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Moderating the Role of Firm Size in Sustainable Performance Improvement through Sustainable Supply Chain Management

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Received: 8 May 2018; Accepted: 18 May 2018; Published: 21 May 2018



Abstract: In the context of the Chinese government's strategy for sustainable development, the study of sustainable supply chain management (SSCM) for enterprises has important practical significance. Drawing data from 172 Chinese firms, the model studied the moderating role of firm size on the SSCM practices and the sustainable performance of the firms (economic, environmental, and social), using hierarchical regression analysis on SPSS 22.0. The results suggest that SSCM practices and firm size are positively related to the firm's environmental and social performance. Firm size moderates the effect of SSCM practices on economic performance. Additionally, SSCM internal practices have a significant positive impact on the economic performance of large enterprises, but not so much on the economic performance of the Small and medium enterprises (SMEs). This paper proposes a comprehensive SSCM practice performance model that identifies firm size as a moderating role. Through research on the moderating effect of firm size, the implementation and recommendation of SSCM for different firm size are given.

Keywords: sustainable supply chain management; firm size; sustainable performance; hierarchical regression analysis

1. Introduction

Sustainable supply chain management (SSCM) is the embodiment of sustainable concepts in supply chain management, which is driven by the demands of stakeholders to manage the material flow, information flow, and capital flow in supply chain. It also enables managers to strategically and transparently integrate and realize the social, environmental, and economic goals of an organization [1]. SSCM, which integrates environmental and social concerns into the supply chain, has been widely implemented by firms to face challenges in global sustainability. Elkington [2] first put forward the triple bottom line for enterprises to encourage the firms to increase their economic leverage through protecting the environment and improving social performance. Environmental challenges place competing demands on enterprises who extend their green effort across their supply chains [3]. Companies and their extended supply chains are a holistic system, and their management method at the supply chain level is important [4]. Recent studies have shown that some companies and their suppliers develop sustainable strategies in order to reduce energy consumption and improve materials reuse [5].

Most of the literature on firm size shows that large enterprises are more conducive to the company's economic performance and productivity [6]. While, in fact, as a firm expands,

the firm consciously fulfills its corporate and social responsibilities. Such firms have a richer understanding of the corporate environment and social responsibility, and thus use better resources to fulfill their corporate social responsibility. Similarly, without a regulatory framework of green supervision, most SMEs have no incentive to pay heed to sustainability in the supply chain. However, SMEs represent an important sector of many countries, both economically and socially. For instance, in China, SMEs provide more than 80% of employment in cities and towns, and have become the main channel of employment. Indeed, more than 20 million SMEs registered with China's Business Administration Council in 2015, which realized an increase in contribution of profits and taxes. In the industrial sector, more than 365,000 SMEs account for 97.4% of the total number of enterprises; these SMEs contributed taxes of 2.5 trillion RMB, accounting for 49.2% of the total tax revenue; their profits of 4.1 trillion RMB accounted for 64.5% of the total industrial profit. The development of China's SMEs also creates many jobs and supports the community.

As the largest developing country, China's sustainable development strategy and countermeasures are of great significance to the choice of sustainable development path in developing countries. The Chinese government has announced that the CO₂ emission per unit of GDP will decline by 10–20%, compared with 2005 in the Doha Amendment. Moreover, the Paris Agreement also provides external institutional framework for sustainable development in China, which adds external pressures and impetus, and brings new opportunities for the transformation of economic structure and green development in China.

Previous studies on SSCM mainly focused on enterprise economic and environmental performance and very rarely embraced social dimension [7,8]. Further, empirical studies on SSCM on developing economy enterprises and SMEs are scant. Enterprises need a framework to help them to identify and implement their sustainability development schemes [9]. The purpose of this paper is to verify the moderating role of firm size on sustainable supply chain management (SSCM) practices and performance, and, furthermore, to reveal the different impacts of SSCM practices on the performance of different firm size categories in China.

2. Theoretical Background

2.1. SSCM Development

Over the coming decades, uncertainty in the supply chains of manufacturing firms is going to be more important for the companies that are called to compete in a new globalized economy [10], thus the traditional supply chain management (SCM) way of paying heed to cost and competitive relationships has been proven inefficient [11]. With greater emphasis on sustainable development and firms gain sustainable competitive advantage, the long-term choice of these firms is to take an active role in environmental responsibility, and to take active measures to invest in the green movement to maintain competitiveness whilst under pressure from government regulations. International green barriers and consumer awareness of green environmental protection have been gradually enhanced [12]. Implementing the sustainability concept in a firm's supply chain has emerged since the end of the 1980s [13].

