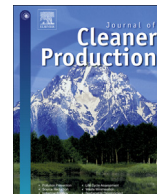




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The role of customer relational governance in environmental and economic performance improvement through green supply chain management

Qinghua Zhu ^{a, *}, Yunting Feng ^a, Seok-Beom Choi ^b

^a Antai College of Economics and Management, Shanghai Jiao Tong University, 1954 Huashan Road, Shanghai 200030, China

^b Department of Chinese Economics and Trade, Cheju Halla University, 38 Halla University Road, Jeju-Do 690-708, South Korea

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ABSTRACT

The formal control from customers through contracts and monitoring requires companies to implement green supply chain management (GSCM) practices. The informal control of customer relational governance (CRG) in terms of trust and cooperation also plays a role but it is not clear how CRG affects companies in gaining environmental and economic performance through GSCM practices. To explore the role of CRG, this paper develops a conceptual model with four hypotheses to propose moderation and mediation effects of CRG on the relationships between two GSCM practices (green innovation and green purchasing) and environmental/economic performance. Based on 333 questionnaires collected from a typical export-oriented city in China, two CRG factors are identified, they are, relationship & trust, and cooperation & reciprocity. Statistic results through hierarchical regression analysis demonstrate that both moderation and mediation effects exist. CRG partially mediates the effect of GSCM practices on environmental performance. However, relationship & trust can be detrimental for green innovation to bring environmental performance. If companies aim to improve economic performance through green purchasing, they should establish relationship & trust with customers. Meanwhile, cooperation & reciprocity with customers is needed for companies to gain economic performance through green innovation. This paper contributes to extend the previous studies of formal control from customers to examine the role of CRG for GSCM association of performance improvement. Statistic results identify effective governance mechanisms from the perspective of customer relations to achieve environmental and economic performance through GSCM practices.

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1. Introduction

Green supply chain management (GSCM), which integrates environmental concerns into supply chains, has been widely implemented by companies to improve performance. Some studies showed that GSCM can bring both environmental and economic performance (Chiou et al., 2011). Many studies demonstrated that GSCM can bring environmental performance (Schrettle et al., 2014). For example, Simpson (2012) found that GSCM can reduce waste production. Koh et al. (2012) showed that GSCM can help avoid the use of hazardous substances such as those forbidden by the directive for Restriction of the Use of Certain Hazardous Substances

in electrical and electronic equipment in the European Union. A few studies also showed that GSCM can bring economic performance. Kumar et al. (2012) demonstrated that GSCM is necessary to gain profit for companies. Bose and Pal (2012) showed that the announcement of GSCM efforts can increase companies' stock prices.

Even some studies indicated the positive effect of GSCM practices on performance improvement. However, controversies still exist, especially for economic performance improvement. GSCM can bring positive economic performance by using less materials, but it can bring negative economic performance due to the higher cost of more environmental-friendly materials and technologies (Zhu and Sarkis, 2004). Lack of trust through supply chains may be the key reason (Hoejmose et al., 2012). Previous studies demonstrated formal control from customers through contracts or monitoring can motivate suppliers to gain

* Corresponding author.

E-mail addresses: qhzhu@sjtu.edu.cn (Q. Zhu), fengyt@sjtu.edu.cn (Y. Feng), sbchoi777@naver.com (S.-B. Choi).

performance through practices such as GSCM (Wallenburg and Schaffler, 2014). However, customer relational governance (CRG), which brings effect through informal relationships with customers such as trust and cooperation, may be even more crucial to achieve win–win opportunities between customers and suppliers. In China, relational governance is more effective than formal contractual control to maintain customer–supplier relationships (Zhou et al., 2008). Thus, this paper aims to explore effective governance for GSCM practices with a specific focus on the role of a company's relationships with its customers. This paper contributes to extend the previous studies of formal control from customers to examine the role of CRG for GSCM association of performance improvement. Moreover, it develops a conceptual model to explore moderation and mediation effect of CRG with four hypotheses. Statistic results reveal the possible role of CRG for customers on how to motivate GSCM practices for environmental performance while it is also identified for suppliers on how to achieve economic performance from GSCM by keeping the right relations with customers.

