

# The Impact of Government and Major Customers on Firm's Sustainable Supply Chain Management - Considering Regional Difference

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## ABSTRACT

In the context of the Chinese government's strategy for sustainable development, this paper studies the impact of government and major customers on firm's sustainable supply chain management (SSCM). Drawing the data of 234 public manufacturing enterprises from CSMAR database, the results suggest that the impact of government and major customers on SSCM perform differently among China's three economic regions. Specifically, in Eastern region, the government has significant impact on SSCM, the impact of firm's administrative connection is negative, while the impact of government policies and regulations is positive. Major customers have significant impact on SSCM in Western region. Specifically, the short-term effect of major customers is negatively related to SSCM. While the long-term effect of major customers is in the opposite order, indicating that long-term and stable supply chain relationships with high customer concentration can promote enterprises' SSCM level and short-term cooperation behavior with high customer concentration will hinder the implementation of SSCM.

**Keywords:** Sustainable supply chain management (SSCM), Customer concentration, Government policies and regulations, Firm's administrative connection, Regional difference

## 1. INTRODUCTION

In recent years, while pursuing the maximization of its own economic benefits, the Chinese manufacturing enterprises have not only brought environment problems, such as ecological environment, but also caused frequent social issues. Thus the idea of introducing environmental and social issues into enterprises' economic activities, which is called sustainable supply chain management (SSCM), has aroused hot discussion among scholars.

Many scholars have tried to explore internal factors that affect the implementation of SSCM by using survey, while external stakeholders are relatively ignored. In other words, the impact of external stakeholders on SSCM deserves more attention [1][2][3][4].

To address this issue, based on stakeholder theory, we focus on two types of key external stakeholders-government agencies and major customers. On the one

hand, government agencies own compulsory rights to affect manufacturing enterprises' strategy [3][5]. On the other hand, major customers can take advantage of customer dependency to affect manufacturing enterprises' strategy [6]. Extant literatures have mainly studied the effect of customer groups [7][8][9][10], little attention has been paid to major customers. But not all stakeholders should be equally involved in all decisions [11]. It is difficult for one-time trading customers and small continuous trading customers to have substantial effect on enterprises. Only major customers whose sales account for a high proportion of the total sales of the enterprise can have a significant impact on the enterprise [6]. So instead of studying customer groups, this paper focuses on major customers.

To capture the impact of government stakeholders, on the one hand, we examine a firm's administration connection, as indicated by a firm's affiliation with the government at different levels [7]. On the other hand, we

examine government policies and regulations by counting the number of government policies and regulations' keywords, to capture the impact of major customers, we examine customer concentration, which refers to the proportion of the sales revenue of the top five customers to the total current sales of the company [12].

Though there are many studies concerning about factors that affect enterprises' SSCM, little attention has been paid whether the factors' effect would be different among different regions. However, as we all know, China is a country that has vast territory, and development imbalance exists in terms of economic development level and resources conditions among different regions, so it is necessary to study whether government and major customers will perform differently among China's three economic regions.

Above all, we will investigate the impact of government and major customers on enterprises' SSCM, and further analyze whether government and major customers' effect will perform differently among China's three economic regions.

As we will argue below, the government has significant influence on enterprises' SSCM in China's Eastern region. Specifically, firm's administrative connection exerts significantly negative influence on SSCM, while government policies and regulations have positive impact on SSCM. Major customers have significant influence on enterprises' SSCM in China's Western region. Specifically, the short-term effect of major customers is negatively related to SSCM. While the long-term effect of major customers positively and significantly affects SSCM, indicating that long-term and stable supply chain relationships with high customer concentration can promote the implementation of enterprises' SSCM and short-term cooperation behavior with high customer concentration will hinder the implementation of SSCM.

This paper mainly has two contributions. Firstly, when comes to factors that affect SSCM, scholars have ignored the impact of major customers on SSCM. To make up this research gap, this paper investigates the relationship between major customers and SSCM in China's context. What's more, few scholars have examined whether SSCM's affecting factors performs differently among different regions. In this paper, besides investigating the impact of government and major customers on enterprises' SSCM, we further analyze whether government and major customers' effect will perform differently among China's three economic regions.