SSCM is a critical and timely topic that captures the increasing concerns of government and the public over sustainability, be it through legislation, public interest, or competitive opportunity [14]. Under environmental and economic performance, SSCM focuses on employees and communities to ensure sustainable performance [15]. Mefford [16] detailed the economic value of SSCM, and dispelled the narrow view of the sustainable supply chain. Done correctly, SSCM will also increase sales, reduce costs, reduce financial risk, increase profits, and eventually increase shareholder returns. New technology is introduced into the enterprise so that energy consumption, land use rate, and labor costs can be reduced [10]. Lu [17] focused on the future development of SSCM by studying how environmental and social performance affect the entire supply chain, and proposed some research directions for the next 20 years. There are many specific ways to establish a SSC framework;

simulation-optimization frameworks are either an alternative approach or an effective solution method for the integrated problems [18]. Centobelli et al. [19] organized the SSC framework and proposed six main literature gaps. From these six sustainability gaps, eight research issues have been identified.

2.2. SSCM Practice and Sustainable Performance

Previous studies have shown that internal management of enterprises is an important factor for enterprises to gain competitive advantages [20]. Company salary structure is an important component of company motivation mechanism [21]. Forming an incentive system for employees can help to improve employee environmental initiatives, and help enterprises to establish an environment suitable to their needs [22]. The second aspect of the internal SSCM practices is the implementation of enterprise information technology [23]. A study of 120 manufacturing firms in the United States pointed out that the ability of e-commerce technology utilization in the process of enterprise procurement and cooperation has a significant positive impact on the integration of suppliers and customer production information. Third, employee participation also contributes to the management of the sustainable supply chain [24]. It is necessary to train and publicize employees in all aspects of environmental performance and social sustainable development, improve employee awareness of environmental protection, and enhance their enthusiasm, so as to build a sustainable supply chain [25]. Fourth, quality is still an important factor in ensuring value-addedness in the production and delivery of products in the supply chain [20]. Therefore, enterprises should ensure the future competitiveness of enterprises by enhancing their strategic status and operational efficiency [26]. Fifth, innovation ability has a positive impact on the SSCM of enterprises. The level of innovation of an enterprise directly affects the sustainable of the whole supply chain [27]. Sixth, ecological design is the key dimension in the management of green supply chains, which has a significant impact on the sustainable development of the enterprise [28]. The development strategy of enterprises is also a factor that affects internal SSCM practices, and enterprise strategy is a factor in the implementation of high-level supply chain management [29].

In reality, many enterprises have benefited from the establishment and practice of green supply chain operations, and they have been recognized by social performance [30]. Managers agree that internal control of the enterprise is conducive to ensuring the continued operation of enterprises; for listed companies, internal control and the company's share price are positively correlated [31]. Therefore, we posit the following hypotheses:

Hypothesis 1a(H1a). *Internal SSCM practices are positively related to economic performance.*

Hypothesis 1b(H1b). *Internal SSCM practices are positively related to environmental performance.*

Hypothesis 1c(H1c). *Internal SSCM practices are positively related to social performance.*

As competition shifts from a single enterprise to the whole supply chain, the focus of market competition has not only remained in the internal management practice, but also has begun to focus on the external management practice [20]. Against this backdrop, firms should not only focus on their own quality assurance work, but also strive to extend the management to suppliers and customers so that they manage the whole supply chain network [26].

Following the literature, this paper divides the external practices of SSCM into the following seven points: First, to ensure effective product, information, and capital flows in the supply chain, firms need to establish an appropriate information sharing level and business coordination capability with cross-functional cooperation [32]. Second, compliance with laws and regulations on environmental and social problems is another necessary factor for sustainable supply chain enterprises to improve their environmental and social performance [25]. Third, enterprise external SSCM practice also includes supplier environmental assessment. When the supplier's environmental management ability is high, product regulation and process supervision can reduce pollution, but it has significant negative and

positive impacts on economic performance [33]. Fourth, product recovery can reduce the consumption of toxic and harmful materials, as well as the negative impact of products on the environment. Fifth, green procurement also has a positive impact on the sustainable supply chain of the enterprise. Through empirical research on manufacturing enterprises in Malaysia, Zailani et al. [34] reported that green procurement has a positive impact on the economy, society, and environment, and is conducive to the successful implementation of SSCM. Finally, we consider the impact of product traceability on SSCM. The enhanced traceability of upstream and downstream producers can improve the production behavior of upstream and downstream producers [35]. Firms implement effective SCM to obtain high quality, low-cost competitive advantage, thus making it profitable for enterprises to enhance their sustainable performance [36]. Thus, we posit the following hypotheses:

Hypothesis 2a(H2a). *External SSCM practices are positively related to economic performance.*

Hypothesis 2b(H2b). *External SSCM practices are positively related to environmental performance.*

Hypothesis 2c(H2c). *External SSCM practices are positively related to social performance.*

2.3. Firm Size and Sustainable Performance

Although Chinese SMEs tend to imitate product design in order to overcome the constraints of resources and capabilities and to reduce the cost of product development, large enterprises are more capable than SMEs in obtaining abundant innovative resources [37]. At the same time, the marketing, production, and R&D activities can easily be promoted in the large enterprise to benefit the enterprise [38]. A recent report by the European Commission clearly underscores the difference between SMEs and large firms. The report shows that in Europe, large enterprises are more likely to act to improve resource efficiency, recycle, provide green products and services, and establish a more environmentally friendly management system than the SMEs. Thus, we posit the following hypotheses:

Hypothesis 3a(H3a). *Firm size is positively related to economic performance.*

Hypothesis 3b(H3b). *Firm size is positively related to environmental performance.*

Hypothesis 3c(H3c). *Firm size is positively related to social performance.*

2.4. Moderating the Effect of Firm Size

As an adjustment variable, firm size affects the relationship between the management mode and the development of enterprises [39]. Carr et al. [40] proposed that firm size should be identified as a moderating variable, and then studied its impact on the relationship between supply chain integration and sustainable performance. Few studies are involved in the role of firm size in the relationship between SSCM and sustainable performance. Firm size could affect the implementation of enterprise environmental practices, as larger enterprises have more available resources and receive greater environmental pressure than smaller firms [41].

Managers who work at firms of different sizes should adopt different management methods to manage enterprises. Previously, it was generally agreed that the role of internal management practice was important for the commitment to sustainability among SMEs, and SMEs had a less formalized organizational structure than large enterprises [42]. In addition to these issues, the small size of the enterprise means that ownership, control, and operation is often in the hands of an individual or a small group of individuals [43]. Therefore, we posit the following hypothesis:

Hypothesis 4a(H4a). *Firm size positively moderates the relationship between internal SSCM practices and economic performance.*

Hypothesis 4b(H4b). Firm size positively moderates the relationship between internal SSCM practices and environmental performance.

Hypothesis 4c(H4c). Firm size positively moderates the relationship between internal SSCM practices and social performance.

Large enterprises and SMEs have different approaches to supply chain management, and large enterprises pay more attention to the development of the entire supply chain [44]. Large enterprises have sufficient technical capacities and budgets to implement e-commerce and E-supply strategies, while SMEs are still constrained by resources [45]. Large enterprises have advanced information technology, such as customer relationship management applications, and decision support systems that could be applied to facilitate the information flow within the supply chain, which help enterprises to manage supply chains more conveniently [46]. Therefore, we posit the following hypothesis:

Hypothesis 5a(H5a). Firm size positively moderates the relationship between external SSCM practice and economic performance.

Hypothesis 5b(H5b). Firm size positively moderates the relationship between external SSCM practice and environmental performance.

Hypothesis 5c(H5c). Firm size positively moderates the relationship between external SSCM practice and social performance.

Research on the links between firm size, SSCM, and sustainable performance is still in its infancy, particularly research on SSCM in developing countries [9]. Existing studies mostly focused on organizational environment, social environment, and supply chain members' management. From the literature, there is no empirical study on the moderating effect on firm size between SSCM and performance. Hence, this paper proposes a conceptual model (Figure 1), to examine the role of firm size in sustainable performance improvement through SSCM.

