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An institutional theoretic investigation on the links between internationalization of Chinese manufacturers and their environmental supply chain management

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ABSTRACT

Increased market internationalization with more and stricter environmental regulations in different countries has caused manufacturers to extend their environmental management practices to cover their supply chain partners. Thus, environmental supply chain management (ESCM) has become an important competitive and environmental strategy for manufacturers to pursue. China, as a global manufacturer, is also facing this balance of economic development with environmental protection. The literature remains unclear on whether internationalization is beneficial or costly when it comes to environmental management practices such as ESCM within China. Further insight into this issue will be useful for organizations in developing and emergent economies to more effectively prepare for internationalizing their operations and markets. Using internationalization drivers that propel the implementation of environmental management practices in the Chinese manufacturing industry, we applied cluster analysis to group a sample of 377 Chinese manufacturers surveyed in 2007 into three clusters: mature internationalization, emergent internationalization, and domestic-focused. Institutional theory within an internationalization context sets the theoretical foundation for evidence that the international environmentally oriented institutional drivers encountered are positively associated with the adoption of ESCM practices by Chinese manufacturers. We also find significant differences in the environmental, economic and operational performance outcomes across the three manufacturer clusters. We conclude that manufacturing organizations experiencing internationalization with a greater extent of adopting ESCM practices tend to perform better.

1. Introduction

Environmentalism, environmental burdens, and resource scarcity are inescapable aspects of the globalization conversation. Since China's economic and cultural portal was opened to the world in the early 1980s, Chinese manufacturers have not been an exception. At the same time, after entry into the World Trade Organization (WTO), China has experienced increasing competitive drivers to compete or cooperate with foreign organizations from developed countries, for example, through managing the global supply chains (Quer et al., 2007; Roth et al., 2008). The greater sophistication and demands for environmental performance from foreign customers and enterprises are posing more pressures for Chinese enterprises to improve their environmental performance (Qi et al., 2008; Yin and Ma, 2009; Zhu et al., 2008). Exporting products or becoming suppliers of foreign customers in China requires Chinese enterprises to address environmental concerns more forcefully with the aim to overcome green barriers and increase their international competitiveness (Zhao, 2007). Research on the relationship between internationalizing business operations and organizational environmental management practices for Chinese organizations, especially for environmental supply chain management (ESCM) practices that consider both supplier and customer involvement is still in its infancy. Further, it is unclear whether greater ESCM implementation is related to better performance improvement. Understanding relationships between international environmentally oriented institutional (IEI) drivers and ESCM practices, and further if ESCM can bring performance improvement, will allow both Chinese manufacturers and policy makers to make informed-actions when they implement internationally oriented environmental management strategies.

Chinese manufacturers encounter a variety of IEI drivers in managing their global supply chains. Using institutional theory, we posit that IEI drivers pertaining to coercive, normative, and

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mimetic isomorphic forces prompt an environmental focus by Chinese manufacturers to compete in international markets and are key elements in determining their extent of adopting ESCM practices. We thus aim to examine if there exist different clusters of Chinese manufacturers based on the IEI isomorphic drivers encountered by them. We develop general research propositions based on the supposition that different forms of IEI isomorphic drivers will be associated with differing levels of adopting ESCM practices by Chinese manufacturers. We also investigate whether IEI isomorphic drivers are critical for improving manufacturer environmental and business performance. These driver characteristics are helpful for determining whether manufacturing organizations should take advantage of internationalization drivers in improving their performance. Overall, we find that there are significant results for our propositions which help to further expand the understanding and application of institutional theory to study the internationalization of environmental management practices.

To achieve our research objectives, in Section 2 we briefly introduce institutional theory as the theoretical foundation for our two propositions relating to ESCM practices among Chinese manufacturers. The two propositions are elaborated in Section 3. In Section 4, we discuss the methodology employed for testing the propositions and the findings. We conclude with a summary and future research directions in Section 5.

2. Theoretical background and propositions

2.1. International environmentally oriented institutional drivers for ESCM practices

According to the institutional theory, environmental alignment with business operations may be influenced by three forms of isomorphic drivers: normative, coercive, and mimetic (DiMaggio and Powell, 1983).

