

Relationships Among Institutional Pressures, Top Managers' Postures, and Green Supply Chain Management: A Case Study of High-Tech Industries in Taiwan

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ABSTRACT

Because of the limited number of studies investigating the factors that drive organizations to implement green supply chain management (GSCM), several questions require further clarification. A review of the green supply chain research showed that few studies have explored the relationship between institutional pressures and GSCM, and that they have not answered why organizations facing the same institutional pressures adopt different GSCM practices. To investigate this question further, this study applied the effects of top managers' postures toward GSCM. Therefore, institutional theory and top managers' postures were combined to examine the relationships among institutional pressures, top managers' postures, and GSCM implementation. This study used the questionnaire method to collect samples of the electrical and electronics industries in Taiwan. Of 1,000 questionnaires mailed, 180 valid questionnaires were returned. The results revealed four main effects. First, institutional pressures (customer and competitor) have a significant positive effect on the implementation of GSCM. However, government regulations pressures have no effect on the implementation of GSCM. Second, institutional pressures (government regulations, customer, and competitor) have a significant positive effect on top managers' postures toward GSCM. Third, top managers' postures toward GSCM have a significant positive effect on the implementation of GSCM. Finally, institutional pressures through top managers' postures toward GSCM have an indirect effect on GSCM.

Keyword: Green supply chain management (GSCM), Institutional pressures, Top managers' postures toward GSCM

INTRODUCTION

The increased prominence of the climate agenda has had a considerable effect on environmental policies (Huang and Yang, 2014). Therefore, currently, as never before, people are concerned with the environment and climate change (Walker et al., 2008; Zhu et al., 2013). Moreover, with the rise of international environmental regulations, such as the Montreal Agreement, Basel Treaty, Kyoto

Protocol, Waste Electrical and Electronic Equipment (WEEE) Directive, Restriction of Hazardous Substances (RoHS) Directive, and Ecodesign for Energy Using Products (EuP) Directive, companies are increasingly aware that environmental management is an essential strategic problem with the potential for a lasting effect on organizational performance (Huang et al., 2009; Huang and Wu, 2010; Diabat and Govindan, 2011). In business and management, there is an increasing onus on organizations to fulfill their role in society (Huang et al., 2012), including the responsibility to minimize their impact on the environment (Christmann, 2000). Firms are facing increasing pressure to become environmentally responsible and increasingly green. Companies should reevaluate their business approaches to stay profitable in the future (Kumar et al., 2012).

Environmental sustainability stimulates firms to perform corporate environmental practices and to develop green and sustainable supply chain initiatives (Lee, 2008; Walker et al., 2008; Kumar et al., 2012; Wu et al., 2014). Therefore, green supply chain management (GSCM) plays a critical role (Rao and Holt, 2005; Walker et al. 2008; Azevedo et al., 2011; Kumar et al., 2012; Zhu et al., 2011, 2013). GSCM aims at optimizing the overall flow of material and information along the value chain (Beamon, 1999; Zhu et al., 2005; Srivastava, 2007; Azevedo et al., 2011). GSCM practices can include reducing packaging and waste, assessing the environmental performance of vendors, developing highly ecofriendly products, and reducing carbon emissions associated with transporting goods (Rao and Holt, 2005; Zhu and Sarkis, 2007; Walker et al., 2008; Holt and Ghobadian, 2009; Hu and Hsu, 2010). Although GSCM has emerged into an organizational philosophy that enables organizations and their partners to achieve corporate profitability and market-share objectives by reducing environmental risk and impact while improving ecological efficiency (Rao and Holt, 2005; Zhu et al., 2008; Azevedo et al., 2011), numerous barriers hinder corporations in adopting GSCM practices. For example, Walker et al. (2008) determined that internal barriers included cost and lack of legitimacy, whereas external barriers included regulations, poor supplier commitment, and industry-specific barriers. Therefore, the factors influencing the drivers and pressures that encourage corporations to implement GSCM practices warrant further study.

Various stakeholder and institutional pressures stimulate firms to pursue GSCM practices (Sarkis et al., 2011; Zhu et al., 2013). Governmental or regulatory institutional pressure is a critical driver in motivating firms to implement GSCM practices (Sarkis et al., 2011; Zhu et al., 2013). Market need has motivated the adoption of GSCM practices (Walker et al., 2008; Hall, 2001), whereas exports and sales to foreign customers are two critical drivers that stimulate firms to adopt GSCM practices (Zhu and Sarkis, 2006; Sarkis et al., 2011). Institutional theory posits that three institutional isomorphic pressures may influence organizational competitive environmental alignment: coercive, normative, and mimetic pressures (DiMaggio and Powell, 1983; Jennings and Zandbergen, 1995, Sarkis et al., 2011). Many studies have recognized the value of institutional theory for explaining firm-level behaviors (Hoffman, 2001; Delmas and Toffel, 2004; Clemens and Douglas, 2006; Scott, 2014).