To achieve the goals of this research, Section 2 will introduce a conceptual model followed by a literature review for the development of hypotheses. Section 3 will describe the methodology, including items development, data collection, and factor analysis. Results, discussion, and implications on both general descriptive statistics, as well as moderation and mediation effects of CRG, will be presented in Section 4. Section 5 will conclude the whole paper with a summary of the key results, limitations, and directions for potential research.

2. A conceptual model and hypotheses development

2.1. A conceptual model

Green practices through supply chains need upstream and downstream integration. However, no common definition exists for GSCM. In the 1990s, GSCM mainly focused on the supplier side, and green purchasing was used to define GSCM (Min and Galle, 1997; Webb, 1994). Since the late 1990s, GSCM has been extended to consider reverse logistics, internal environmental management related to supply chains, eco-design and customer cooperation with environmental concerns (Diabat and Govindan, 2011; Eltayeb et al., 2011; Shang et al., 2010; Sheu, 2008; Zhu and Sarkis, 2004; Zhu et al., 2008). In this study, GSCM considers two key practices, and it is defined as green purchasing from the supplier side and green innovation considering environmental impact through a whole supply chain for a product.

Customers can exert formal control on suppliers for practices such as GSCM implementation through contracts and monitoring (van der Valk and van Iwaarden, 2011). However, customer governance through relational ties including cooperation and trust can be even more important for developing countries such as China (Campbell, 2007; Park and Luo, 2001; Zhang and Zhou, 2013; Zhou and Xu, 2012; Zhou et al., 2014). Relationship can be at both the company and personal levels (Lozano, 2008). Thus, this study includes two CRG dimension at two levels. CRG is considered as a moderator and/or mediator, which will be discussed in detail for hypotheses development in Sections 2.2 and 2.3.

Fig. 1 shows a conceptual model, which will be used to examine the role of CRG for improving both environmental and economic performance through GSCM practices. The scale of a company can affect environmental practices for companies, and thus Fig. 1 includes the operational scale of companies as a control variable (Gallo and Christensen, 2011).

2.2. The moderation effect of customer relational governance

A moderation effect indicates that the positive relationship between a dependent variable and an independent variable can be strengthened when a moderator exists. GSCM management can bring both environmental performance (Koh et al., 2012; Simpson, 2012) and economic gains (Bose and Pal, 2012; Kumar et al., 2012). Companies in developing countries such as China gained ISO14001 certification as their efforts for GSCM practices initially due to the requirement from their international customers (Zhu et al., 2012b). However, ISO14001 certification only demonstrates that a company has established an environmental management system. Whether companies really implement GSCM-related practices and gain performance improvement need relational governance by customers (Chung et al., 2005). To examine effect of GSCM on performance, the benchmark or performance improvement from GSCM can be a reasonable indicator (Tseng et al., 2014).

Besides the formal control from customers, informal control of CRG including cooperation and trust is needed for companies to really implement GSCM-related practices and gain performance improvement (Chung et al., 2005). Customer cooperation is helpful to improve performance, especially for economic performance (Tseng and Chiu, 2013; Zhu et al., 2013). Trust and commitment in customer–supplier relationships can improve loyalty and cooperation, and thus may be valuable for a company to improve its performance (Wu et al., 2015). If a customer possesses strong powers to shape relationships with its supplier, such cooperative relationships can affect a supplier's economic performance (Kim and Wemmerlov, 2015).

Based on the above discussions, the first two hypotheses are put forward.

Hypothesis 1. *Customer relational governance moderates the relationship between GSCM practices and environmental performance.*

Hypothesis 2. *Customer relational governance moderates the relationship between GSCM practices and economic performance.*

2.3. The mediation effect of customer relational governance

A mediation effect indicates that a mediator is necessary for an independent variable to derive a dependent result. Communication and cooperation with customers may be necessary to achieve performance improvement through GSCM practices (Seuring and Muller, 2008). Trust is necessary between various supply chain partners for GSCM implementation (Hoejmose et al., 2012). Customer cooperation can be necessary to gain economic performance through corporate environmental management practices (Zhu et al., 2011). When a customer plays a key role in cooperation with its supplier, operations management such as GSCM may bring operational performance, and then result in economic gains (Kim and Wemmerlov, 2015). A customer's demand on environmental management efforts by suppliers can be changed, and such demand can be necessary for suppliers to improve environmental performance through their proactive environmental management practices such as GSCM implementation (Johansson, 2014).