Normative isomorphic drivers cause enterprises to conform in order to be perceived as having legitimate organizational activities. China has attracted more foreign investment, providing motivation for Chinese manufacturers to better serve foreign customers by improving their environmental performance – increasingly a precondition for satisfying the environmental social expectations of foreign customers. For example, a number of foreign investors and multinational corporations such as Bristol-Myers Squibb, IBM and Xerox have encouraged, not necessarily required, their Chinese suppliers to develop environmental management systems (EMS) in compliance with ISO 14001 (Yin and Ma, 2009). But sales to foreign customers may also be more direct and encompass the need to generally meet social consumer expectations and norms. In fact, ISO 14000, even when not required, is viewed as a signal to the market that the organization is meeting the social expectations of sound environmental performance and is a self-regulatory mechanism to meet socially desirable expectations (King et al., 2005; Lo et al., 2010; Terlaak, 2007). Thus, sales to foreign customers – an integral element of globalization – is an international *normative* isomorphic driver for Chinese manufacturers to implement ESCM practices.

Second, conformity through coercive isomorphic drivers occurs from influences exerted by those in power. Government agencies are an example of powerful institutions that may coercively influence the actions of an organization through, for example, fines and trade barriers (Rivera, 2004). One such international regulatory scheme, take-back obligations, especially in Europe, has been designed for electronics products used in the European Union member countries (Barba-Gutierrez et al., 2008). Although China, as one of the main developing countries (Nnorom and Osibanjo, 2008), is in the process of establishing such regulations, international laws in other regions such as the European Community Directive on waste electrical and electronic equipment (WEEE) have caused China and Chinese firms to reevaluate their investment recovery and reclamation programs (Yu et al., 2008). Nearly one quarter of exported electronic/electrical appliances in China are sold to the European Community, and in 2003 products with sales of about 30 billion US dollars were under the auspices of the WEEE regulations. It was estimated that Chinese companies will pay about 3–5% of the sales price for the treatment of used products which amounts to about 0.9–1.5 billion US dollars (CCTV-2, 2004). Thus, we consider export countries' environmental regulations as a *coercive* IEI isomorphic driver for Chinese manufacturers to adopt environmental management practices.

Finally, mimetic isomorphic drivers occur when organizations imitate the actions of successful competitors in an industry, in an attempt to replicate the path of their success. Operating under environmental uncertainty, it is natural for organizations to benchmark or even imitate industrial best practices to stay competitive (Wong et al., 2009c). When the benefits of a management practice are unclear, the goals are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations (DiMaggio and Powell, 1983; Wong et al., 2009a). Organizations borrow the "innovation" of management practices (ISO 14001 in this case) from both foreign and local competitors that they perceive to be more legitimate or successful to play it safe among competition (Lai et al., 2006). In China, one main purpose of internationalization for companies is to address competitive disadvantages (Child and Rodrigues, 2005). Globalization has created opportunities for Chinese manufacturers to learn from and share innovations with their foreign competitors, especially those operating in China (Liu and Buck, 2007). For example, the electrical/electronics industry in China has a long-term history of international business exposure through exporting products to multinational companies. Compared to other industries, the electrical/electronics industry in China seems to implement better environmental management practices, and experiences in this industry can be disseminated to other industries in China. Evidence of some mimicking occurred in the electronic and communication device manufacturers who accounted for an impressive 71% of total ISO 14001 (environmental certification) certified organizations in China by the end of 2001 (Zhu and Zhao, 2004). Whether ISO 14001 actually accrues organizational benefits is controversial in the literature, and yet it is still a voluntary practice instead of a regulatory requirement (Yang et al., 2009). The high adoption rate of this standard is more likely to be driven by its symbolic value for legitimacy held among competitors rather than actual performance. This example of following green strategies of foreign producers and competitors in the same product category is a *mimetic* IEI isomorphic driver for Chinese manufacturers.

Organizations are not exposed to the same types of drivers or to the same extent. Globalization, especially after China's entry into the World Trade Organization (WTO), may result in stronger drivers for many Chinese enterprises to improve their environmental performance. Sometimes, it is the latest global environmental issue that is puzzling Chinese regulatory bodies such as the State Environmental Protection Agency, which may emphasize one environmental issue and a specific industry over other environmental issues and industries. For example, with the Kyoto Protocol requirements and international drivers for reducing greenhouse gas emissions, there may be differing and increased drivers on those industries that are heavy emitters of greenhouse gases (e.g., power generation). Regulatory policies such as the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS) and WEEE have differentiating influences on petro-chemical and electronics/electrical industries, respectively. It is important to recognize and understand

whether these differences do exist among industries. In response, the related organizations can develop a more effective plan to tackle these various drivers, especially those unfamiliar with the ecological and economic circumstances in China. Also, understanding the source of the drivers for environmental improvements and determining if those drivers vary in industrial sectors will be useful references for policy makers who may wish to guide the industry/environment relationship within China. Overall, different industries have different controls in competition, uncertainty and technology, and thus individual firms in different sectors are presented with different types and intensities of environmental challenges (Zhu and Sarkis, 2006). In particular, manufacturing enterprises in developing economies encounter a more vulnerable international supply chain environment where transportation and product distribution strategies are critical for their performance success (Saranen et al., 2010). One viable operations strategy for them to compete is environmental management which has been found effective to reinforce manufacturing competitiveness in terms of cost, delivery and quality for managing the supply chains (Yang et al., 2010).