Based on institutional theory, we assumed that firms' decisions respond to these pressures (i.e., coercive, normative, and mimetic) rather than endanger the survival of the organization (Selznick, 1949). These pressures exerted on a corporation also influence the organizational practices and structures (Scott, 1995). Indeed, the effect of the institutional environment may facilitate corporations in reducing barriers to implementing GSCM practices (Darnall et al., 2008; Wu et al., 2012). In addition, top managers realize the value of GSCM, thus adding it to the strategic agenda of corporations and devoting resources to its implementation (Handfield et al., 2005; Wu et al., 2012). The individual attitudes of top managers are likely to mediate and buffer the firm and interfirm influence (Ye et al., 2013). Thus, we examined whether top managers' postures (i.e., top managers' attitudes) toward implementing GSCM acts as a mediating variable in the relationship between institutional pressures and GSCM implementation.

This study provides particular contributions. First, from the perspective of institutional theory, we provide additional insights into why firms engage in GSCM practices. Second, because the role of top management in developing and implementing environmental practices has been discussed in numerous studies on corporate environmentalism (Sharma, 2000; Banerjee et al., 2003), we explored the effect of top managers' postures on GSCM implementation. Third, this study is the first to test whether top managers' postures acts as a mediator in the relationship between institutional pressures and GSCM practices. Finally, this study is a response to the call of Sarkis et al. (2011) for future studies to apply organizational theory to investigate GSCM.

This paper is organized as follows: Section 2 introduces the theoretical background and research hypotheses. Section 3 describes the research methodology. Section 4 presents the data analysis and results. Section 5 concludes with the findings, management implications, study contributions, and recommendations of some directions for future research.

THEORETICAL BACKGROUND AND RESEARCH HYPOTHESES

Definition and practices of GSCM

Definition of GSCM. Numerous studies have referred to the green supply chain (GSC) over the past decade because of emerging environmental management topics. The growth in the literature on GSCs began in the early 1990s, with studies on corporate environmental management, environmentally conscious manufacturing strategy, and supply chain management (Zhu et al., 2005). GSC is a multidisciplinary concept that emerges mainly from executing environmental management practices in the context of supply chains (Beamon, 1999). Various studies have offered different definitions.

Beamon (1999) defined GSCM as extending the traditional supply chains to include activities aimed at minimizing the environmental impacts of a product throughout its entire life cycle, such as green design, resource saving, harmful material reduction, and product recycle or reuse. Zhu et al. (2005) indicated that GSCM ranges from green procurement (GP) to integrated life-cycle management,

with the supply chain beginning at the supplier and flowing through the manufacturer and customer to end with reverse logistics. Azevedo et al. (2011) defined GSCM as any action that is performed across the supply chain (SC; inward to the focal company and involving relationships with partners upstream and downstream) to eliminate or reduce any type of negative environmental impact.

This study referred to Srivastava (2007) who defined GSCM as integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, the delivery of the final products to the consumers, and end-of-life (EOL) management once a product outlives its usefulness.

GSCM practices. Numerous studies have examined GSCM, one of the most prominent topics on corporate environmental management to emerge over the past decade. For example, Bowen et al. (2001a) analyzed the implementation patterns of green supply and determined three pattern types, including product-based green supply and advanced green supply. Sarkis (2003) presented a strategic decision framework that entailed using an analytical network process for evaluating green-supply-chain alternatives. GSCM practices cover supplier evaluation (Yang et al., 2010), internal environmental management (Carter et al., 1998; Zhu et al., 2005; Zhu et al., 2007), external GSCM (Rao and Holt, 2005; Vachon and Klassen, 2006; Zhu et al., 2007), investment recovery, ecodesign (Zhu et al., 2005; Zhu et al., 2007), GSC integration, and environment collaboration (Vachon and Klassen, 2006).

Rao and Holt (2005) classified GSCM practice according to internal logistics, internal supply chain, external logistics, and reverse logistics. Zhu et al. (2005) investigated China's textile, automobile, power-generating, chemical/petroleum, electrical, and electronics industries and proposed four methods for implementing GSCM practices: (a) Internal environmental management: Managers support environmental management and install an environmental system. (b) External GSCM: Companies ask their suppliers to enhance their environmental performance and collaborate with their customers. (c) Ecodesign: Companies redesign their products to reduce the use of raw materials and energy and enable these products to be recycled and remanufactured. (d) Investment recovery: Companies sell excess inventory, materials, scrap, and used materials to reclaim the capital. Holt and Ghobadian (2009) examined the level and type of greening the SC in the UK manufacturing sector. Hu and Hsu (2010) explored factors that are critical for implementing GSCM in Taiwan's electrical and electronics industries relative to EU directives and determined 20 critical factors along four dimensions (i.e., supplier management, product recycling, organization involvement, and life-cycle management).

In this study, GSCM practices were classified into five categories according to the research of Zhu and Sarkis (2007): internal environmental management, green procurement, collaboration with customers, investments in waste recycling, and ecodesign.