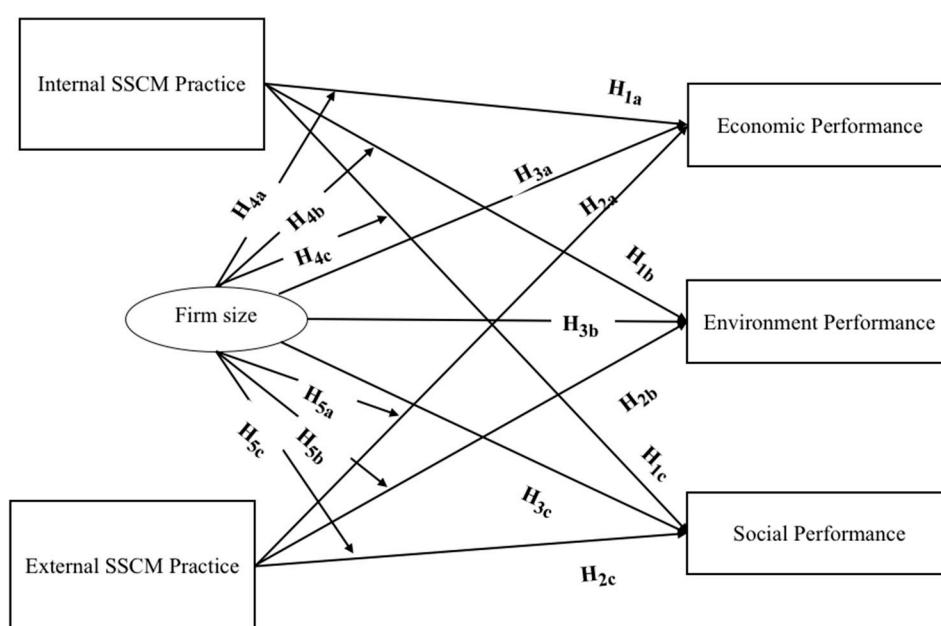


Figure 1. Research model. SSCM—sustainable supply chain management.

3. Method

3.1. Survey Questionnaire and Measures

The questionnaire used in this research has been built in accordance with the existing literature on SSCM research. It was accordingly modified to accommodate the present conditions of SMEs in China. Thus far, some studies on SSCM and performance exist. Through the study of the moderating role of firm size, the classification and recommendations of SSCM for different firm sizes are given. The internal and external SSCM practices are two second-order variables. Internal practices measurement has been measured by a seven-item scale, following Pagell et al. [21], Zhu et al. [27], and Sila et al. [20]. External practices measurement has been measured by a six-item scale measure. Specific indicators were described in Section 2.2. The instrument was pre-tested by experts involved in the implementation of SSCM in China.

We designed the sustainable performance scale of this study based on existing studies, in combination with expert advice and results of interviews with representative residents. According to the development status of SMEs in China, the indicators for measuring the sustainable performance of enterprises have been finally determined. Sustainable performance has three parts: economic, environmental, and social performance, and we measure them separately.

3.2. Data

To ensure the enterprises we have surveyed attach importance to sustainable performance, the enterprises we were looking for were restricted to ISO14001 and ISO9001 certified firms in China. This is because Chiappetta Jabbour et al. [47] research shows that ISO14001 and ISO9001 certified firms support sustainable performance.

We employed a survey to collect data and test the validity of the model and research hypotheses. The initial data covered enterprises of different sizes in multiple industries (medical, food, and manufacturing). These firms have adopted sustainable supply chain management to face environmental challenges and regulatory pressure. Our original sample was 670 firms located in North China and Eastern China, gathered randomly through interviews or e-mail. In total, 178 firms provided effective information for this research. We categorized firm size using the size division standard of Chinese enterprises, as shown in Table 1.

Table 1. Break down of firms by firm size.

Firm Size	Small	Mid	Large
Number (%)	45 (25)	64 (36)	69 (39)

3.3. Exploratory Factor Analysis

Data were analyzed and the hypotheses of the conceptual model were tested using SPSS 22.0 [48]. In Table 2, the exploratory factor analysis on SSCM yielded two factors (internal SSCM practices and external SSCM practices) with eigenvalues greater than one, which accounted for 77% of the variance. All items met the criteria of factor loading scores greater than 0.5. Therefore, SSCM is divided into internal SSCM practices and external SSCM practices [48]. The reliability coefficient Cronbach's alpha values for the SSCM factors are high (0.91 for internal SSCM practices and 0.86 for external SSCM practices), indicating that the variables used in this paper have good internal consistency, and the reliability of the scale is tested.

Table 2. Exploratory factor analysis of sustainable supply chain management(SSCM) practice.