2.2. Environmental supply chain management and performance improvement

As noted earlier, globalization brings both opportunities and drivers for Chinese manufacturers to improve their environmental performance through ESCM practices, encompassing the working relationship upstream with suppliers and downstream with customers. After China's entry into the WTO, more foreign companies have initiated operations within China, increasing the opportunity for Chinese manufacturers to serve as foreign company suppliers. These early foreign company drivers caused many Chinese manufacturers to rethink the role of environmental management practices in their organizational strategies and operations (Zhang et al., 2008).

Product export is one main driver for Chinese manufacturers to implement environmental management practices (Zhang et al., 2008). To export products, Chinese manufacturers are required to improve their environmental management practices, not only internally, but also with their suppliers. For example, according to the RoHS directive, Chinese manufacturers exporting electrical products to the European Union market must avoid using six types of hazardous substances including lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers in their products. ESCM practices, particularly those involving cooperation with suppliers and raw material testing, are considered key challenges in addressing issues to avoid using such hazardous substances (Yu et al., 2008).

With internationalization, Chinese manufacturers are required to compete with their foreign competitors. Since some Chinese industries such as power generation and utilities are more domestic-focused, whereas others such as the electronics industry are more globally focused, we speculate that differing national and international drivers and related motivations for ESCM practices across Chinese industries and organizations exist. For example, the electronics industry in China has comparatively more manufacturers that are ISO 9000 and ISO 14001 certified relative to other industries due to the environmental requirements by their foreign customers or regulations and social expectations of their exporting countries (Zhu and Zhao, 2004).

Over the years, further evidence has shown that pressure for enhanced environmental regulation and product standards from principal developed-world importers of Chinese goods may socially (normatively) urge Chinese firms to self-regulate rather than attempting to reduce the cost of their exports by lowering environmental standards. These self-regulation results have indicated that rather than causing Chinese firms to engage in a "race to the bottom" with the lowering of environmental standards, increased trade and investment encourages more consideration of environmentally sound policy and practices (Zeng and Eastin, 2007).

Based on the preceding arguments, we put forward our first proposition:

Proposition 1. *Chinese manufacturers encountering stronger international environmentally oriented institutional isomorphic drivers tend to implement environmental supply chain management practices more intensively.*

As a developing country, China highlights economic development as a priority, but these demands of economic modernization place competing demands upon Chinese manufacturing managers who are also increasingly required to act responsively towards improving the environment, especially in light of the increasing global focus on China's substantial environmental problems, following its entry into the WTO. In response to these nascent issues, the Chinese government has been instituting approaches to environmental management, such as establishing stricter environmental regulations, promoting cleaner production, and encouraging ISO 14001 certification (Yuan et al., 2006) in what has been termed a 'Circular Economy' (Fang et al., 2007; Sarkis and Zhu, 2008; Yang and Feng, 2008; Zhu et al., 2010). Environmental improvements, for example, through logistics management innovation, are also increasingly demanded and expected by Chinese enterprises' international chain of partners. To improve environmental performance, Chinese manufacturers have also implemented ESCM practices. By cooperating with their suppliers and customers, Chinese manufacturers have been paying efforts to improve their environmental situations and operational efficiencies (Yang et al., 2010).

We argue that the various IEI isomorphic drivers, which represent the initiatives for Chinese manufacturers to embrace ESCM initiatives, will provide Chinese organizations with insights not only on the opportunity to enhance profitability, but also on the potential to enhance international trade partnerships by addressing regulatory and competitive requirements for reducing environmental damages in the global logistics chain. ESCM practices geared towards cooperation with suppliers and customers help organizations integrate technological organizational innovations, thus providing for the concurrent improvements in operational, economic, and ecological performance (Lai et al., 2010). Chinese companies maintaining better relationships with foreign investors will tend to achieve better productivity and thus be more successful in the market (Guthrie, 2005).