## 2. LITERATURE REVIEW AND HYPOTHESIS

### 2.1. Literature Review

#### 2.1.1. Research on Sustainable Supply Chain Management (SSCM)

Sustainable supply chain management (SSCM) refers to the management that integrates environmental and social dimensions into enterprises supply chain activities to meet the needs of customers and stakeholders, finally improve the long-term economic performance of individual enterprises and the whole supply chain[13][14][15].

Together environmental supply chain management and socially responsible supply chain management are considered components of SSCM [16]. Concretely speaking, environmental supply chain management refers to the arrangement of resource utilization, pollution and ecological environment[17], and socially responsible supply chain management consists of employees' rights and interests protection, production safety, consumers' rights and interests protection, suppliers' rights and interests protection and social welfare et al [16][17].

#### 2.1.2. Research on Government

The government often plays an important role in enterprises management behaviour and decision-making because of its unique politics [18], and can influence enterprise's SSCM by two ways. One way is government policies and regulations, and the other is firm's administrative connection [6].

On the one hand, to capture the impact of government stakeholders, Li et al (2018) develops the concept of "firm's administrative connection", which is indicated by a firm's affiliation with the government at different levels (e.g., the central, provincial, or municipal governments) [6]. The relationship between firms and government stakeholders through political ties is reciprocal and mutually dependent[19]. The influence of firm's administrative connection is twofold. Firstly, firm's administrative connection allows enterprises to acquire special resources and unique information to improve enterprises' SSCM. Secondly, government linkages means obligations for enterprises to meet government expectations [20], which of course contain the sustainability goals. In this paper, we use the concept that Li et al (2018) developed to examine government stakeholders' impact[6].

On the other hand, government policies and regulations are usually a hot topic when measuring the impact of government stakeholders [8]. While most

scholars have used survey to measure government policies and regulations in SCM research, content analysis rarely has been used [21]. As content analysis techniques provide a means for supply chain scholars to efficiently analyse rich data across multiple firms and industries [21], in this paper, we will use content analysis to quantify government policies and regulations.

### 2.1.3. *Research on Major Customers*

To capture the impact of major customers, the concept of customer concentration has been developed. Customer concentration refers to the degree of customer concentration or decentralization, which effectively describes an enterprise's customer characteristics. The higher customer concentration is, the more stable the supplier-customer relationship is, and the more dependent the enterprise is on major customers[22]. So major customers have more power to interfere the enterprise's SSCM.

The accounting standards implemented on January 1, 2007 required enterprises to "disclose the total sales revenue of the top five customers and their proportion in the total sales revenue", which reflects the customer concentration of listed companies. So in this paper, we measure the impact of major customers by the proportion of the sales revenue of the top five customers to the total sales revenue [12].

## 2.2. *Hypothesis*

### 2.2.1. *Firm's Administrative Connection and SSCM*

There is no unified conclusion about the impact of firm's administrative connection on SSCM. Some scholars hold the view that firm's administrative connection is positively related to SSCM. Because the government is more likely to allocate political tasks to those enterprises who have stronger government linkages [6]. So the enterprises who have stronger government linkages may be faced with greater SSCM pressure. By sorting out enterprises' sustainability situation, it has been noted that compared with non-state enterprises, state-owned enterprises play better in fulfilling social responsibility. It has been suggested that state-owned enterprises are better to perform social responsibility to employees than private enterprises. What's more, the enterprises' linkages with government can be regarded as a kind of special and unique resource, which can bring about financial resource and political support for enterprises [23][24]. This kind of financial resource and political support can provide unparalleled competitive advantages, thus help manufacturing enterprises to improve SSCM.

From the above research, we can find that enterprises who have weak linkages with government perform

sustainability mainly out of their profit maximization goals, while enterprises who have strong linkages with government need keep balance between self-profit and government tasks. In this paper, we discuss influencing factors of SSCM from supply chain perspective, which means enterprises' profits are given priority compared with political tasks. In other words, enterprises who have weak linkages with government will have better SSCM performance. So we posit the following hypothesis:

H1: firm's administrative connection is negatively related to SSCM.

### 2.2.2. *Government Policies and Regulations and SSCM*

The more perfect government policies and regulations in the region where the enterprise is located, the clearer enterprises' responsibility is.

Correspondingly, enterprises need pay more for violating government policies and regulations. To obtain legitimacy, enterprises are more motivated to implement SSCM. Government policies and regulations have made green production efficiency increase steadily. The relationship between government subsidy policies and companies' green behaviours has been discussed and government subsidy policies could promote companies' green purchasing in primary stage[25].