SSCM	F1	F2
Salary and compensation system	0.812	0.314
Information technology management	0.762	0.530
Employee participation	0.747	0.531
Total quality management	0.742	0.113
Innovation ability	0.715	0.278
Ecological design	0.701	0.491
Sustainable development strategy	0.663	0.591
Share information with suppliers and distributors	0.246	0.894
External supervision mechanism	0.281	0.891
Supplier environmentally assessment	0.308	0.876
Product recovery	0.361	0.830
Green purchase	0.569	0.648
Product traceability	0.585	0.616
Eigenvalue	7.161	5.930
Cumulative variance	42.122	77.002

We further consider the impact of SSCM of Chinese enterprises in different stages of enterprise development on sustainable performance. The AVE is larger than the variable correlation, so internal consistency conforms to the requirements, and the variable correlation matrix is shown in Table 3. If the AVE is greater than or equal to 0.5, then the measure of the variable conforms to the validity test. The AVE values of all of the variables are greater than 0.7. There is no problem of multiple collinearities.

Table 3. Means, standard deviations, and correlation.

Variables	Mean	S.D.	1	2	3	4	5
1.Internal SSCM practices	18.90	5.08	0.728				
2.External SSCM practices	18.66	7.38	0.102	0.751			
3.Economic performance	16.08	3.40	0.347	−0.311	0.409		
4.Environmental performance	16.00	3.46	0.215	0.259	0.308	0.419	
5.Social performance	16.40	3.38	0.221	0.310	0.318	0.212	0.413

4. Analysis and Results

The hypotheses proposed in this paper were examined through six steps, using hierarchical regression analysis [48]. First, the control variable of firm age and the control variable of industry type are involved in the regression. Second, the two independent SSCM practice factors are involved in the regression. Third, firm size as a moderating variable was included. The fourth to sixth layers of the model added the interaction between SSCM practices and firm size, respectively, to the test.

Table 4 shows the results of the regression analysis on economic performance. Model 1 in Table 4 shows that the control variables do not have a significant impact on the enterprise environmental performance. Next, adding internal SSCM practices and external SSCM practices in Model 2 leads to a significant change in R^2 ($\Delta R^2 = 0.18$, $p < 0.001$), and a negative beta value for economic performance ($\beta = -0.11$, $p < 0.05$), which indicates that in order to improve the internal SSCM practices, the firm may need to reduce the economic benefit. Hypothesis 1a was thus not supported. The external SSCM practice shows a significant positive relationship with economic performance ($\beta = 0.19$, $p < 0.01$), thus supporting Hypothesis 2a. Although the internal SSCM practices will lower economic performance, good external SSCM practices will offset this effect. Model 3 showed that the addition of firm size does not improve the predictive ability of the regression model on economic performance ($\Delta R^2 = 0.24$, $p < 0.001$). The coefficient of firm size was statistically positive and significant ($\beta = 0.22$, $p < 0.001$). Hypothesis 3a was thus supported.

Table 4. Results of regression analysis for economic performance ^a.

Variable	Economic Performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm age	0.08	0.08	0.09	0.07	0.04	−0.09
Industry type	−0.07	−0.06	−0.05	−0.06	−0.04	−0.05
Internal SSCM practices		−0.11 *	−0.10	−0.08	−0.10	−0.04
External SSCM practices		0.19 **	0.14 *	0.15 *	0.17 **	0.17 **
Firm size			0.22 ***	0.19 **	0.17 **	0.18 **
Internal SSCM practices * Small enterprises				−0.09		
External SSCM practices * Small enterprises				0.14 *		
Internal SSCM practices * Mid-sized enterprises					−0.06	
External SSCM practices * Mid-sized enterprises					0.15 **	
Internal SSCM practices * Large enterprises						−0.13 *
External SSCM practices * Large enterprises						0.16 **
R ²	0.01	0.19	0.25	0.33	0.29	0.37
ΔR ²	0.01	0.18	0.24	0.32	0.28	0.36
F	1.06	11.60 ***	12.84 ***	13.78 ***	14.14 ***	12.60 ***
ΔF	1.06	10.54	11.78	12.72	13.08	11.54

Notes:^an = 172 (two-tailed test). Standardized coefficients are reported. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

