# Exploratory Study on Green Supply Chain Management Practices and Drivers in Large and Medium Industries of Bhutan

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## Abstract

*Green supply chain management (GSCM) has become a key approach for industries seeking to become economically and environmentally sustainable. The concern for GSCM has received much attention in recent years. This paper examines and describes GSCM practices and drivers in large and medium industries of Bhutan. Further, it aims to find whether the industry's size and type influence the GSCM practice adoption. The study used a cross-sectional research design. Survey data is obtained from 73 industries by administering structured questionnaires via email. The study used descriptive statistics and the inferential statistical test - ANOVA test to interpret the results. Results showed that national environmental regulation is a major driver of GSCM adoption and highly adopted practices are green distribution and internal environmental management. Results also portrayed that there is no significant variation in the adoption of practices among different sizes and types of industries. GSCM is comparatively a new concept in Bhutanese industries.*

*Keywords:* Adoption, drivers, green supply chain management, industries, practices

## Introduction

In recent times, one of the needs of an organisation's present-day corporate strategy is to depict itself as socially responsible and environmentally sustainable. Green supply chain management

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(GSCM) has emerged as a key strategy of sustainability to provide a competitive advantage with significant parallel gains for the company's profitability (Achillas et al., 2019). The GSCM has its roots in both environment management and supply chain management (Srivastava, 2007). The recent developments have brought uncertainty to the business environment, which necessitates the reconstruction and restructuring of strategy in their organisations to ensure sustainability, profitability, and competitiveness in the market (Zailani et al., 2012). This resulted in promulgating and adopting GSCM practices.

Srivastava (2007) defined GSCM as integrating environmental thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of final product to consumers as well as end-of-life management of the product after its useful life. The adoption of various practices differs in type of industries and its size (Zhu & Sarkis, 2006). According to Zhu and Sarkis (2004), the commonly practiced GSCM practices are internal environmental management, green purchasing, eco-design, cooperation with customers and investment recovery. Similarly, Achillas et al. (2019) identified GCSM practices like green procurement, green production, green distribution, green packaging, and reverse logistics.

Most of the industries or firms have adopted GSCM practices due to environmental regulations, competition among industries and pressure from suppliers, consumers, and stakeholders (Zhu et al., 2008). Firms were found to adopt GSCM practices since they improve economic, environmental, and organisational performances (Altaf et al., 2020; Geng et al., 2017; Green et al., 2012; Rao & Holt, 2005; Zhu & Sarkis, 2004).

The inclusion of environmental concerns and green practices in the supply chain has gained much attention. Increasing interest in the environment and climate change and efforts by governments and organisations around the world to minimize environmental impact has resulted in including GSCM practices (Laosirihongthong et al., 2013). Environmental concerns related to climate change and declining natural resources embark on considering green practices. GSCM practices have gained attention in the last decade enabling industries

to achieve better performance while reducing the negative impacts on the environment (Geng et al., 2017). According to Walker et al. (2008), ecological balance is deteriorated by environmental problems like environmental pollution, global warming and depletion of resources. Those problems lead governments, communities, and companies to take precautions in environmental matters. ElTayeb et al. (2010) reflected that most environmental problems are from business organisations. Therefore, they are subjected to pressure and compelled to produce environmentally friendly products wherein GSCM was found to be the best mechanism to adopt.

As Bhutan is widely known to the world for its pristine environment and conservation, the Constitution of Bhutan mandates environmental conservation and it is also considered to be one of the pillars of Gross National Happiness. According to the Economic Development Policy of Bhutan, the economic development process should take environmental mainstreaming into account in a phased manner that allows industries to grow as well as engage in cleaner production (Royal Government of Bhutan, 2016). Furthermore, the Twelfth Five Year Plan's National Key Result Areas of the country also broadly focused on achieving social development, economic development and environmental conservation (Gross National Happiness Commission, 2019). To achieve both economic development and environmental conservation, adopting Green Supply Chain Management (GSCM) practices would be the best option. Therefore, to ensure sustainability and promulgate the adoption of GSCM practices, it is important to explore different GSCM practices whereby later the impact on performance can be studied. On top of that, there are only few researches and reports published in this field in Bhutan therefore viewed as an opportunity to do research in this particular field.

The study aims to explore various Green Supply Chain Management Practices and drivers in large and medium industries of Bhutan. Furthermore, it aims to study how the adoption of GSCM practices vary in different type and sized industries.

## Literature Review

This chapter consists of an inclusive interpretation of what green supply chain management (GSCM) is, why it is adopted and its accompanying benefits by reviewing past studies. Consequently, it funnels down to explore various GSCM practices and Drivers.

Emergence of GSCM

The concept of green supply chain management originated from the concept of green purchasing which was proposed by Webb in 1994 and it was first proposed for the Environmental Responsibility Manufacturing study in 1996. Moreover, with growing trends and environmental issues, GSCM emerged whereby companies adopted to have profit along with decreasing environmental damage (Shan & Wang, 2018). Having competitive advantage, ecological efficiency, and less environmental risks lead to emergence of GSCM (Zhu et al., 2005). Achillas et al. (2019) stated that with the emergence of environmental issues, traditional supply chains have been held accountable which resulted in the intensive integration of environmental sustainability in business practices. To that end, the increasing interest of the stakeholders involved in the supply chain on environmental issues led to the development of a green supply chain.