Formal control from customers requires companies to implement GSCM practices, but there is no guarantee for companies to improve their performance. Companies need to proactively implement GSCM practices to satisfy customers with better environmental performance, and thus economic performance can also be realized (Shin and Thai, 2016). Meanwhile, suppliers' flexibility such as GSCM efforts is key to improving trust and commitment

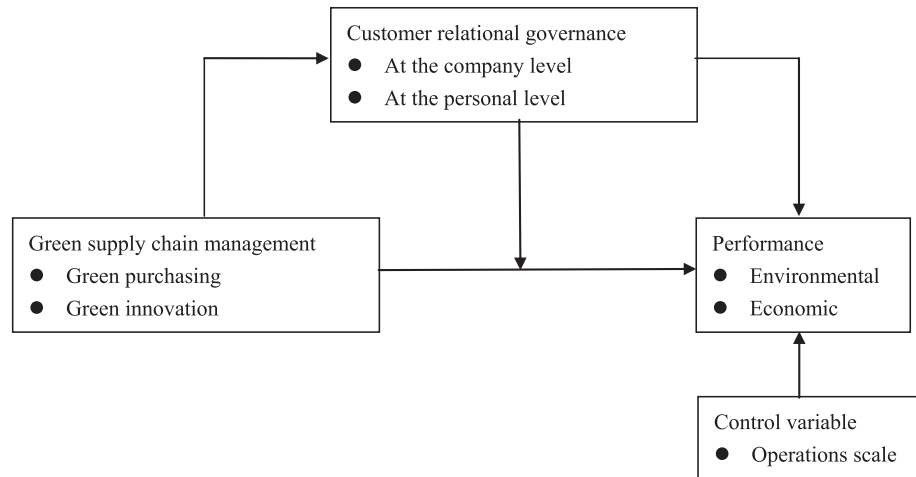


Fig. 1. A conceptual model of customer relational governance for performance improvement through green supply chain management.

from customers (Han et al., 2014). A good relationship between suppliers and customers is needed for suppliers to achieve performance improvement (Storey and Kocabasoglu-Hillmer, 2013).

Based on the above discussion, two more hypotheses are put forward.

Hypothesis 3. *Customer relational governance mediates the relationship between GSCM practices and environmental performance.*

Hypothesis 4. *Customer relational governance mediates the relationship between GSCM practices and economic performance.*

3. Methodology

3.1. Items development and data collection

3.1.1. Items development

As mentioned above, GSCM in this study includes two factors. As the first factor, green innovation comprises items on eco-design considering the product's life cycle (Ahmadi and Tiruta-Barna, 2015). Then three items (the first three items of Factor 1 in Table 1) were developed. Internal efforts such as a comprehensive plan, investment, and data collection are also part of green innovation. Thus, three items were further considered (see Table 1). The second factor is green purchasing. Self-audit and third-party certification are two common practices, which can be extended to the second-tier suppliers (Zhu et al., 2005). Thus, three items on green purchasing (Factor 2 in Table 1) were developed. Respondents were required to evaluate the implementation level of each GSCM

practice in their companies using a five-point scale, they are, 1 = Not even consider; 2 = Have considered and discussed but not sure if do or not; 3 = Have plans to implement; 4 = Begin to implement; 5 = Have implemented successfully.

CRG items were developed considering two levels. For items at the company level, two main studies (Johnson et al., 2013; Poppo and Zenger, 2002) were examined to develop a construct which includes three main dimensions, they are, structural, cognitive, and relational. The third relational dimension includes three sub-dimensions, they are, interaction, mutual commitment, and reciprocity. Besides these two studies, all items were developed based on several previous studies (Galaskiewicz, 2011; Hsueh, 2014; Zhou et al., 2014). The first three items of Factor 1 and all items of Factor 2 in Table 2 are those at the company level.