Previous literature

Numerous studies on GSCM have investigated the internal and external drivers influencing GSCM practices. For instance, Bowen et al. (2001b) analyzed the relationship between supply management capabilities and green supply practices and identified internal drivers for implementing green supply policies (i.e., strategic purchasing and supply, corporate environmental proactivity, and supply management capabilities). Trowbridge (2001) distinguished between internal and external drivers for implementing GSCM at a chip manufacturer. Internal drivers include the willingness to improve risk management because of potential interruptions in the supply chain and collaboration with suppliers to determine alternative materials and equipment that minimize environmental impacts. External drivers include customers, investors, and nongovernmental organizations.

Lee (2008) identified the main drivers compelling companies to participate in GSCM implementation as buyer influence, government involvement, and GSC readiness. Walker et al. (2008) reviewed the literature and identified the factors driving or hindering organizations in implementing GSCM initiatives, including internal drivers, such as organizational factors, and external drivers, such as regulation, customers, competitors, society, and suppliers. Based on interviews conducted at seven different private- and public-sector organizations, they further identified internal barriers, such as cost and lack of legitimacy, and external barriers, such as regulation, poor supplier commitment, and industry specific barriers. Diabat and Govindan (2011) used a framework involving interpretive structural modeling to determine the drivers affecting GSCM implementation. In addition, several studies by Zhu and various colleagues (e.g., Zhu et al., 2005; Zhu and Sarkis, 2006; Zhu et al., 2007, 2013; Zhu et al., 2008) have argued that internal and external pressures and drivers influenced companies to implement GSCM. They reviewed numerous studies for investigating how internal and external pressures and drivers separately influenced GSCM practices. Few studies have explored the simultaneous effect of internal and external pressure and drivers.

Zhu and Sarkis (2007) studied the moderating effects of institutional pressures between GSCM practices and organizational performance by evaluating the simultaneous effect of institutional pressures and firm internal drivers on GSCM. Moreover, Wu et al. (2012) investigated the moderating effects of institutional pressures between firm resource and GSCM practices. Few studies have explored the direct effects of institutional pressures on GSCM; therefore, this topic merits further research.

Chatterjee et al. (2002) argued that top management plays a critical role in establishing an organization's norms and expectations. Several studies have investigated top managers' roles in developing and implementing environmental practices (Sharma, 2000; Banerjee et al., 2003), reverse logistics practices (Carter and Ellram, 1998; Ye et al., 2013), and GSCM implementation (Trowbridge; 2001; Handfield et al., 2005; Zhu et al., 2008). Therefore, we adopted both institutional theory and top managers' attitudes in exploring the relationship among institutional pressures, top managers' postures, and GSCM implementation.

Institutional theory and GSCM implementation

Institutional theory. Institutional theory (Parsons, 1956; Thompson, 1967) investigates how external forces influence an organization. DiMaggio and Powell (1983) argued that managerial decisions are strongly influenced by three institutional mechanisms, namely coercive, mimetic, and normative isomorphism, that create and diffuse a common set of values, norms, and rules, producing similar practices and structures across organizations that share a common organizational field. Jennings and Zandbergen (1995) were the first to use institutional theory for explaining firms' adoption of environmental management practices. Green institutional theory asserts that institutional forces (i.e., coercive, mimetic, and normative) influence how firms address green problems (Jennings and Zandbergen, 1995). Critics of institutional research (Hoffman, 2001) have argued that studies applying institutional theory (Scott, 2014) place excessive emphasis on the homogeneity of organizational populations and not on the processes that may have created this outcome.

An organizational field is defined as "those organizational [spheres] that ... constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products" (DiMaggio and Powell, 1983, p. 148). Therefore, we proposed that all institutional pressures (i.e., government regulations pressures, customer pressures, and competitor pressures) have the capacity to influence an organization's responsiveness to GSCM.

Institutional pressures on GSCM implementation. Regarding institutional pressures and environments, Jennings and Zandbergen (1995) used institutional theory in interpreting enterprises' adoption of environmental management practices and determined that green institutional theory contains coercive, mimetic, and normative institutional power that influences enterprises to resolve green problems. Coercive pressures, mainly stemming from governments, are key drivers of environmental management practices (Hoffman, 2001; Delmas and Toffel, 2004; Clemens and Douglas, 2006; Zhu and Sarkis, 2007; Sarkis et al., 2011; Zhu et al., 2013). Mimetic pressure drives firms to imitate competitors' initiatives in implementing environmental management practices (Carter et al., 1998; Walker et al., 2008; Ye et al., 2013). Normative pressure induces firms to conform their practices to social legitimacy. Customers create these pressures through the market, compelling firms to implement environmental management practices (Hall, 2001; Walker et al., 2008; Zhu et al., 2013). Indeed, the influence of the institutional environment can aid corporations in reducing obstacles to GSCM practices (Darnall et al., 2008; Wu et al., 2012).