GSCM policy and practice are mainly to improve the environmental performance of the supply chain and industry as a whole (Holt & Ghobadian, 2009). Srivastava (2007) stated that the GSCM concept emerged from the hybrid supply chain management concept after adding environmental standards fulfilment throughout the product life cycle. Its emergence was driven by increasing environmental degradation, diminishing natural resources and rising pollution levels. Similarly, Rasool et al. (2016) supported that GSCM is an expanded form of conventional supply chain management that considers environmental factors while achieving supply chain management objectives. The promulgation of strict environmental regulations which impact the manufacturing process and logic brought the application of GSCM into existence (Simpson & Samson, 2007 as cited in Nelson et al., 2012).

*Drivers of GSCM*

Drivers are generally categorised as internal and external drivers. Internal drivers include environmental management systems of firms, voluntary initiatives to engage in environment-friendly activities, environmental leadership, and enhancing efficiency. The external drivers include regulation fostering pollution prevention, economic incentives, pressure from stakeholders, environmental auditing, increased green practices, knowledge of consumers, and international trade mandates to go green (Achillas et al., 2019). Exploratory study by Walker et al. (2008) also identified that drivers of GSCM practices are organisational factors, regulation, customers, competitors and societal pressure. Organisations are more likely to be influenced by external rather than internal drivers. Zhu & Sarkis (2006) found that enterprise's environmental mission and internal multinational policies are considered very important for adopting GSCM practices.

Legislative drivers and environmental attitudes are found to be key drivers to the organisations to adopt GSCM practices whereas societal pressure is the least influential factor (Holt & Ghobadian, 2009). Similarly, Zhu et al. (2005) and Laosirihongthong et al. (2013) also found regulatory pressure as the main driver in manufacturing organisations to adopt GSCM practices. Contrastingly, Hu & Hsu (2010) found that top management support was the most important driver of GSCM practices when they conducted an empirical study for the electrical and electronics industries in Taiwan. The GSCM practices are also influenced by customer pressure, and shareholder pressure, government regulatory pressure.

*Practices of GSCM*

Various GSCM practices were adopted by many organisations. According to Srivastava (2007), the GSCM includes green design, green purchasing, green production, green distribution, logistics, marketing, and reverse logistics. Similarly, Zhu and Sarkis (2004) identified the GSCM practices like internal environmental management, green purchasing, eco-design, cooperation with customers and investment recovery. GSCM practices vary depending upon region, organisational terms and norms, understanding and availability of the resources and gaps in knowledge (Islam et al., 2017).

Zhu et al. (2008) found that manufacturers believe the implementation of GSCM practices should be multifaceted, and not limited to a specific practice.

Green Purchasing (GP) is defined as integrating environmental problems and concerns in the procurement process (Rao & Holt, 2005). Zhu et al. (2008) stated that GP should be implemented to assure high quality of the deliverable products and to control the eco-performance of suppliers starting from the materials and its flow within the organisation. Successful implementation of GP is found to be determined by supplier relationship management as it helped the supplier to participate significantly in the process of greening the products and services.

Customer cooperation refers to the exchange of information and collaboration between the organisation and their customers. Main stakeholders in the supply chain are customers since they play a major role in an organisation's decision regarding product design and services (Rao & Holt, 2005). Incorporating customers' feedback improves visibility and enables joint planning for the environment (Geng et al., 2017). It is found that customer cooperation is helpful to improve performance, especially economic performance (Altaf et al., 2020).

Eco-design is the integration of the environmental aspect while designing products and delivering services throughout its life cycle. It has been acknowledged as one of the most effective GSCM practices (Thamsatitdej et al., 2017). Eco-design gives importance in designing products that are energy efficient, recyclable, bio-based, ozone resilient and green powered.

Investment recovery is another practice of GSCM which is commonly adopted where scrap or used materials are resold. Investment recovery aims to recover the highest value from obsolete items. It reduces the waste from disposal and it lengthens the life of the product where it can be recycled into other products (Zhu & Sarkis, 2004). Internal environmental management is the company's own environmental protection policies and targets to ensure protection of the environment (Chan et al., 2012). Within the scope of internal environmental management, it covers the commitment from top-level managers and

support from mid-level managers which are necessary for the development of GSCM programs. Further, the significant improvement of performance was resulted from better implementation of internal environmental management practices and it also acts as precursor to implementation of other GSCM practices (Zhu et al., 2010; Zhu et al., 2012; Green et al., 2012).

Green packaging is also commonly known as eco-friendly packaging which aims to have the lowest environmental impact. The common green packaging practices are reducing the amount of packaging, packaging to allow reuse, and using recyclable packaging materials (Sezen & Cankaya, 2019). Rokka and Uusitalo (2008) attested that a larger segment of consumers favoured environmentally labelled packaging as the most important criteria in their choice. The Green transportation/distribution is application of practices and technologies which aim to mitigate transportation's negative environmental impact (Achillas et al., 2019). Common green practices in transportation are the preference and use of non-polluting means of transport, the use of energy efficient transportation, and designing of efficient distribution. Green distribution helps improve a company's image and reputation (Achillas et al., 2019).