Learning from a previous study (Leung et al., 2005), CRG at the personal level comprises two dimensions. The first dimension is personal relationship (*guanxi*) while the second dimension is personal trust (*xinyong*). For the first dimension, items were developed mainly according to a previous study (Leung et al., 2005). For the second dimension, two main studies (Canning and Hanmer-Lloyd, 2007; Leung et al., 2005) were referred to develop all the items, which are shown in Table 2.

A five-point scale was used to evaluate each CRG item at both the company and personal levels. Five-point scales are: 1 = Strongly disagree; 2 = Partially disagree; 3 = Neither disagree nor agree; 4 = Partially agree; 5 = Strongly agree.

For measuring environmental performance, waste emissions as well as consumption of materials are considered. The first item is about the reduction of three types of wastes, they are, air emission,

Table 1
Rotated component matrix^a on green supply chain management practices.

Items	Factors	
	1	2
Design of products for reuse, recycle, recovery of material, component parts	.739	.328
Design of products to avoid or reduce use of hazardous products and/or their manufacturing process	.852	.141
Cooperation with customers for eco-design	.722	.352
Implementation of comprehensive material-saving plan	.843	.223
Investment in green equipment and technology	.792	.348
Management of documentation and information for environmental technology	.730	.316
Environmental audit for suppliers' internal management	.285	.805
Main suppliers' ISO14000 certification	.441	.702
Second-tier supplier (suppliers' suppliers) environmentally friendly practice evaluation	.168	.845

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

^a Rotation converged in 3 iterations.

Table 2
Rotated component matrix^a on customer relational governance.

	Factors	
	1	2
The customer has a long-term alliance with our company.	.699	.394
Our company and this customer often have activities that are purely social, such as after-work-get-togethers.	.729	.375
The customer establishes a strategic partnership with our company.	.766	.371
Our senior managers have a close personal relationship (<i>guanxi</i>) with senior managers of the customer.	.710	.413
Our senior managers consider customer's praising responses to our environmental practices as <i>mianzi</i> .	.781	.345
Our company implements environmental practices due to <i>renqing</i> with senior managers.	.781	.315
The customer managers have interpersonal relations with our managers.	.779	.353
The customer managers share business values with our managers.	.727	.482
The customer managers and our managers always tend to avoid opportunistic behavior.	.735	.419
The customer managers know our managers so long and they trust that our managers have personal trust (<i>xinyong</i>) in the field.	.762	.367
The customer managers believe that our managers will carry out what they promise them.	.793	.344
The customer managers believe that our managers have a good social credit rating in the field.	.751	.415
The customer provides help in areas such as human resources support to implement environmental practices with our company.	.327	.787
The customer has a department that cooperates with our company on the environmental	.286	.836
The customer shares its environmental goals with our company.	.425	.727
The customer shares its environmental reports and achievements with our company.	.468	.659
The customer provides compensation for our environmental efforts.	.406	.684
The customer collaborates with our company to solve environmental problems.	.411	.779
The customer shares environmental practices implementation experiences with our company.	.411	.723
The customer shares costs of environmental practices with our company.	.367	.759

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

^a Rotation converged in 3 iterations.

waste water and solid wastes. For consumption, water consumption is closely related to waste water production, and thus only consumption of hazardous/harmful/toxic materials is included about its decrease. Environmental accidents have become a major issue for all companies, and thus the decrease in frequency of environmental accidents is considered as the third item for measuring environmental performance. For measuring the improvement in economic performance, both the decrease in operational cost and potential long-term financial performance are considered. All the items on performance are shown in Table 3. For each item, respondents were asked to answer if significant improvement has been achieved due to their GSCM practices on a five-point scale, they are, 1 = Totally no; 2 = Partially no; 3 = Not sure; 4 = Partially yes; 5 = Totally yes.