We added the interaction term of SSCM practices and small enterprises in Model 4, and found that the regression significantly increased the predictive power ($\Delta R^2 = 0.32$, $p < 0.001$). Such results indicate that moderation effects do exist. The coefficient of the interaction between the internal SSCM practices and small firms has no significant effect ($\beta = -0.09$). However, the coefficient of the interaction between the external SSCM practices and small firms was statistically positive and significant ($\beta = 0.14$, $p < 0.05$). In Model 5, we study the impact of SSCM practices on the economic performance of the mid-sized enterprises. It has a significant change in R^2 ($\Delta R^2 = 0.28$, $p < 0.001$). The internal SSCM practices have no significant impact on the economic performance of mid-sized enterprises ($\beta = -0.06$), but external SSCM practices have a significant positive impact on the economic performance of mid-sized enterprises ($\beta = 0.15$, $p < 0.01$). Additionally, the negative beta for an interaction variable appeared in Model 6 ($\beta = -0.13$, $p < 0.05$), indicating an opposite moderation effect. Further examination indicates that the coefficients of the interaction between the external SSCM practices and large enterprises are positive and significant ($\beta = 0.16$, $p < 0.01$). Thus, from Models 4, 5, and 6 in Table 4, Hypothesis 4a was supported, but Hypothesis 5a was not supported. The results of Table 4 show that the external SSCM practices are associated with economic performance improvement. The larger the firm size, the greater the influence of external practices on economic performance. While internal SSCM practices and economic performance are negatively correlated, large firm size can weaken this correlation.

Model 1 in Table 5 shows that the control variables do not have a significant impact on the enterprise environmental performance. Adding internal SSCM practices and external SSCM practices in Model 2 leads to significant changes in R^2 ($\Delta R^2 = 0.81$, $p < 0.001$), which indicates that SSCM practices have a significant positive impact on environmental performance (for internal SSCM practices, $\beta = 0.41$, $p < 0.01$; for external SSCM practices, $\beta = 0.89$, $p < 0.001$). Hypotheses 1b and 2b were supported. External SSCM practices have a higher impact on a firm's environmental performance. We inserted firm size into Model 3, and found that firm size has a significant positive relationship with environmental performance ($\Delta R^2 = 0.81$, $p < 0.001$; $\beta = 0.11$, $p < 0.01$), thus supporting Hypothesis 3b.

Table 5. Results of regression analysis on environmental performance.

Variable	Environmental Performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm age	−0.12	−0.01	−0.01	−0.02	−0.02	−0.02
Industry type	0.07	−0.01	−0.01	−0.02	−0.01	−0.02
Internal SSCM Practices		0.41 **	0.32 **	0.20 **	0.43 **	0.61 ***
External SSCM Practices		0.89 ***	0.91 ***	1.07 ***	0.85 ***	0.87 ***
Firm size			0.11 **	0.10 **	0.12 **	0.13 **
Internal SSCM Practices *Small enterprises				0.24 **		
External SSCM Practices *Small enterprises				0.29 **		
Internal SSCM Practices *Mid-sized enterprises					0.39 **	
External SSCM Practices *Mid-sized enterprises					0.49 **	
Internal SSCM Practices *Large enterprises						0.76 ***
External SSCM Practices *Large enterprises						0.63 ***
R ²	0.05	0.86	0.86	0.88	0.88	0.89
ΔR ²	0.05	0.81	0.81	0.83	0.83	0.84
F	2.30	10.78 ***	10.81 ***	14.96 ***	16.03 ***	17.37 ***
ΔF	2.30	8.48	8.51	12.66	13.73	15.07

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Next, we added the interaction term of SSCM practices and small enterprises in Model 4, and found that the regression increased the predictive power significantly ($\Delta R^2 = 0.82$, $p < 0.001$). This suggests that moderation effects do exist. The result showed that the coefficient of the interaction between SSCM practices and small enterprises was positive and significant (for internal SSCM practices, $\beta = 0.24$, $p < 0.01$; for external SSCM practices, $\beta = 0.29$, $p < 0.01$). We discuss the impact of SSCM practices on the environmental performance of mid-sized enterprises in Model 5. The result showed that Model 5 has a significant change in R^2 ($\Delta R^2 = 0.83$, $p < 0.001$). Both internal SSCM practices and external SSCM practices have a significant positive impact on the environmental performance of mid-sized enterprises (for internal SSCM practices, $\beta = 0.39$, $p < 0.01$; for external SSCM practices, $\beta = 0.49$, $p < 0.01$). Further examination indicates that the coefficients of the interaction between SSCM practices and large enterprises are positive and significant in Model 6 (for internal SSCM practices and large enterprises, $\beta = 0.76$, $p < 0.001$; for external SSCM practices and large enterprises, $\beta = 0.63$, $p < 0.001$). Thus, according to Models 4–6 of Table 5, Hypotheses 4b and 5b were supported. Table 5 shows that SSCM practices are associated with environmental performance improvement. The larger the firm size, the more significant the positive impact of internal management on environmental performance.