Zhu and Sarkis (2007) explored how Chinese manufacturers are driven to implement GSCM because of institutional pressures, whereas Hoffman (2001) indicated that governments, regulators, competitors and consumers, community and environmental interest groups, and industry associations could directly affect a plant's environmental practices. Delmas and Toffel (2004) proposed that interested parties control coercive power and norms to pressure companies, compelling them to adopt environmental management practices. Clemens and Douglas (2006) re-

vealed that institutional pressures affect voluntary environmental actions. Consumer pressure spurs organizations to respond and implement environmental protections for enhancing performance (Kagan et al., 2003). In particular, small companies are under pressure from their customers (Hall, 2001). Ye et al. (2013) indicated that coercive, normative, and mimetic pressures are essential environmental factors for reversing logistics practices. In conclusion, this study suggested that institutional pressures encountered by enterprises affect GSCM implementation, and thus proposed the following hypotheses:

H1: Government regulations pressures have direct positive effect on enterprises' GSCM implementation.

H2: Customer pressures have direct positive effect on enterprises' GSCM implementation.

H3: Competitor pressures have direct positive effect on enterprises' GSCM implementation.

Top managers' postures

Many studies have emphasized that top management plays a key role in establishing an organization's norms and expectations (Chatterjee et al., 2002; Walker et al., 2008). Top management support is necessary to ensure the continuing success of reverse logistics programs (Carter and Ellram, 1998; Ye et al., 2013). Handfield et al. (2005) argued that companies' top management should recognize the consequences of environmental matters in the supply chain. Hu and Hsu (2010) suggested that top management support is one of the critical factors for implementing GSC practice. In this study, we considered top managers' postures because of their potential influence on institutional pressures and GSCM implementation.

Effect of institutional pressures on top managers' postures. From the perspective of institutional theory, organizations are definitely affected by external pressures. An organization must attempt to respond to these pressures; otherwise, the survival of the organization may be endangered (Selznick, 1949). The pressures exerted on an organization also affect its organizational practices and structures (Scott, 1995). Furthermore, Oliver (1997) considered that the institutional pressures exerted on organizations produce the following actions: organizational choices are limited by outside institutional pressures, organizational survival depends on whether the organization can respond and meet the requirements of the outside world, the organization is driven to prove its legitimacy, and the organization is driven by outside interests.

Regarding the relationship between institutional pressures and top managers' postures, Sharma (2000) stated that top executives' cognition of the external environment affects the actions adopted and the environmental strategy selected by an organization. Zhu and Cote (2004) advocated the notion that the driving forces of green actions, such as green trade barriers on exports, investment in overseas downstream manufacturers, consumer pressure, and environmental care also compel top executives to be aware of the consequences of environmental problems and to start thinking about GSCM practices. Seuring (2004) considered

that GSCM necessitates continual cost effectiveness and long-term sustainable development in a company's growth process; whether a company adopted the image and reputation of environmental protection depended on the top executives' concept of environmental consciousness. Government regulatory power and other interested parties make executives cognizant of whether the company's products comply with environmental laws and regulations, affecting the implementation of the company's environmental protection policies (Ye et al., 2013). Zhu and Sarkis (2006) state that governmental regulations and corporate environmental goals are major business pressures; companies cannot ignore environmental problems but must integrate them into their business plan. In summary, this study suggested that institutional pressures encountered by enterprises affect the top managers' posture, and thus proposed the following hypotheses:

- H4: Government regulations pressures have direct positive influence on top managers' postures toward GSCM.
- H5: Customer pressures have direct positive influence on top managers' postures toward GSCM.
- H6: Competitor pressures have direct positive influence on top managers' postures toward GSCM.

Effect of top managers' postures on GSCM implementation. Several studies have emphasized that top management plays a critical role in establishing an organization's norms and expectations (Chatterjee et al., 2002). For instance, top managers' postures have a positive effect on implementing product recovery (Ye et al., 2013). Regarding the relationship between the stewardship behaviors of top managers and GSCM, Banerjee et al. (2003) indicated that the commitment of key management personnel is a strong internal force for promoting the corporate environmental theory of top executives. Sharma (2000) also reported that top executives' cognition of the external environment affects the actions adopted and the environmental strategy selected by the organization. Steger (1996) suggested that the GSC requires a value chain, which entails adopting environmental protection as a basis while creating and learning the organizational culture of a company's management system.

Handfield et al. (2005) believed that a company's top executives should realize the relevance of environmental problems in the supply chain. Trowbridge (2001) indicated that top executives' strong support for GSCM practices and risk management is an internal driver that can enhance the cooperation mechanism among various units. Zhu et al. (2008) argued that top management support could affect the success of new system initiatives by promoting employee empowerment and increasing commitment of the firms' employees. According to this discussion, we considered top managers' posture affects GSCM implementation and thus proposed the following hypothesis:

- H7: Top managers' postures toward GSCM have a direct positive influence on GSCM implementation.