3.1.2. Data collection

Questionnaires were collected in Wenzhou. Wenzhou was chosen since it is famous for its export-orientation and the activeness of small and medium-sized enterprises (SMEs), and thus CRG has become extremely important for global supply chain management. First, Wenzhou is a typical export-oriented city. Wenzhou is a prosperous foreign treaty port, and is also well-known for its emigrants who leave China for Europe and the United States. By the end of 2014, Wenzhou had established import and export trade relationships with 213 countries or regions, and 6127 companies had imported or exported products. The total export in 2014 was 18.551 billion US dollars, including 7.239 billion to Europe, 5.07 billion to Asia, 2.683 billion to North America, 1.935

billion to South America, 1.304 billion to Africa and .303 billion to Oceania. Second, SMEs are active and contribute much to the economic development. For example, the output produced by SMEs in 2014 was RMB293.154 billion, accounting for 38.21% of the total industrial output of RMB474.011 billion. The value-added output by SMEs was RMB77.221 billion, accounting for 44.16% of the total added value of industrial output (RMB174.881 billion).

To understand the situation in Wenzhou, site visits to six companies and interviews with general managers of these six companies were carried out with the help of a local university, Wenzhou University, for arrangements in January 2015. Based on site visits, a questionnaire was developed. The questionnaire was reviewed by all general managers as well as six local scholars in the field of corporate environmental management, including four from two local universities, one from a local institute, and one from the local government. Based on suggestions and comments by all local managers and scholars, the questionnaire was finalized. During March 16 and May 8, 2015, 391 questionnaires were randomly handed out through two district governments and one exporting association. The district governments randomly selected companies from their lists and then sent emails to these companies. The companies emailed back the filled questionnaires or filled and returned the printed questionnaires. The exporting association handed out questionnaires randomly during two meetings and the respondent companies returned the questionnaires on site or later. Among these 391 questionnaires, 31 are not from manufacturing companies while 27 have over the half of unanswered questions. Excluding 58 questionnaires, totally 333 are usable.

3.2. Factor analysis

To extract the theoretical dimensions (factors) of GSCM practices, CRG and performance, an exploratory factor analysis (EFA) with maximum likelihood and a varimax rotation was used. EFA, rather than confirmatory factor analysis, was chosen since CRG items were totally newly developed while GSCM and performances items were chosen only considering those related to CRG.

Both the scree test and the initial eigenvalue test indicate two factors for GSCM practices, explaining 70.5% of the inherent variation. Loadings for GSCM items are shown in Table 1. Based on item

Table 3
Rotated component matrix^a on performance.

Items	Factors	
	1	2
Reduction of air emissions, waste water, or solid wastes	.774	.461
Decrease in consumption of hazardous/harmful/toxic materials	.890	.321
Decrease in frequency of environmental accidents	.812	.412
Decrease in cost of operation	.445	.805
Promotion of the enterprise's long-term financial performance	.345	.885

^a Rotation converged in 3 iterations.

characteristics, two factors were labeled as green innovation and green purchasing, which explain 44.1% and 26.4% of the inherent variation, respectively. Items in the same factor were further examined to determine whether they can be grouped together through the reliability test with the benchmark value of .70 (Nunnally and Bernstein, 1994). The reliability coefficient alpha values for two GSCM factors are high with .91 and .79 for green innovation and green purchasing, respectively.

Similar methods were used to identify CRG factors. Loadings are shown in Table 2. The first factor, labeled as relationship & trust, explaining 40.0% of the inherent variation. The second factor, labeled as cooperation & reciprocity, explaining 31.2% of the inherent variation. The reliability coefficient alpha values for the two governance factors are high with .96 and .94, respectively.

For performance, EFA shows two factors and loadings of all items are shown in Table 3. The first factor (environmental performance) and the second factor (economic performance) explain 85.6% of the inherent variation totally, 47.3% and 38.3%, respectively. The reliability coefficient alpha values for the two performance factors are high with .91 and .86, respectively.

4. Results, discussion and implications

4.1. Results

4.1.1. General descriptive statistical results

Table 4 shows descriptive statistical results for all factors of GSCM practices, CRG, and performance.