Reverse logistics is the process of moving or transporting goods from its final destination back to the manufacturer and suppliers to create value or for proper disposal. It involves reverse products or materials for reuse, recycle, re-manufacturing, repair, and refurbish (Eltayeb et al., 2011). The reverse logistics has been asserted as one of the common GSCM practices and it brings better GSCM performances (Azevedo et al., 2011; Diabat et al., 2013)

*Adoption of GSCM Practices*

Zhu et al. (2012) found differences in GCSM practices adoption and performance when they clustered industries as early adopters, followers and laggards. Early adopters are relatively more advanced in implementing GSCM practice and commonly adopted internal environmental management and investment recovery. Moreover, adoption of GSCM practices is found to be varied by type of industry (Zhu & Sarkis, 2006; Zhu & Sarkis, 2007). Different organisations respond differently to GSCM initiatives based upon their specific

organisational contingencies (Holt & Ghobadian, 2009). On top of that, organisation size also plays a major role in GSCM practices adoption. Medium and large-sized industries are more advanced than small-sized industries, especially in environmental management certification (ISO 14001) (Zhu et al., 2008). The UK manufacturing organisations are focusing more on internal activities like environmental operation management control practices rather than proactive external engagement processes such as supplier outreach. In China, the internal environmental management, especially the commitment from top-level managers, is widely practiced and considered to be important because without initial upper management commitment, the programs are bound to fail (Zhu & Sarkis, 2006; Zhu et al., 2012).

According to Zsidisin & Hendrick, (1998), Enterprises in the United States, UK, and Germany have considered investment recovery as a critical aspect for green purchasing and GSCM. In most of the leading companies in developed countries green purchasing gets significant attention whereby they evaluate both first and second-tier suppliers (Zhu & Sarkis, 2006). Most of the firms adopt the GSCM because it improves their economic, environmental and organisational performances. According to Zhu and Sarkis (2004), there is a promising relationship between overall GSCM practices and economic and environmental performance. The enterprises adopting GSCM practices are found to have win-win opportunities. The meta-analysis findings of Geng et al. (2017) attested that the GSCM practices lead to better performance in four aspects: economic, environmental, operational, and social performance- image-building and public relations.

## Methodology

This chapter discusses the research methodology that was adopted in this study. It begins with outlining the research design. The research method consists of sampling techniques, and the Data analysis section.

*Research Design*

The study is quantitative in nature as it quantifies and analyses variables in order to get results. The study employed cross-sectional survey research design. Cross-sectional studies are appropriate when the data is collected across several firms at one point in time (Cooper & Schindler, 2006). The questionnaire surveys were administered via email to collect data. The study examines and describes different GSCM practices adopted by the sampled industries and also identifies the drivers of GSCM adoption.

*Sampling*

The study population was 97 operational large and medium industries under the Production and Manufacturing sector which are listed in the industrial information system (IIS) of the Department of Industry. A simple random sampling technique was used to draw the sample and the sample size for the study was calculated using Qualtrics sample size generator considering a confidence interval of 95 percent and margin of error 0.05. The sample size for the study is 78. The industries were assigned numbers and the online random number generator is used to randomly select the participants to omit biasness.

*Data Collection*

The study depended mainly on primary data collected through administering structured questionnaire surveys through email to the large and medium industries under the production and manufacturing sector of Bhutan.

*Research Instrument*

The questionnaire consists of three sections labelled Part 1 to 3. Part 1 consists of the demographic details of the respondents. Part 2 consists of information on different GSCM practices adopted by the industries and they were measured on a Likert scale. Part 3 also consists of Likert statements to assess what made them adopt the GSCM practices (drivers). A structured questionnaire was used to collect the data from the participants. Questionnaire was pre-tested before sending it to the participants to review structure, ambiguity, and completeness.

*Construction of Likert Scale*

The five-point Likert Scale has been used to collect the data for Part 2 and Part 3. The Part 2 statements on the adoption of GSCM practices were answered using a five-point Likert scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree*, and 5= *Strongly agree*). Similarly, for Part 3, the statements on what made them adopt GSCM adoption were answered using a five-point Likert Scale (1 = *Strongly Disagree*, 2 = *Disagree*, 3 = *Neutral*, 4 = *Agree* and 5= *Strongly agree*). Likert scale has been adopted as it provides respondents to choose one option that best aligns with their views and it measures respondents' extent of or disagree with particular statements.

*Administration of Research Instrument*

The data collection was carried out in the first two weeks of November 2020. The questionnaires were administered via email to the participants. Their contact details and email account have been obtained from a list of large and medium industries provided by the Department of Industry. A total of 78 questionnaires were administered. To remind the participants, follow-up calls and emails have been made. After administering a questionnaire survey to 78 participants, 73 responded to the survey which accounts for 93.5 percent response rate. The study focused on Production and Manufacturing industries because they produce more air, land, and water pollution than the service sectors (Stead & Stead, 1992). The senior experienced managers were the respondents for the study.