Mediating effect of top managers’ postures

Regarding the relationships among institutional pressures, top managers’ postures toward GSCM, and GSCM implementation, when top executives respond to the concerns or pressures of the institutional environment regarding environmental protection, the top executives must understand environmental problems, their implications for organizations, and how to respond to them (Jennings and Zanbergen, 1995). When companies address environmental protection, top executives must respond to the present market to remain competitive; in particular, frontline staff members within an enterprise frequently lead in grasping customer needs and market information (Ye et al., 2013). Many top executives of Taiwan’s manufacturing industry believe that an enterprise can amplify its market share by adopting green products as a production orientation; this opinion is also consistent with international environmental regulations and is beneficial when determining overseas markets for products (Huang and Wu, 2010).

Current environmental regulations have become increasingly stringent, particularly regarding EU environmental directives. Electronics products exported by Taiwan’s electrical and electronics industry to the European Union are forbidden from containing toxic substances. The directives contain high environmental protection standards. Such external regulatory pressures and the driving pressure from relevant interested parties force top executives to be aware of environmental matters and to contemplate GSCM implementation (Zhu and Cote, 2004). Enterprises are driven to implement GSCM when executives perceive external environmental pressures, thus making products comply with environmental laws and regulations, while also enhancing the company’s image and attaining a competitive advantage (Zhu et al., 2007). In summary, this study suggested that institutional pressures encountered by enterprises affect GSCM implementation in enterprises through top managers’ postures, and thus proposed the following hypothesis:

H8: Institutional pressures through top managers’ postures toward GSCM have an indirect effect on GSCM implementation.

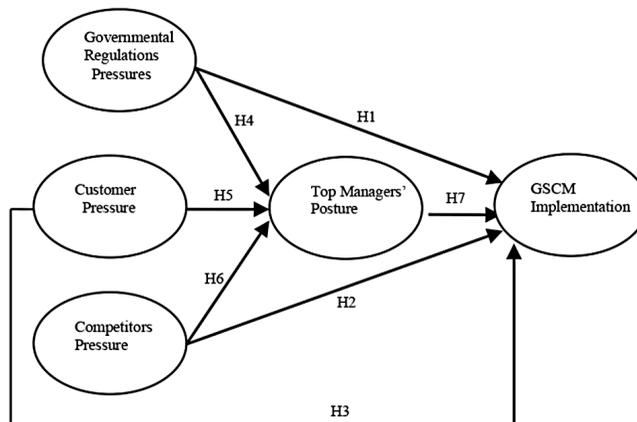


Figure 1. The proposed model of this research.

MATERIALS AND METHODS

Measures

Measures of the constructs were developed at several stages. At the first stage, according to the defined constructs, tentative measures were either borrowed or developed from the literature. At the second stage, to establish content validity, a list of the defined constructs and measures was submitted to a panel of manufacturing, environmental, and purchasing academicians who were identified as authorities on the subject of GSCM. At the third stage, items were refined by conducting five case study interviews, which led to further purification of the items and to changes in the questions for improved understanding. Finally, we pretested our questionnaire instrument to ensure that the questions were clearly understood and easily answered by the respondents. We arranged for various respondents to complete our draft survey, including manufacturing, environmental, and purchasing managers from 36 companies in our industry sample. At this stage, no particular problems with wording or with the validity of the scale or response format were found.

Operational definition

Institutional pressures. The current study defines institutional pressure as those organizations that have the capacity to influence an organization's responsiveness to GSCM, including coercive, mimetic, and normative pressures (DiMaggio and Powell, 1983). We adopted the proposal of Delmas and Toffel (2004) that interested parties use normative and coercive power to exert pressure on an enterprise, including pressures from government regulations, customers, and competitors. All of the items were measured on a 7-point Likert scale, with scores ranging from 1 (very unimportant) to 7 (very important), in which the average of three items for each constituent was adopted for subsequent analysis. The measurements are shown in Appendix A.

Top managers' postures. We modified the definition of Ye et al. (2013) by defining top managers' postures as their attitudes toward GSCM implementation. According to the recommendations of Sharma (2000) and Banerjee et al. (2003), we divided top managers' postures into two constructs: a cognitive mechanism and an emotional mechanism.

We refer to the measurement items of Ye et al. (2013) to assess the level of top managers' posture towards GSCM. All of the items were measured on a 7-point Likert scale, with scores ranging from 1 (very strongly disagree) to 7 (very strongly agree), in which the average of three items for each constituent was adopted for subsequent analysis. The measurements are shown in Appendix A.

GSCM implementation. We adopted the definition of Srivastava (2007) and considered that GSCM implementation entails incorporating environmental concepts into supply chain management, including product design, material purchase, manufacturing processes, the ultimate consumer, and product recycling. According to the procedures of Zhu and Sarkis (2007), we divided GSCM practices into five constructs: internal environmental management, green procurement, collaboration with customers, investment in waste recycling, and ecological design. All of the

items were measured on a 7-point Likert scale, with scores ranging from 1 (not considering it) to 7 (implementing very successfully), in which the average of three items for each constituent was adopted for subsequent analysis. The measurements are shown in Appendix 1.