Model 1 in Table 6 shows that the control variables do not have a significant impact on enterprise environmental performance. Model 2 has a significant change in R^2 ($\Delta R^2 = 0.76$, $p < 0.001$), the results showed that SSCM practices have a significant and positive impact on social performance (for internal SSCM practices, $\beta = 0.48$, $p < 0.001$; for external SSCM practices, $\beta = 0.47$, $p < 0.001$). Hypotheses 1c and 2c were supported. Firm size in Model 3 has a significant impact on the R^2 of the regression model ($\Delta R^2 = 0.77$, $p < 0.001$), and firm size has a significant positive relationship with social performance ($\beta = 0.11$, $p < 0.01$). Hypotheses 3c was thus supported.

Table 6. Results of regression analysis for social performance.

Variable	Social Performance					
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Firm age	0.11	0.06	0.01	0.04	0.05	0.04
Industry type	−0.04	−0.01	−0.03	−0.02	−0.03	−0.02
Internal SSCM Practices		0.48 ***	0.43 ***	0.65 ***	0.28 ***	0.35 ***
External SSCM Practices		0.47 ***	0.48 ***	0.25 ***	0.56 ***	0.61 ***
Firm size			0.11 **	0.10 **	0.14 ***	0.19 ***
Internal SSCM Practices *Small enterprises				0.41 **		
External SSCM Practices *Small enterprises				0.31 **		
Internal SSCM Practices *Mid-sized enterprises					0.43 **	
External SSCM Practices *Mid-sized enterprises					0.41 **	
Internal SSCM Practices *Large enterprises						0.66 ***
External SSCM Practices *Large enterprises						0.91 ***
R ²	0.07	0.83	0.84	0.87	0.85	0.86
ΔR ²	0.07	0.76	0.77	0.80	0.78	0.79
F	4.54	10.90 ***	11.34 ***	15.29 ***	15.81 ***	18.22 ***
ΔF	4.54	6.36	6.80	10.84	11.27	13.68

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.

Model 4 in Table 5 shows a significant change in R^2 ($\Delta R^2 = 0.80$, $p < 0.001$). Such results indicate that moderation effects do exist. The coefficient of the interaction between SSCM practices and small enterprises has a significant impact on social performance (for internal SSCM practices, $\beta = 0.41$, $p < 0.01$; for external SSCM practices, $\beta = 0.31$, $p < 0.01$). Next, on the impact of SSCM practices on social performance in mid-sized enterprises in Model 5, there is a significant change in R^2 ($\Delta R^2 = 0.78$, $p < 0.001$). SSCM practices have a significant positive impact on the social performance of mid-sized enterprises (for internal SSCM practices, $\beta = 0.43$, $p < 0.01$; for external SSCM practices, $\beta = 0.41$, $p < 0.01$).

Further examination indicates that the coefficients of the interaction between SSCM practices and large enterprise are positive and significant in Model 6 ($\Delta R^2 = 0.79$, $p < 0.001$; for internal SSCM practices and large enterprises, $\beta = 0.66$, $p < 0.001$; for external SSCM practices and large enterprises, $\beta = 0.91$, $p < 0.001$). The effect of external SSCM practices on social performance in large enterprises is more significant than that of internal SSCM practices. From Models 4, 5, and 6 in Table 6, Hypotheses 4c and 5c were supported. The SSCM practices are associated with social performance improvement. The larger the firm size, the more significant the positive impact of internal management on social performance.

5. Discussion and Prospects

5.1. SSCM Practices and Sustainable Performance

SSCM practices have a positive impact on a firm's environmental and social performance. Using advanced environmental technology can reduce pollutant emissions, which can not only improve the working environment of the employees, but also help to improve the quality of life of the surrounding groups in the area in which their factories are located. Hence, firms carry out internal SSCM practices to improve the environmental performance. Firms implementing internal SSCM practices can improve the working conditions of employees and enhance their product image and corporate reputation, which promotes the social performance of the firm. This is consistent with the findings of Teixeira et al. [49]. Internal SSCM practices have no significant direct impact on a firm's economic performance. Green innovation ability, employee education, and total quality management require huge initial investment, so internal practices do not have a direct positive effect on enterprise economic performance, consistent with other developing countries [47].

