reached the significant level of 0.05. Therefore, it is suitable for hypothesis testing.

In this paper, the pure verification method of regression analysis is adopted to verify the theoretical model (Hou et al., 2004), and the results are shown in table 6. In line with H_{4b}, the stronger the technical turbulence, the stronger relationship between driving force and supply chain social responsibility in Chinese e-commerce industry. In line with H4b, the more volatile the market, the weaker the relationship between driving force and SCC. Thus, H_4 is supported.

Table 6
REGRESSION ANALYSIS

	Independent variable	
	Standardized estimate	t-value
Independent variable	Supply Chain CSR	
Driving Force	0.38	4.58*
Technological turbulence	0.21	2.55**
Market turbulence	-0.02	-0.23
Technological turbulence×Driving Force	0.16	2.18**
Market turbulence ×Driving Force	-0.04	-0.51
R-square	0.25	
Model F	11. 71*	

Notes: n=296. CI[a]=confidence interval (5,000 bootstrap samples). *p<0.05; **p<0.01; ***p<0.001

In addition, when we comprehensively consider the overall role of driving factors and environmental uncertainty as shown in table 7, the stronger the degree of environmental uncertainty, the stronger supply chain performance of the for EC is in the post-pandemic era (see in Figure 3).

Table 7
PATH TEST RESULTS

	Environmental uncertainty			
Variables	Model 1	T value	p	SE
Independent Variables				
Driving Force	0.42***	6.62	0.00	0.06
Environmental uncertainty	0.28***	4.63	0.00	0.06
Interaction				
Driving Force ×Environmental uncertainty	0.18***	4.57	0.00	0.04
Model R^2	0.39			
ΔR^2	0.04			
F-valeu	20.88			

Notes: N=306, Driving force, supply CSR and their interaction were centered prior to the analyses. ΔR^2 is the change in R^2 for the addition of the interaction term to the regression. *p<0.05; **p<0.01; ***p<0.001

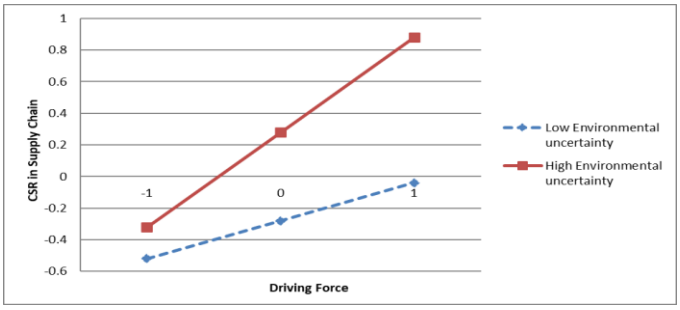

FIGURE 3

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CONCLUSION AND DISCUSSION

This paper establishes China's e-commerce industry as the research object, analyzes the driving force, SCC and supply chain performance with the environmental uncertainty in Chinese e-commerce industry, and empirically tests the relationship between SCC and supply chain performance. The following conclusions are drawn through the analysis.

This paper supports the multi-dimensional concept of SCC proposed by Miao and Wu (2009), which can be measured from suppliers, customers, environment, employees and social morality. The driving forces of economy and reputation proposed in this paper have a significant positive impact on the implementation of SCC. The majority of EC are small and medium-sized companies, under the profit-oriented influence, it is unrealistic to solely rely on company' conscience to fully fulfill the CSR in supply chain. Among the three driving forces, the influence of reputation on CSR implementation in e-commerce supply chain is more significant than the others, which is in line with the current situation in China. Zhou (2016) researches that the driving force of reputation is an important reason for EC to implement CSR, the investment of EC in fulfilling CSR can be understood as a kind of reputation investment, which can increase the trust and satisfaction of consumers, so as to ensure that EC with CSR endeavor can prevent others from being speculative competitors to occupy the market and profit. Combined with the current situation of China's e-commerce industry, e-commerce companies should consider the impact of reputation management, "*Liuliu fake incident*" of JD.com and "*Netease violent layoffs*" has damaged to corporate reputation. Moreover, the pressure from competitors, the demand from suppliers' shareholders, and the consideration of their own profits pressurize EC to collaborate partners in the supply chain, respond actively to competitors, and thus assume more CSR.