Sampling and data collection

Taiwan is an excellent case study of an emerging market for green management practice for several reasons. First, the Taiwanese business environment has undergone considerable adjustments, thus creating much uncertainty. Numerous Taiwanese companies are thus under increasing pressure to develop appropriate practices for meeting the challenges of this uncertain business environment (Huang and Wu, 2010). Second, Taiwan is an export-oriented economy; according to the Taiwanese Ministry of Economic Affairs, the export of electrical and electronics products to the European Union, for example, exceeds US\$7.8 billion per year (Hu and Hsu, 2010). Finally, implementing the WEEE and RoHS policies has considerably influenced Taiwan's electrical and electronics industries, which comprise approximately 30,000 manufacturers, hence presenting major challenges to firms implementing GSCM in Taiwan.

Data collection entailed distributing questionnaires to various companies involved in electrical and electronics manufacturing, which included producers of semiconductors, optoelectronics, communications and networking equipment, household appliances, electronics, and computers. We selected participants from the 2011-2012 members of the Taiwan Electrical and Electronics Manufacturers' Association (TEEMA), With more than 3,600 members and a long history (since 1948), TEEMA is the foremost association in Taiwan. We randomly selected 1,000 member companies as a sampling standard from those with a capital of more than NT\$10 million. Distributed through postal mail, the questionnaires were addressed to the managing directors of the manufacturing or purchasing departments of the target organizations, because most of the sample companies may have lacked GSCM representatives or departments.

Vigorous follow-up procedures, including reminder mailings, were employed to ensure a sufficiently high response rate. Among the 180 valid questionnaires that were returned, first-generation businesses constituted most of the respondents (78.3%), followed by second-generation businesses (14.4%). Furthermore, enterprises with 200-1000 employees constituted most of the respondents (52.2%), followed by those with less than 200 employees (37.8%).

RESULTS

Reliability and discriminant validity

SPSS Version 19.0 and AMOS Version 18.0 were used to assess the correlations among the questionnaire constructs. The following statistical methods were employed: reliability and validity analysis, confirmatory factor analysis, and structural equation.

We assessed construct reliability by calculating Cronbach’s alpha coefficients. According to Cuieford (1965), Cronbach’s α values higher than 0.7 indicate high reliability, whereas values between 0.7 and 0.35 represent acceptable reliability, and those lower than 0.35 indicate unacceptable reliability. In our study results, the Cronbach α values of all the variables exceeded 0.7, indicating the high reliability and internal consistency of the measurement scales.

According to the standard of convergent validity assessed by Fornell and Larcker (1981), all standardized factor loadings should be higher than 0.5, with values indicating composite reliability exceeding 0.6. As shown in Table 1, all of the constructs exhibited indicator-factor loadings higher than 0.5, composite reliability (CR) values higher than 0.7, and average variance extracted (AVE) values higher than 0.5. The measurement scales are presented in Appendix A.

Table 1. Measurement model and confirmatory factor analysis.

| Variable | Construct | Factor loading | CR | AVE | Cronbach’s α |
|-------------------------|---|----------------|-------|-------|---------------------|
| GSCM implementation | Internal environmental management (IEM) | IEM1 0.576 | 0.877 | 0.622 | 0.871 |
| | | IEM2 0.823 | | | |
| | | IEM3 0.899 | | | |
| | | IEM4 0.838 | | | |
| | | IEM5 0.640 | | | |
| | Green procurement (GP) | GP1 0.765 | 0.937 | 0.849 | 0.932 |
| | | GP2 0.837 | | | |
| | | GP3 0.853 | | | |
| | | GP4 0.948 | | | |
| | | GP5 0.914 | | | |
| | Collaboration with customers (CC) | CC1 0.937 | 0.945 | 0.815 | 0.941 |
| | | CC2 0.980 | | | |
| | | CC3 0.957 | | | |
| | | CC4 0.710 | | | |
| | Investment in waste recycling (IWR) | IWR1 0.670 | 0.712 | 0.556 | 0.692 |
| IWR2 0.754 | | | | | |
| IWR3 0.653 | | | | | |
| Ecological design (ED) | ED1 0.874 | 0.956 | 0.878 | 0.953 | |
| | ED2 0.957 | | | | |
| | ED3 0.653 | | | | |
| Institutional pressures | Governmental regulations pressure (GRP) | GRP1 0.969 | 0.853 | 0.612 | 0.852 |
| | | GRP2 0.984 | | | |
| | | GRP3 0.519 | | | |
| | | GRP4 0.521 | | | |
| | Customers pressure (CMP) | CMP1 0.952 | 0.840 | 0.643 | 0.821 |
| | | CMP2 0.618 | | | |
| | | CMP3 0.802 | | | |
| | Competitors pressures (CTP) | CTP1 0.884 | 0.879 | 0.652 | 0.875 |
| CTP2 0.895 | | | | | |
| CTP3 0.799 | | | | | |
| CTP4 0.613 | | | | | |
| Top managers’ posture | Top managers’ posture (TMP) | TMP1 0.821 | 0.762 | 0.520 | 0.953 |
| | | TMP2 0.717 | | | |
| | | TMP3 0.611 | | | |
| | | TMP4 0.828 | | | |

Discriminant validity was assessed by comparing (a) the correlations between a specific construct and all other constructs with (b) the AVE for the focal construct (Hair et al., 2006). Table 2 shows the correlation matrix for the constructs; the diagonal elements have been replaced by the square root of the AVE construct. The constructs demonstrated adequate discriminant validity, because these diagonal elements were greater than the off-diagonal elements in the corresponding rows and columns.