The link between these performance measures is further supported by the evidence that a proactive environmental approach, often caused by drivers beyond domestic regulatory drivers, can prepare enterprises for superior longer-term performance through improved management of environmental risks and the development of organizational capabilities for continuous environmental improvement in Chinese manufacturers (Zhu and Sarkis, 2004).

Overall, the literature has discussed varying ways organizations can gain value from ESCM including: (1) cost savings from efficiency and other environmental savings, new revenue generation from practices such as asset recovery; (2) new uses for by-products and reuse; (3) better reputation and image due to more environmentally sound practices; and (4) expanding markets and further supporting the 'right-to-operate' due to more environmentally conscious processes and products (Ambec and Lanoie, 2008; Budeanu, 2009; Sarkis, 2009). Thus substantial business and operational performance opportunities, beyond just improved

environmental performance, exist from adoption of ESCM practices.

Based on the preceding arguments, our second proposition is:

Proposition 2. *Chinese manufacturers encountering stronger international environmentally oriented institutional isomorphic drivers tend to achieve better overall performance.*

3. Methodology

3.1. Data collection

To collect data for evaluating our propositions, we utilized questionnaire surveys administered to Chinese manufacturers in 2007 with a focus on the chemical/petrochemical, electronic, automobile, and mechanical/machining industries. These industries are characterized with relatively higher levels of resource consumption, waste production, and implementation of environmental management practices. Reflecting the distribution of such industries in China, we chose major cities and industrial zones as our targeted research areas and carried out our surveys mainly in Suzhou of Jiangsu Province in Southeast China, Dalian of Liaoning Province in Northeast China, and Tianjin in Mid-east China. These regions represent some of the most industrially concentrated and densely populated areas within China and are representative of the overall Chinese manufacturing industry.

To ensure the content validity of the questionnaire, we completed a pretest for two manufacturing enterprises within each of the four industrial categories. The pretest aimed to determine if the questionnaire was fully understood and whether there were ambiguities in the questionnaire items based on practitioner feedback. Each pretest interview lasted about half a day (four hours). Only minor modifications were required focusing primarily on improvement in question legibility and understanding according to the suggestions by the interviewees.

Out of the 600 questionnaires administered to all the manufacturing enterprises and their representatives, a total of 377 unique and usable manufacturing enterprise responses were received. The target respondents for this study possessed middle or senior management experience. This level of key respondent is supported by other similar research studies on supply chain relationships such as Lai et al. (2008) who considered that mid-level managers are participative and knowledgeable in organizational practices such as ESCM in the supply chain, which is consistent with our findings from extensive corporate interviews beyond the survey questionnaire. Among the 377 responses, 120 (31.8%) are from the chemical/petrochemical industry, 65 (17.2%) are from the electronics industry, 75 are from the automobile industry (19.9%), 68 (18.0%) are from the mechanical industry, and 49 (13.0%) are unknown. We targeted manufacturers with different ownerships and size. The respondents include 159 state-owned manufacturers (42.2%), 112 private Chinese manufacturers (29.7%) and 106 foreign manufacturers or joint ventures (28.1%); 128 (34.0%) are small manufacturers with less than 300 employees, 131 (34.7%) medium-sized manufacturers with between 300 and 2000 employees, and 118 (31.3%) large manufacturers with over 2000 employees.

Non-response bias can be a problem for interpretation of empirical results. To evaluate the threat of the potential bias problem, we separated the completed questionnaires into two groups. There were 142 questionnaires in the first group which were returned within 2 weeks after the survey mailing. We made follow-up phone calls to encourage participation in this study and received an additional 235 completed questionnaires within a month of the phone calls. This batch of questionnaire returns was classified as the second group. We performed a series of *t*-tests to compare mean values of all the theoretical constructs between the two groups and found no significant differences at the $p > 0.05$ level. This test result suggests that non-response bias should not be a problem in this study (Armstrong and Overton, 1977).

3.2. Questionnaire development

Three questions were developed to operationalize the three international drivers. First the *normative isomorphic drivers* are operationalized by determining whether their environmental motivation (driver) arising from the institutional driver is attributable to sales to foreign customers. *Coercive isomorphic drivers* are operationalized by asking the extent of environmental pressures encountered from the export countries' environmental regulations. The third, *mimetic isomorphic drivers* are operationalized by asking the extent of environmental pressures encountered from competing with 'green' products against foreign producers (i.e., foreign competitors in product categories emphasizing greenness in their products). Respondents were asked to respond using a five-point Likert-type scale (i.e., 1 = not at all important, 2 = not important, 3 = neutral, 4 = important, 5 = extremely important).