*Data Analysis*

The researcher used Statistical Package for Social Sciences (SPSS) and Microsoft Excel for data analysis. All the completed questionnaires were examined for completeness and consistency. The data were numerically coded and analysed in SPSS. The analysis involved both descriptive and inferential statistics. Descriptive statistics including frequency counts, percentages, mean, and standard deviations were used to summarize the data. The reliability of the Likert items was tested using Cronbach's Alpha. The One-way Analysis of Variance (ANOVA) has been used to evaluate differences in the practices of GSCM in different industries. To determine the relationship between

drivers and GSCM practices' adoption Pearson correlation test has been used.

*Reliability Analysis*

Reliability analysis was carried out on the various GSCM practices and drivers. The Internal environmental management subscale consisted of four items ($\alpha$= .651), the Green purchasing subscale consisted of six items ($\alpha$= .779), the Eco-design subscale consisted of 4 items ($\alpha$= .740), Green packaging subscale consisted of four items ($\alpha$= .746), the Green Distribution subscale consisted of four items ($\alpha$= .644), the Customer cooperation subscale consisted of four items ($\alpha$= .711), the Investment recovery subscale consisted of three items ($\alpha$= .729), the Reverse logistics subscale consisted of four items ($\alpha$= .727), and the Drivers consist of six items ($\alpha$= .763). The acceptable value ranges from 0.70 to 0.95 (Tavakol & Dennick, 2011). According to Hulin et al. (2001), the generally accepted rule is that a Cronbach alpha coefficient of 0.6-0.7 indicates an acceptable level of reliability, and 0.8 or greater indicates a very good level.

**Table *1***

*Cronbach's Alpha Value for Variables*

| Variables | Number of items | Cronbach's alpha |
|---|---|---|
| Internal environmental Management | 4 | .651 |
| Green Purchasing | 6 | .779 |
| Eco-design | 4 | .740 |
| Green Packaging | 4 | .746 |
| Green Distribution | 4 | .644 |
| Customer cooperation | 4 | .711 |
| Investment Recovery | 3 | .729 |
| Reverse Logistics | 4 | .727 |
| Drivers | 6 | .763 |

## Result

This chapter comprises the results of the study. It provides information on the profile of respondents. The chapter also consists of descriptive statistics for variables. It also includes the comparison among the

industry for GSCM adoption. The findings are presented based on objectives. The chapter ends by discussing the results and providing the implications of the study.

*Profile of Sample Industries and Respondents*

The characteristics of responding industries are presented in Table 2. The table shows that there is a high sample from Mining and Quarry-based Industries (19.2%) and the lowest sample from the Iron and Steel-Based Industry (6.8%). The table also shows that more than half (56.2%) of the industries are Medium sized category whereas Large-sized Industry accounted for 43.8 percent. In the field of ownership, more than half (67.1%) of the industries are private, while the rest are State-owned (15.1%), Foreign Direct Investment (11%), and Public (6.8%).

**Table 2**

*Profile of Sample Industries*

| Industry type | Frequency | Percent |
|---|---|---|
| Food and Agro-Based Industry | 11 | 15.1 |
| Iron and Steel-Based Industry | 5 | 6.8 |
| Alloy-Based Industry | 8 | 11.0 |
| Plastic and Packaging Industry | 7 | 9.6 |
| Forest and Wood-based Industry | 5 | 6.8 |
| Mining and Quarry-based Industry | 14 | 19.2 |
| Alcohol and Beverages Industry | 7 | 9.6 |
| Mineral Based Industry | 10 | 13.7 |
| Others | 6 | 8.2 |
| Total | 73 | 100.0 |
| *Company Size (Investment)* | | |
| Medium | 41 | 56.2 |
| Large | 32 | 43.8 |
| Total | 73 | 100.0 |
| *Type of ownership* | | |
| State-owned | 11 | 15.1 |
| Foreign Direct Investment | 8 | 11.0 |
| Private | 49 | 67.1 |
| Public | 5 | 6.8 |
| Total | 73 | 100.0 |

*Drivers of GSCM practices in Industries*

Table 3 portrays the means and standard deviations of the various drivers that made industries adopt the GSCM practices. The major driver to adopt the GSCM practices was National environmental regulations ($M$ = 4.23, $SD$ = .641). Then it is followed by the industry's own commitment to GSCM practices ($M$ = 3.86, $SD$ = .631), Competitive advantage of adopting GSCM practices ($M$ = 3.78, $SD$ = .712), Competitors' GSCM adoption ($M$ = 3.73, $SD$ = .712), Customers demand for GSCM ($M$ = 3.64, $SD$ = .752) and the lowest driving factor is Shareholders' pressure to adopt GSCM practices ($M$ = 3.33, $SD$ = .800).