If there is no sophisticated government policies and regulations, no compulsory power force enterprises to implement SSCM, so overall SSCM performance will be worse. Thus we posit the following hypothesis:

H2: government policies and regulations is positively related to SSCM.

### 2.2.3. *Government Policies and Regulations and SSCM*

Major customers' impact is reflected by customer concentration. The higher customer concentration is, the stronger major customers' impact is[26]. But there is no consensus whether this kind of impact is positive or negative [27].

On the one hand, the higher customer concentration is, the more likely major customers will supervise and help manufacturing enterprises to implement SSCM. The first reason is that major customers are more likely to collaborate with manufacturing enterprises [27], even make specialized investment to implement SSCM. Klassen and Vachon (2006) have found that collaboration with customers will increase manufacturing enterprises' investment in environment protection [29]. China now put greatly emphasis on sustainability in various dimensions (such as environment sustainability and social sustainability). In this context, manufacturing enterprises who don't implement SSCM may be fined or

closed, leading to supply breakdown and finally resulting in major customers' loss. To lower this kind of risk, major customers will interfere manufacturing enterprises' SSCM. The higher customer concentration is, the stronger major customers' supervision is.

The second reason is that manufacturing enterprises usually frequently share information with their major customers. In the process of information sharing and communication, manufacturing enterprises can maintain valuable information and increase their learning effect [28] or, thus enhance the implementation of SSCM. Thus we posit the following hypothesis:

H3: customer concentration is positively related to SSCM.

On the other hand, major customers may hinder manufacturing enterprises' SSCM. Firstly, it cost a lot to supervise manufacturing enterprises to implement SSCM. So major customers may be unwilling to be supervisors of manufacturing enterprises' SSCM. Lack of major customers' supervision makes manufacturing enterprises relax requirement for SSCM.

Secondly, implementing SSCM may need change the manufacturing enterprise's existing facilities and technologies, which may lead to product quality reduction and delivery delay. Klassen and Vachon (2007) found the reason why some manufactories couldn't reduce energy consumption lied in that their customers refused manufactories to change their facilities[29].

Thus we posit the following hypothesis:

H4: customer concentration is negatively related to SSCM.

#### 2.2.4. Firm's Administrative Connection and SSCM

Above all, we have proposed hypothesis about the impact of government and major customers on enterprises' SSCM from national perspective. But at the same time, it should be noted that China is a country who owns vast territory, so imbalance of economic development and resources among regions objectively exists. What's more, the governments of each province have the power to formulate local policies and regulations. These differences may result in stakeholders perform differently among regions.

Aljarah et al (2018) showed that customer relationship was one of the influencing factors of the disclosure quality of corporate social responsibility, but this relationship only existed in regions with low marketization process, this relationship wasn't significant in regions with high marketization process. The study suggests that customer relationships can be different in regions whose marketization process is different[31].

From above all, we can learn that no matter what government or major customers, their functions can be totally different among China's different regions. In the case of many different factors, the impact of government and major customers in different regions on SSCM may differ as well. Thus we posit the following hypothesis:

H5: the impact of government and major customers on SSCM differ among different regions.

To better understand our hypothesis, we have drawn the conceptual model, as shown in Figure 1.

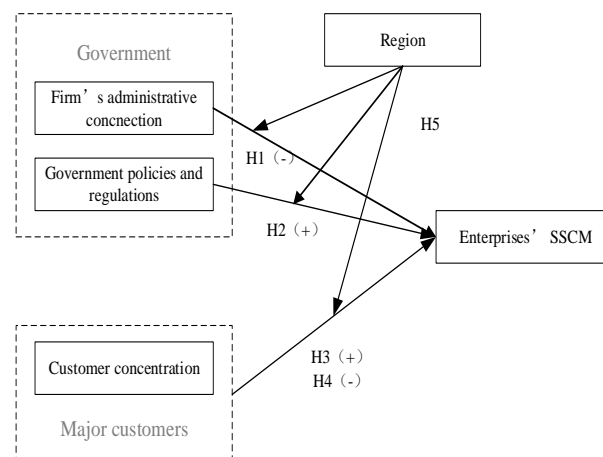


Figure 1 Conceptual model

### 3. METHODOLOGY

#### 3.1. Data and Sample

To test our hypothesis, we choose the China's manufacturing enterprises from 2012 to 2016 using the data from CSMAR database. What's more, we visited the government website of each province to collect government policies and regulations data as we need. Our sample consists of 234 firms with 1170 firm-year observations in 19 industries and 3 regions.