Two GSCM practices have mean values of 3.40 and 3.16 (3 = Have plans to implement; 4 = Begin to implement), respectively. Such results indicate that companies generally plan and partly begin to implement these two practices. Green innovation has a relatively higher mean value of 3.40, and such a result is consistent with the previous studies. Companies, even in developed countries, implement internal environmental management practices first, while institutional motivators are needed for companies to extend their efforts to their supply chains (Zhu et al., forthcoming). Companies need pay more attention to green purchasing, which is important for them to green their supply chains.

Two CRG factors have similar and relatively high mean values, they are, 4.04 (4 = Partially agree) for relationship & trust, and 3.90 for cooperation & reciprocity. Two high mean values indicate that customers generally have good relationships and cooperate with companies. Such results may come from the particular situation in Wenzhou. Wenzhou has many emigrants, and these emigrants establish companies abroad and then become customers of companies in Wenzhou. Even if companies operated by emigrants are not direct customers, these emigrants have actively introduced foreign companies to buy products produced in Wenzhou.

It is somewhat surprising to have two high and similar mean values for performance. Both are around 4.00 (4 = Partially yes for a significant performance improvement). Such result indicates that companies achieve environmental and economic performance at the same time. For most studies about GSCM practices,

environmental performance is higher than economic performance (Zhu et al., 2005, 2012a). Companies in Wenzhou can achieve a significant improvement in economic performance, which can be a result of their export orientation. Besides, people in Wenzhou are typically realists, and they may be reluctant to implement GSCM practices if these practices only bring environmental performance.

4.1.2. Results and discussion on moderation and mediation effects

Moderation and mediation effects of CRG on the relationships between GSCM and performance are examined through four steps using hierarchical regression analysis (Hayes, 2009; MacKinnon et al., 2004). First, the control variable of company size was entered. Learning from Dean and Snell (1991), size was measured using the natural logarithmic transformation of the number of full-time employees. Second, two independent GSCM factors were entered as a block. Third, two potential moderators and/or mediators of CRG were included. Finally, four interaction variables of two independent factors and two CRG factors were entered as a block. Results are shown in Table 5.

To test the moderating effects, the variance partitioning procedures were conducted based on a previous study (Jaccard et al., 1990). The results in Step 4 can show whether moderating effects exist through two ways. The first way is that collectively the incremental F for the step is significant, and the other way is that an individual interaction variable has a significant beta value (Zhu and Sarkis, 2004). To avoid potential threats of multicollinearity, the “centering” technique was employed by the use of deviation scores for each independent factor and two potential moderators (Zhu and Sarkis, 2004). All variance inflation factors (VIF) are close to 1.00, and thus multicollinearity should not be a problem.

Table 5 shows that the incremental Fs in Step 4 are significant for both environmental and economic performance. Such results indicate that moderation effects do exist. However, a further examination indicates that the Fs for the regression in Step 4 are both lower than those in Step 3. Moreover, one negative beta value for an interaction variable appears for environmental performance, which indicates an opposite moderation effect. Thus, Hypothesis 1 is oppositely supported. Such result indicates that green innovation is associated with environmental performance improvement but a higher level of relationship & trust from customers can weaken such association. For economic performance, both positive and negative beta values appear for interaction variables. Thus, a further examination is needed to check if and how Hypothesis 3 is supported. The negative interaction indicates that cooperation & reciprocity will weaken the positive relationship between green purchasing and economic performance.

By referring to the four requirements proposed by Baron and Kenny (1986), mediation effects were examined. Regression analysis shows that two GSCM factors affect two CRG factors, and thus the first requirement is met. Step 2 in Table 5 shows that two independent factors both affect environmental and economic performance, and such results support the second requirement. Both Steps 3 and 4 in Table 5 show that two CRG factors affect environmental and economic performance, and thus the third

Table 4
Descriptive statistics for GSCM practices, customer relational governance, and performance.

		N	Min.	Max.	Means	S.D.
Green supply chain management (GSCM)	Green innovation (GI)	327	1.67	5.00	3.40	.88
	Green purchasing (GP)	329	1.33	5.00	3.16	.84
Customer relational governance (CRG)	Relationship & trust (CRG1)	329	1.67	5.00	4.04	.89
	Cooperation & reciprocity (CRG2)	325	1.75	5.00	3.90	.88
Performance	Environmental performance (P1)	329	1.00	5.00	4.06	.99
	Economic performance (P2)	330	1.00	5.00	4.01	1.02

Table 5
The role of customer relational governance for performance associated with GSCM practices.