In responding to the drivers for environmental protection and improving performance outcomes, Chinese manufacturers have started to revamp their supply chain operations to focus on cooperation with their upstream and downstream partners (Wong et al., 2009b). In our paper, ESCM practices include green purchasing (GP) on the input side and customer cooperation (CC) with environmental concern on the output side, reflecting the importance of cooperation in the supply chain to preserve the environment. For measurement, nine items for GP and seven items for CC (see details in Table 3) were developed on the basis of previous studies (Zsidisin and Hendrick, 1998; Walton et al., 1998). Questions were answered using a five-point scale, i.e., 1 = not considering it currently, 2 = planning to consider it, 3 = considering it currently, 4 = carrying out to some degree, 5 = carrying it out fully.

Organizational performance improvements due to international drivers through the implementation of ESCM practices are operationalized using items from a previous study on environmental practices and performance (Zhu et al., 2005). These overall organizational performance improvements can be categorized into environmental, economic, and operational performance. *Environmental performance* includes six questions related to reduction of air emission, reduction of waste water, reduction of solid wastes, decrease of consumption of hazardous/harm/toxic materials, decrease of frequency of environmental accidents, and improvement in an enterprise's environmental situation. The five questions on *economic performance* included whether environmental management practices influence caused a decrease of costs for materials purchasing, decrease of costs for energy consumption, decrease of fees for waste treatment, decrease of fees for waste discharge, and decrease of fines for environmental accidents. The six questions for evaluating *operational performance* include increased amount of goods delivered on time, decreased inventory levels, decreased scrap rate, promote products' quality, increased product line, and improved capacity utilization. Questions concerned with these performance indicators were designed with anchor on a five-point scale (1 = not at all, 2 = very little, 3 = to some degree, 4 = relatively significant, 5 = significant). The survey questionnaire of this study was initially developed in English with translation by one of the authors who is a native Chinese speaker and subsequently administered in the Chinese language during the survey data collection.

Table 1
ANOVA statistics and cluster means on international environmentally oriented drivers.

Factor/cluster	Cluster 1 (n = 140)	Cluster 2 (n = 186)	Cluster 3 (n = 51)	F
Sales to foreign customers	4.64	3.62	1.96	307.03***
Export countries' environmental regulations	4.81	3.81	2.39	260.64***
Green strategy of same product (foreign) producers	4.54	3.35	2.24	186.49***
International drivers	4.66	3.60	2.20	856.15***

Scales are 1 = not at all important, 2 = not important, 3 = neutral, 4 = important, 5 = extremely important.
*** $p < 0.001$.

4. Results and discussion

4.1. Comparison of IEI isomorphic drivers

To determine if there are different clusters of Chinese manufacturers in terms of their perceived IEI isomorphic drivers, a statistical cluster analytical approach was adopted with both hierarchical and non-hierarchical cluster methods in our data analysis (Hair et al., 2010). An agglomeration schedule of hierarchical cluster analysis was used to determine how many clusters should be formed. A large increase of coefficient values appeared between the third and fourth stages. This result supported a three clusters solution. After performing the hierarchical analysis, a K-mean cluster analysis (a non-hierarchical clustering technique) of the three factors was performed. The results in Table 1 show that the 377 respondent manufacturers were assigned to one of the three clusters in the K-mean cluster analysis – 140 in cluster 1, 186 in cluster 2, and 51 in cluster 3. To assess whether the mean values of the three drivers were significantly different across the three clusters, analysis of variance (ANOVA) and the Scheffe multiple test were performed. The test results are summarized in Tables 1 and 2. The ANOVA results indicate that statistically significant differences, i.e., $p < 0.001$, exist among the three IEI drivers and the overall driver (average of the three drivers). As indicated in the Scheffe multiple comparison test results, each cluster has unique attributes. Thus, a clear difference exists in the IEI drivers on the sample Chinese manufacturers.

We label the three clusters of Chinese manufacturers as *mature internationalization*, *emergent internationalization*, and *domestic-focused*. The first cluster (n = 140), characterized with the strongest IEI isomorphic driver encountered and labeled as mature internationalization, accounts for 37.1% of the sample. All mean values for the three international drivers and the overall driver are over 4.50, which indicate that manufacturers in this cluster experience all three IEI isomorphic drivers and consider all these drivers important. The second cluster (n = 186) accounts for nearly half of the sample (49.3%). The manufacturers in this cluster encounter those international drivers but only partly consider such drives important with all mean values for the three international drivers and the overall driver between 3.00 (neutral) and 4.00 (important). Thus, we label this cluster as emergent internationalization. The third cluster has 51 samples representing only 13.5% of the total. The manufacturers in this cluster tend not to seriously consider those international drivers with all means values for the three international drivers and the overall driver less than 2.39 (2 = not important, 3 = neutral). Thus, we can reasonably conclude that the manufacturers in this cluster are domestic-focused or less internationalized with their markets and operations.