We have also identified that there exists a systematic absence in fulfilling the social responsibility of supply chain in China's e-commerce industry. Since China's laws and regulations on e-commerce are not perfect at present, with the continuous development of information technology, some problems of the lack of CSR in EC are exposed through the media. At present, the increasing expectations from public prompt EC to actively respond to supply chain social responsibility. For example, EC can select suppliers which are conforming to environmental standards and business ethics, so as to improve customer satisfaction and internal operation efficiency. It is necessary to improve the existing laws and regulations, introduce the concept of CSR into these laws and regulations, and strengthen the responsibility of EC. Further, it is important to speed up the formulation of relevant laws and regulations in the legal bottleneck of e-commerce, such as e-commerce supply chain contract law, internet privacy protection law, etc.

For the supervision of the e-commerce supply chain, it should be mentioned that the Chinese government can guide EC to perform SCC for company's shareholders, regulators, employees, consumers and suppliers. Only when "*hard constraint*" and "*soft constraint*" cooperate with each other, can we establish a long-term accountability mechanisms to promote improve SCC level for the Chinese e-commerce industry. Chinese associations may establish the CSR evaluation system for e-commerce industry. Some scholars contend that CSR for supply chain may be detrimental to the company development and affect performance (Mian, 2011). But, in the long term, due to the implementation of SCC, the operation r efficiency and quality products, both to reduce the subsequent replacement cost, leading to gain greater returns. Zhao et al. (2009) conclude that CSR can be a potential benefit rather than a cost of a company, also, the empirical results of this paper show that the

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implementation of CSR of supply chain has a positive impact on supply chain performance of Chinese e-commerce industry correspondingly.

In addition to market turbulence and technological turbulence in the post-pandemic era, we have also identified that environmental play a key role between driving force and SCC for Chinese e-commerce industry. In the post-epidemic era, facing market and technological fluctuations, China's e-commerce industry must first strengthen its supply chain strategic determination, and use technology tools to improve the efficiency of information sharing and the level of supply chain coordination. For the social responsibility context of technological turbulence, e-commerce companies can turn risks into opportunities, use digital means to upgrade the operational performance of their supply chain partners, and achieve a win-win situation between operational performance and CSR corporate image. For market changes, EC need to strengthen cooperation to promote the flexibility and efficiency of the supply chain, reduce costs, and improve quality and efficiency.

Limitations and Future Prospects

Since the realistic urgency of CSR problems in supply chain, some scholars show strong interests from different angles, but compared with other mature study field, the e-commerce supply chain theory and empirical research remains to be development of CSR, and even can be regarded as a new field. This paper still has obvious limitations in the research process, including the following points:

First, the limitation of index selection is dig. According to the way of literature review, there exists other driving force indicator that may affect the implementation of CSR in supply chain and the performance of EC. Due to subjective and objective limitations, some other factors that may affect the CSR in supply chain may be omitted.

Second, this paper analyzes the three driving forces of CSR in supply chain for China’s e-commerce industry and their influencing results. In the future, a more perfect theoretical framework model can be established to compare and study EC with different sizes and organizational cultures, and analyze the impact of other antecedent variables, such as the support of senior management and the strategic orientation on the implementation of CSR in supply chain.

To have a comprehensive picture of the issues discussed in this study, future research should focus on the depth and scope of study from various scale of EC. Such studies would help to identify different CSR approaches and emerging issues in China’ e-commerce industry. We should note:

First, CSR is built under the framework of sustainable development and stakeholder theory, so it is not CSR performance that makes the performance of companies better, but rather that the performance of companies itself is an important component of CSR, which is closely related to the CSR, whether from the perspective of management philosophy, management policy or management ability. From the perspective of marketing, no matter from the perspective of brand management, or product attributes, the same conclusion can be attained. Therefore, the research on CSR in supply chain of EC focuses more on the positive and negative effects of some institution in different environments, points out the irrationality of some common views in specific environments, and enables companies to get out of this judgment error. Such research is more valuable.

Second, the SCC applicability of stakeholder theory is not strong, mainly because the resource exchange between companies and stakeholders involves value judgment. With different stakeholders and different value judgments, it is more difficult to study the commonness of problems. In the future, we can consider the study of some features of e-

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commerce CSR. The features are easier to explain, and the values and value judgments involved are easier to identify.

Finally, from the perspective of research methods, questionnaire for company insiders used to be a relatively mainstream method, which is a good tool for the study of management philosophy, managers' values. However, at present, such questionnaire research methods are increasingly criticized. The main reason is the statistics bias, the homology bias, or the interpretation bias; there is no way to overcome that. Therefore, comprehensive methods can be considered, and research can be carried out by combining research and objective data.

Conflict of Interest

The authors declare that they have no conflict of interest. This article does not contain any studies with human participants or animals performed by any of the authors. Informed consent was obtained from all individual participants included in the study.

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