		Dependent factors (performance)							
		Environmental				Economic			
		Step 1	Step 2	Step 3	Step 4	Step 1	Step 2	Step 3	Step 4
Control variable	Size	-.18**	-.23***	-.03	-.02	.30***	-.34***	-.17***	-.16***
Green supply chain management	Green innovation (GI)		.24***	.08*	.08		.25***	.11*	.11*
	Green purchasing (GP)		.22***	.13**	.12**		.16*	.08	.08
Customer relational governance	Relationship & trust (CRG1)			.56***	.58***			.44***	.39***
	Cooperation & reciprocity (CRG2)			.26***	.21***			.28***	.34***
Interaction effects	GI*CRG1				-.12*				-.25***
	GI*CRG2				.047				.16*
	GP*CRG1				-.016				.23**
	GP*CRG2				.002				-.17*
F for the step		9.96**	33.20***	305.97***	2.83*	30.86***	27.37***	174.46***	3.36**
F for the regression		9.96**	26.14***	169.14***	97.45***	30.86***	30.28***	108.35***	63.54***
Adjusted R ²		.03	.20	.73	.74	.09	.22	.63	.64

requirement is also met. If an independent factor loses all the effects while a significant beta value appears for a potential mediator in Step 3, a perfect or complete mediation effect exists (Hayes, 2009). If an independent factor has a lessened, but still significant, beta, a partial mediation effect exists.

For environmental performance, the results of Step 3 in Table 5 show that two beta values of GSCM factors are lessened but are still significant, while two beta values of CRG factors are significant. Thus, the partial mediation effect appears, and Hypothesis 2 is partly supported. For economic performance, the beta value for green innovation is lessened but still significant. Thus, the relationship between green innovation and economic performance is partly mediated. Hypothesis 4 is partly supported. Green purchasing completely loses its effect in Step 3, which indicates that the effect of green purchasing on economic performance is totally mediated by CRG. Hypothesis 4 is entirely supported.

4.2. Discussion

Both the GSCM practices, green innovation and green purchasing, have been implemented only in the initial stage among companies located at Wenzhou. However, these companies have good relationships with their customers, and seem to develop win–win opportunities. Thus, improvements in both environmental and economic performance are achieved. Such results show that CRG has the potential to improve performance for companies. If companies can become more proactive to implement GSCM practices, and continue to maintain good relationships with customers, performance can be further improved.

The results shown in Table 5 and introduced above indicate that two CRG factors have the partial mediation effects on the relationship between GSCM practices and environmental performance. Moreover, a negative significant beta value of an interaction variable indicates an opposite moderation effect. Considering the results for both moderation and mediation effects, cooperation & reciprocity has a partial mediation effect while relationship & trust has a negative moderation effect on green innovation. A further examination shows that cooperation & reciprocity can be necessary for green innovation to achieve environmental performance. Companies have made efforts to implement green innovation considering environmental impacts of whole life cycles for their products. However, companies can improve their environmental performance only when they can cooperate or have win–win opportunities with their customers. Unfortunately, relationship & trust with customers can be detrimental for green innovation to bring environmental performance.

The effect of green purchasing on economic performance is totally mediated by CRG. Moreover, a positive moderation effect with relationship & trust and a negative moderation effect with cooperation & reciprocity both exist. Thus, if companies try to improve economic performance through green purchasing, it is necessary to maintain relationship & trust with customers. However, cooperation & reciprocity can have a negative effect, and thus it should be avoided. For green innovation, its effect on economic performance is partly mediated. A positive interaction effect with cooperation & reciprocity indicates that cooperation & reciprocity with customers can not only be helpful, but sometimes necessary, for companies to realize economic performance through green innovation. Unfortunately, a negative interaction effect with relationship & trust shows that companies may not bring economic performance through green innovation, if they maintain close relationships with their customers.