#### 3.2. Dependent Variables

The source of our dependent variable, sustainable supply chain management (SSCM) is from CSMAR database. The CSMAR database provides detailed scores on SSCM from 9 aspects. Once the enterprises have shown evidence on one aspect, then CSMAR addresses SSCM activity by assigning a value of 1 to the enterprises on this aspect. So SSCM can be 9 at most and 0 at least. The 9 aspects contain: (1) environmental protection and environmental sustainability; (2) social donation; (3) suppliers' rights and interests protection; (4) customers and consumers' rights and interests protection; (5) safety production specification; (6) employees' health and safety protection; (7) focus on public relationships and social welfare; (8) social responsibility system construction and improvement; (9) shareholders and loaners' rights and interests protection.

### 3.3. Explanatory Variables

We measure firm's administrative connection as a categorical variable between 5 and 1 to capture the government hierarchy: "5" was assigned to firms affiliated with the central government; "4," to firms with a provincial government; "3," to firms with municipal government; "2," to private enterprises; and "1," to foreign enterprises [6].

Data of government policies and regulations is from government website of each province. After collecting related polices and regulations' text by using Octopus collector, which is an effective web collection software, we again use ROSTCM software to extract keywords about SSCM, to measure the province's regulation intensity. In this paper, we totally defined 43 keywords for ROSTCM to extract.

The source of customer concentration is from CSMAR database, which refers to the proportion of the sales revenue of the top five customers to the total sales revenue.

### 3.4. Control Variables

In this paper, we mainly observe the influence of government and major customers on SSCM. To prevent the interference of the internal factors and major suppliers, we include the number of employees, main business revenue [16], supplier concentration[22], the proportion of independent directors, separation rate of two rights and the shareholding ratio of top 10 shareholders[32].

Besides, considering that we will discuss whether government and major customers' impact have spatial difference, we classify China into 3 regions according to the economy development and geographical position, naming Eastern region, Central region and Western region respectively.

### 3.5. Research Models

We adopt two empirical models to test our hypothesis. The first model examines the effect of government and major customers on SSCM in terms of the national level and three regions. The first model examines the spatial effect of government and major customers on SSCM using 234 manufacturing enterprises' data. Considering customer concentration has short-term and long-term impact, we kept the current customer concentration, at the same time, we also lagged customer concentration by one year. The second model introduce interaction items of region and explanatory variables to examine whether explanatory variables' effects differ among China's 3 economic regions (Chow test).

#### Empirical model 1:

$$SSCM_{it} = \varepsilon_i + \alpha_{it}BC_{it} + \beta_{it}BC_{it-1} + \gamma_{it}POLICIES + \delta_{it}EQUITY + \theta_{it}REGION + \text{controls}$$

#### Empirical model 2:

$$SSCM_{it} = \varepsilon_i + \alpha_{it}BC_{it_m} + \beta_{it}BC_{it-1_m} + \gamma_{it}POLICIES_m + \delta_{it}EQUITY_m + \varepsilon_{it}REGION_m * BC_{it_m} + \mu_{it}REGION_m * BC_{it-1_m} + \omega_{it}REGION_m * POLICIES_m + \varphi_{it}REGION_m * EQUITY_m + \text{controls}$$

Where "m" is the integral number from 1 to 3, representing China's 3 economic regions respectively. Given that our dependent variable belongs to ordered discrete variables, we use ordered logit model to estimate our results.

## 4. RESULTS

### 4.1. Regression Results

Table 1 presents the correlation matrix and descriptive statistics for the variables used in this study. The results shows that the correlations are below 0.7, indicating that multicollinearity is not a problem in our regression analysis.

Table 2 reports the regression results. Model 1 includes control variables only. Model 2, 3, 4 and 5 introduce the effect of customer concentration, government policies and regulations and firm's administrative connection. Model 2 uses the data of whole 234 manufacturing enterprises to test our hypothesis. Model 3 uses the data of 160 manufacturing enterprises in Eastern region. Model 4 uses the data of 43 manufacturing enterprises in Central region. And Model 5 uses the data of 31 manufacturing enterprises in Western region.