Table 2. Descriptive statistics and correlations.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|------|
| (1)IEM | 0.79 | | | | | | | | |
| (2)GP | 0.70** | 0.92 | | | | | | | |
| (3)CC | 0.71** | 0.70** | 0.90 | | | | | | |
| (4)IWR | 0.44** | 0.48** | 0.53** | 0.74 | | | | | |
| (5)ED | 0.61** | 0.71** | 0.75** | 0.49** | 0.94 | | | | |
| (6)GRP | 0.20* | 0.25** | 0.16* | 0.14* | 0.25** | 0.78 | | | |
| (7)CMP | 0.30** | 0.35** | 0.37** | 0.16* | 0.31** | 0.03 | 0.80 | | |
| (8)CTP | 0.61** | 0.55** | 0.74** | 0.42** | 0.73** | 0.23** | 0.32** | 0.81 | |
| (9)TMP | 0.38** | 0.44** | 0.46** | 0.36** | 0.50** | 0.19* | 0.20** | 0.46** | 0.72 |

Note: n=180, * p < 0.05, ** p < 0.01, Values on the diagonal are the square root of average variance extracted.

Linear structural equations

AMOS Version 18.0 was used in analyses of the linear structural model, and we referred to the recommended fit indices and assessment criteria of Bagozzi and Yi (1988). Table 3 shows the results of the initial model analysis. In the current study, only the goodness of fit index (GFI) and average GFI (AGFI) were close to the recommended value. Although Hair et al. (2006) recommended GFI, AGFI, and normed fit index (NFI) values that approach a value of 1, with proximity increasing the favorability, there is no standard absolute value for determining the fitness between observational data and models. Baumgartner and Homburg (1996) analyzed 184 studies between 1977 and 1994 that adopted structural equation modeling and indicated that those with GFI and AGFI values lower than the recommended values (i.e., >0.9) but within acceptable ranges, were 24% and 48%, respectively. As shown in Table 3, estimating the significant degree of the parameters revealed that the t-value was higher than the absolute value of 1.645, indicating the reliability of all of the indices and potential variables within the measurement mode. Overall, the models and observations represent an acceptable fitness.

Analysis of mediation effects

The construct analysis results of the linear structural relations model showed that the hypotheses regarding institutional pressures, top managers’ postures, and GSCM implementation were supported. Table 4 shows the results. Hypothesis 1

is rejected. Hypotheses 2 through 7 are supported

This study used the method of Baron and Kenny (1986) to analyze medication effect. The result showed that the effect of institutional pressures on GSCM implementation was significant (path coefficient = 0.771, $t = 13.286$) and that the effect of top managers' posture on GSCM implementation was significant (path coefficient = 0.520, $t = 9.869$). According to the criterion, the top managers' posture exhibited a partial mediation effect on institutional pressures and GSCM implementation. Therefore, Hypothesis 8 is supported.

Table 3. Fit of the measurement model.

| Fit indices | Judgment criteria | The results of this research | Fit or not |
|---------------|-------------------|------------------------------|------------|
| Chi-square | | 208 | |
| DF | | 86 | |
| Chi-square/DF | < 3 | 2.41 | yes |
| GFI | > 0.9 | 0.89 | closed |
| AGFI | >0.9 | 0.87 | closed |
| NFI | > 0.9 | 0.90 | yes |
| CFI | > 0.9 | 0.93 | yes |
| RMR | < 0.05 | 0.01 | yes |
| RMSEA | < 0.1 | 0.08 | yes |

Table 4. Results of path coefficient and hypotheses.

| Path | Result | t-value | Support |
|--|--------|---------|---------|
| Government regulations pressures →GSCM implementation (H1) | 0.001 | 0.007 | No |
| Customer pressures →GSCM implementation (H2) | 0.095 | 1.974* | Yes |
| Competitors pressures →GSCM implementation (H3) | 0.429 | 5.054** | Yes |
| Government regulations pressures →Top managers' posture (H4) | 0.166 | 2.549* | Yes |
| Customer pressures →Top managers' posture (H5) | 0.235 | 3.550** | Yes |
| Competitors pressures →Top managers' posture (H6) | 0.665 | 7.844** | Yes |
| Top managers' posture →GSCM implementation (H7) | 0.170 | 2.586** | Yes |
| Institutional pressures →Top managers' posture →GSCM implementation (H8) | 0.520 | 9.869** | Yes |

Note: $n=180$, * $p < 0.05$, ** $p < 0.01$.