**Table 3**

*Drivers of GSCM Practices*

|  | Mean | Std. Deviation |
| --- | --- | --- |
| National environmental regulations | 4.23 | .641 |
| Competitors GSCM adoption | 3.73 | .712 |
| Industry's commitment | 3.86 | .631 |
| Shareholders pressure | 3.33 | .800 |
| Competitive advantage | 3.78 | .712 |
| Customers demand | 3.64 | .752 |

*Note*. All variables used a 5-point Likert scale with (1 = Strongly Disagree, 5 = Strongly Agree)

*Descriptive Analysis of GSCM Practices*

For every item, the mean and standard deviation is generated to study the extent of adoption. Table 4 discloses that the most adopted GSCM practice is Green Distribution ($M$ = 4.05, $SD$ = .595), followed by Internal Environmental Management ($M$ = 4.02, $SD$ = .629), Customer cooperation ($M$ = 3.86, $SD$ = .590), Eco-design ($M$ = 3.82, $SD$ = .681), Green purchasing ($M$ = 3.76, $SD$ = .592), Green packaging ($M$ = 3.71, $SD$ = .763), Reverse Logistics ($M$ = 3.15, $SD$ = .736), and lowest adopted practice is Investment recovery ($M$ = 3.14, $SD$ = .623).

## Table 4

*GSCM Practices Adopted by Industries*

|  | Mean | Std. Deviation |
|---|---|---|
| Internal Environmental Management (IEM) | 4.02 | .629 |
| Industry's Environmental Framework | 4.34 | .731 |
| Auditing for environment compliance | 4.10 | .730 |
| ISO certification | 3.34 | 1.34 |
| Commitment from top management to adopt green practices | 4.32 | .685 |
| *Green Purchasing (GP)* | 3.76 | .592 |
| Environment friendly purchase | 3.90 | .900 |
| Supplier environmental certification | 3.55 | .817 |
| Bulk purchasing of goods | 4.07 | .871 |
| Encourage recyclable packaging to suppliers | 3.55 | .817 |
| Provide raw material specification | 3.92 | .852 |
| Environmental criteria selection of suppliers | 3.62 | .876 |
| *Eco-design (ED)* | 3.82 | .681 |
| Minimal energy usage | 3.47 | .914 |
| Reusable, recyclable, recoverable product design | 3.63 | .993 |
| Minimal use of hazardous substance | 4.21 | .816 |
| Longer shelf life of products | 4.01 | .920 |
| *Customer cooperation* | 3.86 | .590 |
| Customer cooperation for cleaner production | 4.05 | .743 |
| Collecting customer feedbacks | 3.89 | .875 |
| Customer cooperation in green packaging | 3.64 | .856 |
| Customer cooperation for Efficient transportation | 3.88 | .763 |
| *Green Packaging (Gpck)* | 3.71 | .669 |
| Minimal material usage for packaging | 3.93 | .770 |
| Recyclable packaging materials | 3.44 | .850 |
| Easy unpacking | 3.82 | .977 |
| Reusable packaging materials | 3.67 | .944 |
| *Green Distribution (GD)* | 4.05 | .595 |
| Regular maintenance of vehicles | 4.00 | .707 |
| Bulk distribution of products | 4.34 | .692 |
| Using High load capacity vehicles | 4.00 | 1.01 |
| Establishing distribution centres in high demand areas | 3.86 | .976 |
| *Reverse Logistics (RL)* | 3.15 | .736 |
| Collect reusable and recyclable materials | 3.04 | 1.09 |
| Establishing collection centres | 2.81 | 1.05 |

| | | |
|---|---|---|
| Incentives for returning reusable/recyclable materials | 2.75 | .925 |
| Safe disposal | 4.00 | .866 |
| *Investment Recovery (IR)* | 3.14 | .623 |
| Sell excess materials | 2.58 | 1.01 |
| Sell scrap materials | 3.78 | .989 |
| Lowering price when expiry date is near | 3.07 | .977 |

*Note*. All variables used a 5-point Likert scale with (1 = Strongly Disagree, 5 = Strongly Agree)

*Correlation Between Drivers and GSCM Adoption*

The Pearson correlation has been conducted to find the relationship between what motivated/influenced them to adopt GSCM (drivers) and actual GSCM adoption. Table 5 shows that National Environmental regulation was moderately positively correlated with GSCM adoption and statistically significant at 1%, ($r$ (73) = .56, $p < 0.000$). The industry's commitment, shareholders' pressure, and competitive advantage were also moderately positive. A very weak positive correlation was found between competitors' GSCM adoption and GSCM adoption by the company, ($r$(73) = .294, $p = .006$) and also between customers' demand and GSCM adoption, ($r$(73) = .260, $p = .013$). Thus, the result depicted that GSCM adoption is influenced by the GSCM drivers as all variables were positively correlated.