Further analysis shows that foreign companies or joint ventures have more representation in cluster 1, mature internationalization (55, 39.3% of 140), followed by cluster 2, emergent internationalization (43, 23.1% of 186) and cluster 3, domestic-focused (8, 15.7% of 51). State-owned companies have similar representation among the three clusters of Chinese manufacturers, i.e., 59 (42.1%) in cluster 1, 76 (40.9%) in cluster 2, and 24 (47.1%) in cluster 3. There are less private companies in cluster 1 (26, 18.6% of 140), with a higher representation in cluster 2 (67, 36.0% of 186) and in cluster 3 (19, 37.2% of 51).

These results are noteworthy since the majority of respondent manufacturers have experienced IEI isomorphic drivers. These results support our argument that the Chinese manufacturing industry is geared towards a global market and that international drivers for environmental improvements are motivated from internationalization.

4.2. Comparison of implementation for ESCM practices

A one-way ANOVA was performed to examine if differences exist among the three clusters in their extent of adopting ESCM practices. Results shown in Table 3 indicate that ESCM practices are to a large extent significantly different among the three clusters characterized by IEI isomorphic drivers. Mature internationalization manufacturers have the highest level of adopting GP and CC practices with overall mean values of 2.93 for both. Emergent internationalization manufacturers partly consider GP practices and adopt them at a lower level with a mean value of 2.54 but at a comparable level of adopting CC with those of the

Table 2
Scheffe multiple comparison test results.

Factors	Clusters	Level of significance	
		2	3
Sales to foreign customers	1	1.01***	2.67***
	2		1.66***
Export countries' environmental regulations	1	1.00***	2.42***
	2		1.41**
Green strategy of same product (foreign) producers	1	1.19***	2.31***
	2		1.12***

** $p < 0.01$.
*** $p < 0.001$.

Table 3
ANOVA statistics and cluster means on environmental supply chain management practices.

Practice/cluster	Cluster 1 (n = 140)	Cluster 2 (n = 186)	Cluster 3 (n = 51)	F
Green purchasing	2.93	2.54	2.13	14.12***
1. Providing design specifications to suppliers that include environmental requirements for purchased items	3.29	2.80	2.32	11.71***
2. Cooperation with suppliers for environmental objectives	3.30	2.71	2.35	15.61***
3. Environmental audit for suppliers' internal management	2.81	2.54	2.36	2.99
4. Suppliers' ISO 14000 certification	3.28	2.72	2.45	10.14***
5. Second-tier supplier environmentally friendly practice evaluation	2.45	2.38	2.04	2.18
6. Adopting just-in-time logistics system for supplier cooperation	2.71	2.50	2.06	4.54*
7. Suppliers are selected using environmental criteria	3.07	2.69	2.28	8.84***
8. Cooperating with suppliers to reduce packaging	2.77	2.57	2.00	7.00***
9. Require suppliers to use environmental packaging (degradable and non-hazardous)	2.97	2.51	1.96	13.28***
Customer cooperation with environmental concerns	2.93	2.90	2.51	3.64*
1. Cooperation with customers for eco-design	2.82	2.67	2.60	0.96
2. Cooperation with customers for cleaner production	3.07	2.97	2.36	7.26***
3. Cooperation with customers for green packaging	3.09	2.98	2.48	4.78**
4. Cooperation with customers for using less energy during product transportation	3.09	3.07	2.82	1.03
5. Adopting third-party-logistics for customer cooperation	3.29	3.20	2.66	4.77**
6. Cooperation with customers for product take-back	2.85	2.99	2.34	5.12**
7. Cooperation with customers for reverse logistics relationships	2.63	2.85	2.48	2.01

Scales are 1 = not considering it, 2 = planning to consider it, 3 = considering it currently, 4 = initiate implementation, 5 = implement successfully.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

mature internalization manufacturers showing a mean value of 2.90. Domestic-focused manufacturers only plan to consider GP with a mean value of 2.13 and partly consider CC with the mean value of 2.51. Thus, Proposition 1 is supported. The stronger the IEI isomorphic drivers, the greater the intensity of adopting ESCM practices.