DISCUSSION

Findings

This study investigated the relationship among institutional pressures, top managers' postures, and GSCM implementation. The survey data of 180 manufacturers in Taiwan's electrical and electronics industries revealed significant findings. Institutional pressures, which included customer pressures and competitor pressures, had a significantly positive influence on GSCM implementation. This finding echoed previous studies that argued that institutional factors stimulated enterprises implementing GSCM practices (Darnall et al., 2008; Wu et al., 2012; Zhu et al., 2013). However, government regulations pressures did not significantly influence GSCM implementation. A possible reason may be the compulsory role

of government regulations; there is a lack of incentives to implement GSCM. We also found that institutional pressures, including government regulations pressures, customer pressures, and competitor pressures, had a significantly positive effect on top managers' postures toward GSCM. This agreed with the findings of some other studies (Sharma, 2000; Banerjee et al., 2003; Zhu and Sarkis, 2006) that stressed that enterprise executives' cognition and emotions, because of pressures imposed by institutional actors, could lead to an environmental commitment. Moreover, the results showed that top managers' postures toward GSCM positively and significantly motivated corporations to implement GSCM practices, which means that top managers' postures are critical to implementing GSCM. This result supports previous studies in suggesting that top managers who realize the value of GSCM will place it on their corporations' strategic agenda and offer resources to implement GSCM (Handfield et al., 2005; Wu et al., 2012).

The most noteworthy result of our model concerns the role of top managers; institutional pressures are partially filtered through top managers' cognition and emotions, thereby constraining and encouraging firms to implement GSCM. This finding supports the research of Sharma (2000), who indicated that executives' cognition of the external environment affects firms' selections and actions for environmental strategies; this phenomenon explains why firms can adopt different environmental management practices.

Managerial implications

This study provides several meaningful managerial implications. First, from an institutional theory viewpoint, institutional pressures are key factors in motivating enterprises to implement GSCM. In particular, most electrical and electronics manufacturers in Taiwan operate according to original equipment manufacturing and original design manufacturing. They are essential players in the global supply chain and should actively implement GSCM. For example, the various regulatory pressures (e.g., WEEE, RoHS, and EuP) enforce Taiwanese electrical and electronics enterprises to perform GSCM. Therefore, this study suggests that companies must understand the various pressures, including the demands of governments, customers, interest groups, competitors, industries, and other actors.

Second, the mindset of top managers is critical to the success of GSCM implementation. For instance, top managers should vigilantly observe trends and changes in governmental regulation, customers, and competitors to quickly adjust their related environmental strategies. To implement GSCM successfully, top managers should use the best GSCM practices. For example, Xerox and IBM have set up environmental criteria for managing end-of-life (EOL) products and appraising their value; in addition, Sony has required all related suppliers to follow Green Partner Activities since 2001 and has improved its own green management efforts (Chen et al., 2012).

Research contributions

This study provides several contributions to the existing literature on GSCM. First, this study empirically investigated the drivers of GSCM implementation from the perspective of institutional theory. Second, this study examined top managers' postures as the mediator of the relationship between institutional pressures and GSCM implementation, thereby facilitating a clearer understanding of the drivers of GSCM implementation. Third, this study extended the appeal of Sarkis et al. (2011) to further understand and strengthen applying organizational theory to investigate GSCM. Finally, this study reinforced existing evidence for drivers that affect GSCM implementation by applying a large-scale empirical survey.

Limitations and future directions

A limitation of this research is its restricted generalizability. This study aimed at investigating Taiwan's electrical and electronics industries, targeting companies with capital accumulations of NT\$10 million or more; the results of this study are suitable only for partial objects. Future studies can explore the relevance of institutional pressures, stewardship behaviors, and performance in other industries. Because many Taiwanese manufacturers currently establish factories in China, future research can investigate GSCM implementation of Taiwanese manufacturers in China, and in so doing, could compare the difference of GSCM implementation in two countries.

CONCLUSIONS

This study investigates the drivers of GSCM implementation from the viewpoint of institutional theory. However, the institutional view has not answered why organizations facing the same institutional pressures adopt different GSCM practices. To explore this question further, this study uses the effects of top managers' postures toward GSCM. Specifically, this research proposes that top managers' posture is the mediator of the relationship between institutional pressures and GSCM implementation. This study examines these relationships among institutional pressures, top managers' postures, and GSCM implementation through a large-scale study.

The evidence presented here indicates that customer pressures and competitor pressures have significantly positive influences on GSCM implementation. Moreover, the results show that the pressures of government, customers, and competitors have a significantly positive effect on top managers' posture towards GSCM implementation. Additionally, the finding exhibits that institutional pressures via top managers' postures indirectly affect GSCM implementation. The findings of this research suggest that top managers should pay attention to the claims of institutional actors – government, customers, and competitors – and support the company to implement GSCM. However, this study finds that the government pressures have not significantly influenced GSCM implementation. A possible explanation may be that government regulations lack incentives for companies to implement GSCM. Policymakers are encouraged to offer innovative regulations with incentives to stimulate firms to implement GSCM.

ACKNOWLEDGMENTS

The National Science Council of Taiwan (NSC 102-2410-H-151-013) financially supported this research.

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