**Table 5**

*Correlation between drivers and GSCM adoption*

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|---|
| 1. GSCM | Pearson Correlation | 1 | .560** | .294** | .407** | .427** | .439** | .260* |
| | Sig. (1-tailed) | | .000 | .006 | .000 | .000 | .000 | .013 |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 2. National environ-mental regulations | Pearson Correlation | .560** | 1 | .316** | .401** | .173 | .179 | .067 |
| | Sig. (1-tailed) | .000 | | .003 | .000 | .071 | .065 | .287 |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 3. Competitors GSCM adoption | Pearson Correlation | .294** | .316** | 1 | .688** | .477** | .455** | .360** |
| | Sig. (1-tailed) | .006 | .003 | | .000 | .000 | .000 | .001 |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 4. Industry's commitment | Pearson Correlation | .407** | .401** | .688** | 1 | .393** | .520** | .276** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Sig. (1-tailed) | .000 | .000 | .000 | | .000 | .000 | .009 |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 5. Share-holders pressure | Pearson Correlation | .427** | .173 | .477** | .393** | 1 | .445** | .290** |
| | Sig. (1-tailed) | .000 | .071 | .000 | .000 | | .000 | .006 |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 6. Competitive advantage | Pearson Correlation | .439** | .179 | .455** | .520** | .445** | 1 | .475** |
| | Sig. (1-tailed) | .000 | .065 | .000 | .000 | .000 | | .000 |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |
| 7. Customers demand | Pearson Correlation | .260* | .067 | .360** | .276** | .290** | .475** | 1 |
| | Sig. (1-tailed) | .013 | .287 | .001 | .009 | .006 | .000 | |
| | N | 73 | 73 | 73 | 73 | 73 | 73 | 73 |

*Note.* $*p<0.05$, $**p<0.01$

A scatter plot summarizes the results of the relationship between drivers and GSCM adoption (Figure 1). Overall, there was a strong positive correlation between drivers and adopting GSCM practices. Increases in the existence of drivers were correlated with increases in GSCM adoption.

**Figure *1***

*Relationship Between Drivers and GSCM Adoption*
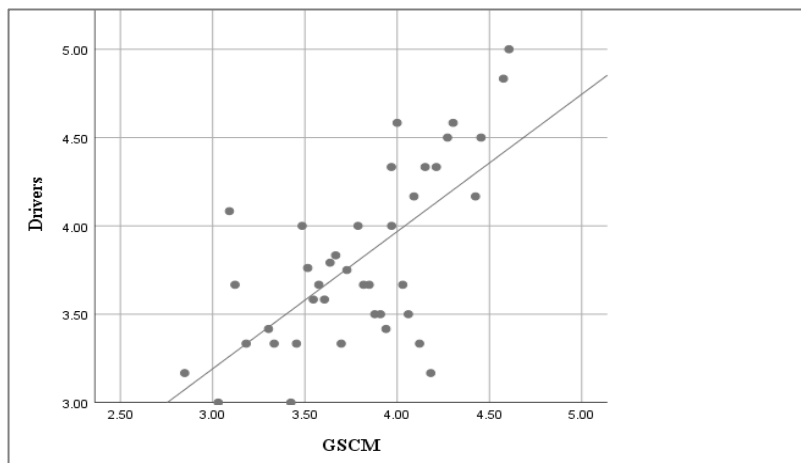


*Comparison of GSCM practices adoption among different types of Industries*

**Table 6**

*Comparison of GSCM Practices Among Different Types of Industries*

| Variables | | GSCM | IEM | GP | ED | CC | Gpck | GD | RL | IR |
|---|---|---|---|---|---|---|---|---|---|---|
| Food & Agro (n=11) | M | 3.84 | 3.84 | 4.02 | 4.05 | 4.18 | 4.00 | 4.02 | 3.25 | 3.09 |
| | SD | 0.37 | 0.76 | 0.50 | 0.76 | 0.66 | 0.62 | 0.61 | 0.81 | 0.58 |
| Iron & Steel (n=5) | M | 3.55 | 3.85 | 4.00 | 3.90 | 3.30 | 3.25 | 4.40 | 2.55 | 2.73 |
| | SD | 0.08 | 0.29 | 0.12 | 0.14 | 0.27 | 0.00 | 0.14 | 0.11 | 0.37 |
| Alloy-Based (n=8) | M | 3.83 | 4.28 | 3.63 | 3.56 | 3.94 | 4.13 | 4.19 | 3.56 | 3.29 |
| | SD | 0.22 | 0.47 | 0.32 | 0.42 | 0.74 | 0.30 | 0.44 | 0.44 | 0.45 |
| Plastic & Packaging (n=7) | M | 4.00 | 4.21 | 4.10 | 4.43 | 4.39 | 4.11 | 4.29 | 3.00 | 3.29 |
| | SD | 0.39 | 0.80 | 0.68 | 0.67 | 0.32 | 0.45 | 0.57 | 0.56 | 0.73 |
| Forest & Wood based (n=5) | M | 3.48 | 3.65 | 3.43 | 3.55 | 3.75 | 3.60 | 3.75 | 2.95 | 3.07 |
| | SD | 0.10 | 0.22 | 0.15 | 0.11 | 0.00 | 0.34 | 0.18 | 0.11 | 0.15 |
| Mining & Quarry (n=14) | M | 3.60 | 4.09 | 3.56 | 3.54 | 3.88 | 3.30 | 3.95 | 3.18 | 3.24 |
| | SD | 0.40 | 0.60 | 0.70 | 0.85 | 0.41 | 0.64 | 0.73 | 0.66 | 0.89 |
| Alcohol & Beverages (n=7) | M | 3.65 | 4.14 | 3.60 | 4.00 | 3.86 | 3.43 | 3.64 | 3.39 | 3.00 |
| | SD | 0.54 | 0.73 | 0.55 | 0.60 | 0.45 | 0.97 | 0.75 | 1.04 | 0.64 |
| Mineral Based (n=10) | M | 3.67 | 3.93 | 3.85 | 3.70 | 3.75 | 3.43 | 4.30 | 3.00 | 3.23 |
| | SD | 0.48 | 0.77 | 0.76 | 0.65 | 0.70 | 0.46 | 0.55 | 1.14 | 0.55 |
| Others (n=6) | M | 3.74 | 4.13 | 3.75 | 3.96 | 3.33 | 4.46 | 3.92 | 3.17 | 3.06 |
| | SD | 0.42 | 0.49 | 0.71 | 0.73 | 0.56 | 0.60 | 0.58 | 0.47 | 0.68 |
| F | | 1.264 | 0.708 | 1.206 | 1.638 | 2.842 | 4.463 | 1.338 | 0.983 | 0.490 |
| p | | 0.278 | 0.683 | 0.310 | 0.132 | 0.009* | 0.000** | 0.241 | 0.457 | 0.859 |