Hypothesis 1 predicts that firm's administrative connection is negatively related to SSCM. Model 2 shows that the coefficient estimate of firm's administrative connection is negative ( $\theta = -0.502$ ;  $p = .000$ ). Model 3 also shows that the coefficient estimate of firm's administrative connection is negative ( $\theta = -0.617$ ;  $p = .000$ ). Thus Hypothesis 1 is supported in China as a whole and Eastern region.

Hypothesis 2 predicts that government policies and regulations is positively related to SSCM. Model 2 shows that the coefficient estimate of government policies and regulations is positive ( $\gamma = 0.000$ ;  $p = .031$ ). Model 3 also shows that the coefficient estimate of government policies and regulations is positive ( $\gamma = 0.000$ ;  $p = .043$ ). Thus Hypothesis 2 is supported in China as a whole and Eastern region.

Hypothesis 3 predicts that customer concentration is positively related to SSCM. Model 5 shows that the coefficient estimate of the lag of customer concentration

is positive ( $\beta=0.057$ ,  $p=.086$ ). Thus Hypothesis 3 is supported in Western region.

Hypothesis 4 proposes a competing hypothesis with Hypothesis 3. Model 5 shows that the coefficient estimate of customer concentration is negative ( $\alpha=0.057$ ,  $p=.086$ ). Thus Hypothesis 4 is supported in Western region.

**Table 1.** Descriptive statics and correlations

	SSCM	Con1_ employees	Con2_sale s	Con3_sc	Con4_ independe nt	Con5_ sharehol ders10	Con6_str	LAG_B C	BC	EQUIT Y	POLICIE S
SSCM	1.000										
Con1_empl oyees	0.126*** 0.000	1.000									
Con 2_sales	0.110*** 0.000	0.758*** 0.000	1.000								
Con 3_sc	-0.087*** 0.004	-0.150*** 0.000	0.019 0.524	1.000							
Con 4_indepen dent	-0.101*** 0.001	0.014 0.630	0.003 0.933	-0.023 0.428	1.000						
Con 5_sharehol ders10	0.142*** 0.000	0.158*** 0.000	0.146*** 0.000	-0.008 0.786	0.024 0.409	1.000					
Con 6_str	0.096*** 0.001	0.042 0.151	-0.007 0.815	-0.026 0.367	-0.098*** 0.001	0.139*** 0.000	1.000				
LAG_BC	-0.128*** 0.000	-0.176*** 0.000	-0.109*** 0.001	0.375** 0.000	0.006 0.864	-0.045 0.169	-0.065** 0.047	1.0000			
BC	-0.146*** 0.000	-0.182*** 0.000	-0.112*** 0.000	0.377** 0.000	0.009 0.753	-0.026 0.370	-0.058** 0.046	0.9213* 0.0000	1.0000		
EQUITY	-0.230*** 0.000	-0.012 0.671	0.012 0.682	0.036 0.222	-0.085*** 0.004	-0.073** 0.013	-0.102*** 0.001	0.0512 0.1173	0.0449 0.1251	1.0000	
POLICIES	0.056* 0.058	0.128*** 0.000	0.087*** 0.003	0.013 0.653	-0.009 0.749	0.007 0.803	-0.102*** 0.001	0.0905* 0.0056	0.0741 0.0112	-0.0383 0.1905	1.0000
Mean	6.242	9964.999	1369847	27.549	0.372	56.740	6.037	25.0397	24.8923 8	3.06752 1	3181.86 3
S.D.	1.137	16607.740	4453019	15.789	0.056	15.398	9.182	17.4374 6	17.3574 6	1.28812	1490.41 1
Min	2	77	17803.840	0	0.182	15.420	0	1.17	1.17	1	240
Max	9	171395	75423024. 800	86.750	0.636	98.388	39.582	97.43	97.43	5	5673