Even though, in general, the mean values for ESCM practices in manufacturers with mature internationalization are highest followed by those with emergent internationalization and those with domestic focus, but their values are not markedly different. As noted in Table 3, differences in the mean values for the ESCM practices are less than those for the international drivers reported in Table 1.

Further analysis of individual GP practices provides insights into the characteristics among the three manufacturer clusters on implementing these practices. The mature internationalization manufacturer cluster has considered or even partly initiated some of the GP practices showing the mean values over 3.00, while the emergent internationalization manufacturer cluster has only partly considered such GP practices displaying the mean values less than 3.00. The domestic-focused manufacturer cluster has only planned to consider such practices with mean values less than 2.50. Three measurement items of GP practices that are more emphasized include providing design specifications to suppliers that include environmental requirements for purchased items, cooperation with suppliers for environmental objectives, and suppliers' ISO 14001 certification. Two GP practices are less emphasized by the manufacturers, environmental audit for suppliers' internal management and second-tier supplier environmentally friendly practice evaluation. These two practices are only partly considered by all three manufacturer clusters, with all mean values less than 3.00.

The difference in the implementation of CC practices is at lesser levels than those of GP practices among the three manufacturer clusters. Mature internationalization manufacturer cluster and emergent internationalization manufacturer cluster are both at the consideration stage in the implementation of all the CC practices. The domestic-focused manufacturer cluster lags behind the two other clusters in the implementation of the four CC practices including cooperation with customers for cleaner production, cooperation with customers for green packaging, adopting third-party-logistics for customer cooperation, and cooperation with customers for product take-back, at the mean values of 2.36, 2.48, 2.66, and 2.34, respectively.

4.3. Comparison of performance improvement across internationalization clusters

A one-way ANOVA was carried out to examine if performance differences exist among the three manufacturer clusters according to their internationalization level. Statistical results shown in Table 4 indicate that performance improvements are significantly different among the three manufacturer clusters. Generally, the mature internationalization manufacturer cluster encountering the highest level of IEI isomorphic drivers tend to achieve better performance improvement with an overall performance mean value of 3.39, which is somewhat higher than those of the emergent internationalization manufacturer cluster with an overall performance mean value of 3.26. The domestic-focused manufacturer cluster characterized with the lowest level of implementing ESCM practices lags behind the other two clusters in performance improvements with the overall performance mean value of 2.89. Thus, Proposition 2 is generally supported.

When compared to ESCM practices, it is noteworthy that performance improvements are found to have similar significant differences among the three manufacturer clusters. The highest significant difference is observed in operational performance improvement, with a mean value of 3.49 for the mature internationalization manufacturer cluster, 3.28 for the emergent internationalization manufacturer cluster, and 2.83 for the domestic-focused manufacturer cluster. All the three manufacturer clusters achieve a certain degree of environmental performance improvements with the mean values over 3.00; they are 3.57, 3.32, and 3.18, respectively. It is somewhat surprising that the emergent internationalization manufacturer cluster has slightly better economic performance improvement with a mean value of 3.21 than that of the mature internationalization manufacturer cluster with a mean value of 3.19. Mature internationalization manufacturer cluster encounter the highest international driver from foreign customers and competitors, and thus implement environmental management practice at a higher level to maintain these

Table 4
ANOVA statistics and cluster means on GSCM performance.

Factor/cluster	Cluster 1 (n = 140)	Cluster 2 (n = 186)	Cluster 3 (n = 51)	F
Environmental performance	3.57	3.32	3.18	4.38*
Economic performance	3.19	3.21	2.61	9.58***
Operational performance	3.49	3.28	2.83	11.52***
GSCM performance	3.39	3.26	2.89	8.60**

Scales are 1 = not at all, 2 = a little bit, 3 = to some degree, 4 = relatively significant, 5 = significant.
* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

international trade relationships. Thus, they may tend to spend more resources on these environmental management practices which may erode their economic benefits, at least in the short term. Another possible reason is that those manufacturers in the mature internationalization cluster tend to export larger quantities of products. In this situation those exporting a large product volume to international locations may suffer higher costs for selling their products due to tariffs, shipping costs, or other high resource consumption which will adversely affect their economic profitability. The underlying reason for this interesting finding will need more detailed investigation. Another issue here is that there may be decreasing returns on performance with ESCM practices in terms of possible generation of additional performance results as organizations further internationalize. Again, this relationship and linkage requires additional investigation.