*Note.* *$p < .05$, **$p < .001$, df (8, 64)

One-way ANOVA was used to determine whether there are significant differences of GSCM practices adoption among different types of industries. Results of ANOVA in Table 6 indicated that there were no significant differences in overall GSCM practices adoption among different types of industries $F(8, 64) = 1.264$, $p = .278$. But considering individual practice, customer cooperation (CC) and green

packaging has significant differences among industries with $F(8, 64) =$ 2.842, $p = .009$ and $F(8, 64) = 4.463$, $p < .001$ respectively. Thus, the result revealed that the industries in Bhutan generally adopt similar GSCM practices.

*Comparison of GSCM Practices Adoption Between Large and Medium Industries*

To compare whether GSCM adoption differs in different sized industries, one-way ANOVA was conducted. Results showed that the effect of industry size on GSCM practices adoption was not significant $F(2, 71) = .600$, $p = .441$. Not only is the overall GSCM adoption not significant but also the individual GSCM practices were also not significant between industries of different sizes. Thus, it unveiled that the large and medium industries did not differ on adoption of GSCM practices.

**Table 7**

*Comparison of GSCM Practices Between Large and Medium Industries*

| Variables | Medium Industry ($n = 41$ | | Large Industry ($n = 32$) | | $F$ | $p$ |
|---|---|---|---|---|---|---|
| | *M* | *SD* | *M* | *SD* | | |
| GSCM | 3.68 | 0.418 | 3.75 | 0.357 | 0.600 | 0.441 |
| IEM | 4.05 | 0.587 | 3.99 | 0.688 | 0.144 | 0.706 |
| GP | 3.75 | 0.591 | 3.79 | 0.603 | 0.064 | 0.802 |
| ED | 3.84 | 0.762 | 3.82 | 0.576 | 0.009 | 0.926 |
| CC | 3.85 | 0.553 | 3.88 | 0.644 | 0.043 | 0.836 |
| Gpck | 3.65 | 0.750 | 3.80 | 0.549 | 1.005 | 0.320 |
| GD | 3.98 | 0.636 | 4.14 | 0.535 | 1.287 | 0.260 |
| RL | 3.07 | 0.729 | 3.26 | 0.745 | 1.208 | 0.275 |
| IR | 3.10 | 0.696 | 3.20 | 0.521 | 0.462 | 0.499 |

*Note.* *$p < .05$, df (2, 71)

## Discussion

The study seeks to explore the various GSCM practices and drivers among industries in Bhutan. Further, the study aims to study the differences of GSCM practices among industries. Findings reveal that National environmental regulation is a major driver and commonly

practiced GSCM practices are green distribution and internal investment recovery. Results also portray that the adoption of GSCM practices is not influenced by the type of industry and its size.

Out of all, the major driver is National environmental regulations. The findings are in line with Zhu et al. (2005) and Laosirihongthong et al. (2013) that the main drivers for the manufacturing organisation is regulatory pressure. This is because the environment is one of the country's top priorities and on top of that, the country is known to the world for its pristine nature. The industries of Bhutan are mandated to abide with environmental standards and additionally, regular inspection of environmental compliance might have propelled towards adopting GSCM practices. Further, National environmental regulation as a major driver is further substantiated by its strong positive correlation with GSCM adoption as shown in Table 5. The shareholder pressure and customers demand turn out to be a minor driving factor. This is because ownership of maximum industries in Bhutan is private in nature therefore, there is minimum involvement of stakeholders. Having customer demand as a minor driver indicates that customers are less involved and have less influence in industry decisions.

The major finding in the GSCM practices field is that green distribution is most highly adopted among the Industries in Bhutan, followed by internal environmental management. It indicates that green distribution is essential and doable among industries of Bhutan. Under the green distribution, industries practice regular maintenance of vehicles, bulk distribute the products, use high load capacity vehicles, and establish distribution centres in high demand areas. Industries also equally adopted the internal environmental management. They do prepare their own industry's environmental framework, audit their own environmental compliances, and also have high commitment from top management to adopt green practices. But, only a smaller number of industries were found to be certified with ISO 14001. This is because of minimal impact on the environment and also because most of the industries are focused on being certified with ISO 9001 which deals with quality management standards. The finding fits in with the study of Zhu et al. (2005) that in

China also the internal environment management is highly practiced as it acts as a predictor to successful implementation of GSCM.