**Table 2.** Regression results

Variables	Model 1		Model 2		Model 3 (eastern)		Model 4 (central)		Model 5 (western)	
SSCM	Coef.	P value	Coef.	P value	Coef.	P value	Coef.	P value	Coef.	P value
Con1_employees	$3.770 \times 10^{-6}$	0.717	$3.620 \times 10^{-6}$	0.787	$7.120 \times 10^{-6}$	0.632	.000	0.827	-0.000	0.541
Con2_sales	$2.480 \times 10^{-8}$	0.556	$3.250 \times 10^{-8}$	0.503	$2.66e \times 10^{-08}$	0.596	-8.670 * $10^{-08}$	0.825	$2.920 \times 10^{-07}$	0.465
Con3_sc	-0.006	0.340	-0.008	0.340	-0.001	0.930	-0.041**	0.048	-0.0228	0.225
Con4_independent	-1.526	0.349	-2.969	0.102	-3.321	0.169	-4.296	0.223	-0.078	0.985

Con5_shareholders10	0.019**	0.010	0.0161*	0.053	0.007	0.470	0.012	0.524	0.058***	0.007
Con6_str	0.022**	0.038	0.028**	0.021	0.034**	0.016	0.069**	0.016	-0.057	0.283
region										
2			-0.533	0.325						
3			-0.817*	0.080						
LAG_BC			-0.003	0.791	-0.014	0.346	-0.012	0.546	0.0570*	0.086
BC			-0.013	0.247	0.001	0.970	-0.015	0.462	-0.082***	0.007
POLICIES			0.000**	0.031	0.000**	0.043	0.000	0.136	0.001	0.197
EQUITY			-0.502***	0.000	-0.617***	0.000	-0.164	0.443	-0.449	0.194
Observations	1170	1170	1170	1170	800	800	215	215	155	155

#### 4.2. Chow Test

According to the grouped regression model in Table 2, we can primarily draw the conclusion that government and major customers' impact among China's 3 economic regions is different. To further testify our conclusion, we run Chow test to examine coefficient difference between groups[33]. Chow test testify coefficient difference between groups by introducing interaction items.

Table 3 shows the coefficient difference between western and Eastern region. It's testified that the interaction between the lag of customer concentration and region is significant ( $\mu=-0.067$ ,  $p=0.049$ ). The interaction between the lag of customer concentration and region is significant ( $\epsilon=0.077$ ,  $p=0.016$ ). It proves that major customers' influence in Western region is different from that in Eastern region.

**Table 3.** The coefficient difference between Western and Eastern region

SSCM	Coef.	P value
Con1_employees	$1.360 \times 10^{-06}$	0.925
Con2_sales	$3.690 \times 10^{-08}$	0.467
Con3_sc	-0.006	0.483
Con4_independent	-2.692	0.204
Con5_shareholders10	0.018*	0.052
Con6_str	0.027*	0.052
LAG_BC	0.053*	0.083
BC	-0.076***	0.008
POLICIES	0.001	0.300
EQUITY	-0.411	0.125
REGION#C.LAG_BC		
3	-0.067**	0.049
REGION#C.BC		

3	0.077**	0.016
REGION#C.POLICIES		
3	-0.000	0.541
REGION#C.EQUITY		
3	-0.193	0.484

Table 4 shows the coefficient difference between western and Central region. It's testified that the interaction between the lag of customer concentration and region is significant ( $\mu=-0.070$ ,  $p=0.050$ ). The interaction between the lag of customer concentration and region is significant ( $\epsilon=0.070$ ,  $p=0.042$ ). It proves that major customers' influence in Western region is different from that in Central region.

**Table 4.** The coefficient difference between Western and Central region

SSCM	Coef.	P value
Con1_employees	-0.000	0.628
Con2_sales	$1.090 \times 10^{-07}$	0.701
Con3_sc	-0.026*	0.068
Con4_independent	-2.629	0.346
Con5_shareholders10	0.037**	0.014
Con6_str	0.020	0.427
LAG_BC	0.061*	0.053
BC	-0.082***	0.005
POLICIES	0.001	0.147
EQUITY	-0.372	0.207
REGION#C.LAG_BC		
2	-0.070*	0.050

REGION#C.BC		
2	0.070**	0.042
REGION#C.POLICIES		
2	-0.001	0.247
REGION#C.EQUITY		
2	0.150	0.622

Table 5 shows the coefficient difference between central and Eastern region. It's testified that the interaction between equity and region is significant ( $\varphi = -0.353$ ,  $p = 0.062$ ). It proves that the influence of firm's administrative connection in Western region is different from that in Central region.