5. Conclusions

China's entry into the WTO represents a major stepping stone to accelerate the internationalization efforts of this country. This growing internationalization trend presents Chinese manufacturers with increasing international drivers when they export products, become suppliers of foreign companies, and compete with foreign competitors operating in China. Using the institutional theory to examine the various IEI isomorphic drivers, we grouped Chinese manufacturers into three clusters characterized with mature internationalization, emergent internalization, and domestic-focused in business orientation. We found that the increased IEI isomorphic drivers are associated with higher levels of ESCM practice adoption.

We also found that these drivers have caused Chinese manufacturers to strive to improve the environmental aspects of their operations and attain subsequent performance improvements. The significant differences in the IEI isomorphic drivers encountered by the three manufacturer clusters suggest that they also vary in performance improvements and ESCM practices. In particular, Chinese manufacturers with international exposure tend to reap better economic performance than those with a domestic focus. It should be noted that the international drivers are not necessarily related to greater economic performance improvement though the mature internationalization manufacturer cluster implement higher level of ESCM practices than those of the emergent internationalization manufacturers.

One implication that can be drawn from our findings is that manufacturing organizations can gain value from their responses to the international drivers for environmental protection. Thus, Chinese manufacturers can embrace internationalization with little fear of dampening their performance. However, further research is needed on why improved environmental, economic and operational performance is occurring. We have made some initial conjectures that with these increased drivers, Chinese manufacturers employ ESCM practices as a response, and that these practices can be helpful for them to reap performance gains on environmental, economic and operational dimensions. One implication is that internationalized manufacturers should take further advantage of their ESCM practices to further improve their performance. Perhaps it is still relatively early in the adoption of ESCM practices by Chinese manufacturers and that over time the differences in performance may widen. A longitudinal study investigating this maturing ESCM practices conjecture is a direction for future research.

Chinese policy makers can be relatively confident that this internationalization trend may be valuable for enhancing the ecological modernization efforts in China, where officials target to attain both economic growth and environmental improvement or minimal degradation. Internationalization can be a viable option for Chinese manufacturers to cooperate more effectively with suppliers and customers, advancing the development of their competence on a global scale.

This is one of the first studies to investigate the role of IEI isomorphic drivers in a manufacturing context on ESCM practices and performance outcomes with internationalization as a basic driver. This study further supports the applicability and usefulness of institutional theoretic foundations to study both internationalization and environmentalism as well as their inter-relationships. Also, there is further support that institutional theoretic concepts are applicable and useful to advance understanding on implementing environmental management under these contexts within a developing country environment, thus strengthening this theory and providing policy insights on the implementation diffusion.

Clearly, there are limitations to this study that further research can address. First, a more in-depth investigation of individual isomorphic pressures and the strengths of their influence on the ESCM of Chinese manufacturers is needed. These limitations also include the need to investigate the direct causal relationships between the three theoretical variables in this study (international drivers, ESCM practices, and performance) and to rule out reverse causality or causation between performance and investment of resources for implementing ESCM practices. That said, those outperforming organizations are better resourced for implementing ESCM practices and tackling the international drivers. Also, we have only considered the manufacturer clusters and the basic drivers–practice–performance relationships. However, there may be other issues (e.g., type of ownership) and practices (technologies, supply chain management practices) that may play a role in these relationships and are thus worthy of further research attention.

Another issue is whether domestic Chinese regulations exert drivers for environmental management efforts such as ESCM practices in the same extent as comparable in strength to those exerted by international entities. Second, we find that the Chinese manufacturer cluster experiencing greater international drivers – mature internationalization – is found to have relatively insignificant differences in economic performance improvement when compared to the emergent internalization manufacturer cluster. We proposed a couple of reasons to explain this result, but further investigation is

warranted to help organizations better understand how to limit this economic loss (or lack of improvement). Economic performance is a large driver of organizational efforts for environmental protection and poor environmental performance may adversely affect Chinese manufacturers' motivations to enter into the international market. If there are environmental reasons inhibiting economic performance improvements, convincing manufacturers to adopt environmental management practices in tackling the international drivers may be a difficult barrier for Chinese policy makers to overcome.

Finally, the survey was administered in two highly industrialized provinces within China. Sometimes environmental regulations and enforcement will vary at the provisional and municipal governmental levels. Extending this study to other provinces within China can help determine whether variations in regionalized regulatory policy and enforcement may cause variations in internationalization and other environmental issues. This area is quite fertile for additional research.

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