4.3. Implications

CRG shows complicated moderation and mediation effects on relationships between GSCM practices and performance among companies. Thus, a cautious choice of governance related to different GSCM practices is needed.

To achieve environmental performance, companies can implement green innovation and green purchasing. Green innovation considers environmental impacts of the whole life cycles for products. For example, a smart design can significantly reduce energy consumption in the downstream supply chain when a product is used. Efforts, even investment, by suppliers may only improve environmental image for their customers. Thus, cooperation with customers is very important and sometimes necessary. Only with support from customers, companies are willing to implement green innovation. Moreover, relationship and/or trust with customers can be detrimental to the effect of green innovation. Such results indicate that green innovation by suppliers can improve their environmental performance, but too close relationships and trust from customers may weaken suppliers for more proactive efforts. Such phenomenon is consistent with the results that normative pressure, or pressure from customers and market, is the key to motivate internal GSCM practices such as green innovation (Gualandris and Kalchschmidt, 2014), and then to improve environmental performance (Zhu and Geng, 2013).

CRG can bring economic performance through two ways. If companies try to gain economic performance through green purchasing, relationship & trust from customers are not only helpful, but also necessary. Alternatively, if companies aim to gain economic performance through green innovation, cooperation & reciprocity

with customers is helpful and partially needed. However, two situations can exist. Close relationship & trust from customers can weaken initiatives of suppliers for their green innovation. Meanwhile, due to cooperation & reciprocity with customers, suppliers may be reluctant to make efforts for green purchasing. As a result for these two situations, suppliers cannot get economic performance through their GSCM practices.

5. Conclusions

Governance along supply chains has gained increasing attention to promote environmental management practices among companies (Vurro et al., 2009). This study examines the moderation and mediation effects of CRG on the relationships between GSCM practices and performance. The results of statistical analysis based on surveys among Chinese manufacturers show that well-informed choices are essential to develop appropriate customer governance mechanisms to achieve either environmental or economic performance through GSCM practices.

Green purchasing can bring environmental performance, which is not affected by CRG. However, to gain environmental performance through green innovation, companies have to cooperate or have reciprocity with customers. Relationship and trust between customers and suppliers can have the negative effect of green innovation on environmental performance. Therefore, customers should understand that informal control of CRG could not have effect on association of green purchasing with environmental performance. To effectively motivate green purchasing for environmental performance by suppliers, customers should exert formal control through contracts or monitoring. Meanwhile, to motivate green innovation by suppliers, customers should avoid too close relationships but try to cooperate with suppliers.

Both green innovation and green purchasing can facilitate economic performance, but only under the right CRG. Green purchasing can bring economic performance for suppliers only if relationship and trust exist between customers and suppliers. Alternatively, green innovation can improve economic performance while cooperation and reciprocity with customers are helpful, and sometimes necessary. Therefore, if suppliers try to improve economic performance through green purchasing, they have to keep good relationship with customers and gain their trust. Meanwhile, when suppliers aim to gain economic performance through green innovation, they need to cooperate with customers to develop win–win opportunities.

Both customers and suppliers can get benefit, either economic or environmental performance improvement, through right relationships for GSCM practices. Such implications can also be helpful for companies, especially for those in the same global supply chains of companies in Wenzhou. Moreover, based on understanding of the CRG role, the Chinese government can work on developing mechanisms to motivate better customer–supplier relationships, especially for companies that follow two national policies of “going outside” and “one-belt-one-road”.

This study reveals interesting findings. However, there are limitations, which are worthy of consideration for future research. First, the CRG factors and items were developed mainly based on perception from site visits and interviews. Theoretical development is needed to explore the in-depth customer's role in relational governance for performance improvement through GSCM practices. Second, two types of CRG, relationship & trust and cooperation & reciprocity, have different moderation and mediation effects on the relationships between two GSCM practices and two types of performance. Thus, companies may find it difficult to make the right choice for relationships with customers. Third, due to the difficulty for data collection, surveys were conducted among

manufacturers in a typical export-oriented city in China. More data from other areas can bring more interesting findings.

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