**Table 5.** The coefficient difference between Central and Eastern region

SSCM	Coef.	P value
Con1_employees	$6.830 \times 10^{-06}$	0.621
Con2_sales	$2.860 \times 10^{-08}$	0.550
Con3_sc	-0.006	0.495
Con4_independent	-3.937**	0.048
Con5_shareholders10	0.008	0.373
Con6_str	0.036***	0.004
LAG_BC	-0.014	0.450
BC	-0.020	0.320
POLICIES	0.000	0.297
EQUITY	-0.257	0.145
REGION#C.LAG_BC		
3	0.001	0.958
REGION#C.BC		
3	0.022	0.375
REGION#C.POLICIES		
3	0.000	0.669
REGION#C.EQUITY		
3	-0.353*	0.062

From the above analysis, we can draw following conclusions. Firstly, in terms of China's Eastern region, the government has significant impact on enterprises' SSCM. Specifically, firm's administrative connection is negatively related to enterprises' SSCM, while

government policies and regulations is positively related to enterprises' SSCM

Enterprises who have weak linkages with the government have better performance in SSCM. Enterprises who have strong linkages with the government are more easily to get "political shelter" from the government. This may weaken enterprises' awareness of sustainable development.

Government policies and regulations is positively related to enterprises' SSCM. In this paper, we calculate the keywords of Government policies and regulations related to SSCM, the more keywords is, the clearer enterprises' obligations and responsibilities is. So enterprises' opportunistic behaviour can be effectively restricted.

The reason why major customers' impact on SSCM is not significant lies in that the Eastern region is the most developed area in China, enterprises in Eastern region have more normal and modern corporation systems, which can regulate enterprises' SSCM. In comparison, major customers' impact seems inappreciable.

Secondly, in terms of China's Western region, major customers have significant impact on SSCM. Specifically, the short-term effect of customer concentration is negatively related to SSCM. While the long-term effect of customer concentration positively and significantly affects SSCM, indicating that long-term and stable supply chain relationships with high customer concentration can promote the company's SSCM level and short-term cooperation behaviour with high customer concentration will hinder the implementation of SSCM. This is because when there is only short-term cooperation between major customers and manufacturing enterprises, the impact of corporate non-compliance on customers is very faint, so major customers are unwilling to supervise and help manufacturing enterprises. On the contrary, major customers are more likely to squeeze manufacturing enterprises, which can lead to manufacturing enterprises' lack of resources to implement SSCM [29][34].

Once there is only long-term cooperation between major customers and manufacturing enterprises, major customers are more likely to be engaged with manufacturing enterprises' non-compliance activities. So the possibility of major customers to supervise and help manufacturing enterprises increases, some customers may even make proprietary investment to help them implement SSCM, thus improve the level of manufacturing enterprises' SSCM.

Thirdly, in terms of China's Central region, neither the government nor major customers have significant effect on SSCM. Major suppliers and corporate management structure play significant role instead.



Last but not least, by Chow test, we do find that firm's administrative connection and major customers perform differently among China's three economic region.

## 5. CONCLUSION

This study has managerial implications for government and firms which want to pursue sustainable development in China and other countries who have obvious regional difference. First, SSCM is not one-size fits-all activities. To improve manufacturing enterprises' SSCM performance, the government must make measures according to the local regions' characteristics. For example, for enterprises in China's Eastern region, the government should try its best to perfect related policies and regulations so that enterprises have enough obligations to implement SSCM. What's more, establishing standardized supervision system to prevent improper relationship between the government and enterprises. For enterprises in China's Western region, the government should pay more attention to supplier-buyer relationship.

Second, supplier-buyer relationship should be noticed in regions where major customers have significant effect. For, departments should be alert to manufacturing enterprises that change customers frequently, as these enterprises easily multiply opportunistic behaviour caused short-term supplier-buyer relationship. For manufacturing enterprises, in the process of implementing SSCM, it's wise choice for them to establish long-term and stable supply chain cooperation relationship with major customers. On the one hand, they can reduce the pressure of capital flow brought by joint investment, on the other hand, long-term cooperation relationship are helpful to reduce transaction cost and achieve win-win situation.

Though there are some innovations, but we cannot deny that limitations exist as well. Firstly, endogeneity hasn't been discussed in this paper, future studies can further test endogeneity using instrumental variable method. The integrative effect of different stakeholders has been ignored, further studies can consider the integrative effect of government and major customers.

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