External SSCM practices have a positive influence on sustainable performance [50]. Collaborating with suppliers or retailers and information sharing can reduce the transaction process and reduce supplier risk, which is good for environmentally friendly development and improvement of suppliers.

Training suppliers and distributors in environmental and social management, while integrating the company's suppliers, requires substantial investment. Further, enterprises' supervision and evaluation of suppliers can help suppliers improve performance [51]. Environmental and social performance is very important to enterprises in contemporary society and is an important intangible asset for the enterprise.

5.2. Moderating Effect of Firm Size

Firm size has a significant impact on economic performance, environmental performance, and social performance. Most of the over 40 million SMEs in China are struggling to simultaneously implement all dimensions of the performance measures. Some SMEs ignore their own technical and managerial capabilities in their pursuit of economic performance, and ignore rules and regulations, still relying mainly on the high consumption of resources in an attempt to achieve the development of firms [52]. Confronted with sustainable development, large enterprises have strong research and development, financing, marketing capabilities, and social compact, and use these attributes to pursue sustainable performance.

Firm size has a significant moderating effect on the relationship between SSCM and sustainable performance. Prioritizing external practices in SMEs may be conducive to long-term and effective growth in developing sustainability. As the available resources of small firms are limited, managers adopting a strategy that focuses on external practices is critical, and deploying it to develop sustainable initiatives is crucial. SMEs implementing external SSCM practices can achieve sustainable development at the minimum cost. The sustainability of internal practices can help firms to quickly transform and upgrade, and adjust their corporate strategies to grow their firms progressively. By implementing a series of right low-carbon strategies, it is possible to have low-carbon advantages so that SMEs can make up for the competitive disadvantage [53]. Undoubtedly, a sustainable strategy is one of the strategies to put large enterprises in an invincible position in the long-term.

5.3. Managerial Implications

This study has managerial implications for firms which want to pursue sustainable development in Chinese and other developing countries. First, large enterprises should make full use of enterprise resources to develop SSCM to strengthen the protection of employee rights and interests, and implement total quality management can improve the efficiency of enterprise management. In addition, strengthening the relationship between the supply chain actors can improve supply chain performance and lift the firm's sustainable performance. In particular, SMEs should focus on the development of external SSCM practices. Internal SSCM practices require firms to pay the cost of economic performance, and SMEs in a development phase of economic performance is more important, but the implementation of external SSCM practices for SMEs can help them to develop sustainable performance at the minimum cost.

Second, the managers in SMEs should recognize that improving their sustainable performance is a process which takes time to accumulate intangible assets, and firms should not be eager to seek success. Based on the implementation of SSCM, sustainable performance will increase with the expansion of firm size. For the long-term development of firms and the entire supply chain, SMEs should strengthen the coordination and integration of the supply chain so that facilitate the common development of enterprises, society and nature.

Finally, the government should view SSCM as an effective method to improve firm's environmental and social performance. Hence, the government should actively promote the implementation of SSCM in firms, guide SMEs to establish an effective SSCM system and promote the establishment of the collaboration mechanism between all supply chain members.

5.4. Research Limitations

This study has some limitations. First, this model is only for certain specific industries in Chinese, but not for all industries. SSCM practices in different industries may have a different impact on sustainable performance. Additionally, in the data collection, we mainly interviewed the managers of the core enterprises in the supply chain. Future research using a multiple respondent (across the entire supply chain, including consumers) approach to offset the single information concerns is suggested. Future studies can consider the moderating role, such as resource integration, organizational efficiency, and technological innovation, more comprehensively. Additionally, such future research may empirically justify the SSCM framework of enterprises in different industries to address quantitative problems in the supply chain environment.

Author Contributions: Conceptualization, J.W. and M.G.; Methodology, J.W. and Y.Z.; Software, Y.Z.; Writing–Original Draft Preparation, J.W. and Y.Z.; Writing–Review & Editing, J.W. and M.G.

Funding: This research was supported by the National Social Science Fund (16CGL033) and Support Project of High-level Teachers in Beijing Municipal Universities in the Period of 13th Five-year Plan (CIT&TCD201704033).

Conflicts of Interest: The authors declare no conflict of interest.

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