Result discloses that the industry does not focus more on green purchasing. Although they do bulk purchasing of goods, they practice environmentally friendly purchase, encouraging suppliers to have recyclable packaging, providing raw material specification, and considering supplier environmental certification to a lesser extent. Similarly, industries averagely practice eco-design, and green packaging. Practicing customer cooperation is also to a low extent because they less involve customers for cleaner production, efficient transportation and incorporating their feedback for betterment is low. This can be justified with earlier finding that customer demand is a minor driver and has less influence on industries.

The least adopted practice was investment recovery which contradicts the findings of Zsidisin & Hendrick (1998), where they reflected that investment recovery was highly practiced in the US and Germany. The industries in Bhutan do not sell the excess materials which could be because they buy the required materials and it can be also because they are developing countries. They hardly practice lowering prices when expiry date is near which is because of higher demand for the products before products shelf life ends as said by one of the respondents from Food and Agro-based industry. But industries generate investment by selling scrap materials to the scrap dealers. Similarly, reverse logistics is also least practiced by the industries. Though they practice safe disposal, industries hardly practice collecting reusable and recyclable materials, establishing collection centres and giving incentives for returning recyclable/reusable materials. This is because of incurring high cost for reversing materials or due to lack of technologies to recover goods. Zhu et al. (2005) study supports the current finding that recovery and recycling of materials is costly and difficult due to lack of recycling systems and relevant technologies.

Overall, the GSCM adoption does not differ among different types of industries. This signifies that industries generally adopt similar practices and are not influenced by the type of industry. However, Customer cooperation and green packaging appear to have significant

differences among the industries. Green packaging is widely practiced in other category industries (pharmaceutical, battery, gas) and found to have been least practiced by Iron and steel and mining and quarry-based industries. This is because most of the materials produced in those industries are not packaged. Customer cooperation is widely practiced in plastic and packaging industries and least adopted in iron and steel-based industries. The findings contradict with the study of Zhu et al. (2007) which has reported they found significant differences of GSCM practices adoption among industries. This was the result because industries in Bhutan widely adopted GSCM practices similarly. They adopted (GD, IEM) highly and least practiced reverse logistics and investment recovery thus resulting in no significant differences in adoption. Comparing overall adoption of GSCM practices among industries, plastic and packaging-based industries have higher adoption of GSCM practices and the Forest and wood-based industries adopt shows less adoption of GSCM practices. This depicts that industries whose action has a comparatively higher footprint to the environment adopt the practices to a greater extent than industries that contribute less impact to the environment like that of Forest and wood-based.

The study finding reveals that GSCM practices adoption did not differ among differently sized industries. The findings fit in with the study of Zhu et al. (2008) which reported that much medium and large industry adopt practices more compared to small industry but the difference in adoption between large and medium sized industries was not found. It contradicted with the finding of Holt and Ghobadian, (2009) who claim that operational activity is also moderated by size of the firms. Since the GSCM concept is comparatively new and still in infancy and on top of that, environmental issues are not that alarming in the country, the size of industry did not influence the adoption of GSCM practices. Both the large and medium industries are in the same direction regarding GSCM practices adoption. Thus, it answers the second research question by stating that the size of the industry does not influence GSCM practices adoption.

The study will act as a pioneer work in the GSCM field in Bhutan. The study presents a series of constructs that identify various drivers and GSCM practices where future researchers can have basis and use

as benchmarks. It can also be used for the validation in future research of the same field. With this study, the experiences in GSCM practices among the large and medium industries can be disseminated to smaller industries in the country. Additionally, the study would have implications for managers and policy makers also. It would help managers of large and medium industries under production and manufacturing sector to know various GSCM practices in their supply chain, hence driving them to take numerous actions to improve and support the environmentally conscious society. This would help managers to identify the practices which are not incorporated in their supply chain which would be later associated with economic and environmental benefits. Further, the study would convince policy makers of the country to support the industries in enhancing capabilities to adopt green supply chains by providing training and technologies.

## Conclusion and Recommendations

The need for economic growth and sustainability amidst the rising environmental issues raises the intrinsic value of greening the supply chain. Adopting the GSCM practices was found to reap both economic and environmental benefits. So, the study aims to explore the various drivers of GSCM and its practices among large and medium industries of Bhutan. The result of the study shows that national environmental factors are major drivers in Bhutanese large and medium industries to adopt the GSCM practices. The highly practiced GSCM practices are green distribution and internal environmental management and least adopted practice was investment recovery. It was found that the adoption of practices does not vary in different types and sized industries.

The study recommends industry sectors like service and contract to increase their generalizability. Furthermore, future research can also include the small industries in the study. Even though the study considered a comprehensive set of drivers and practices, they are not certainly exhaustive therefore deep user interviews with industries is recommended to include other drivers and practices if they are left out. Future research can focus on investigating GSCM adoption

impact on performances by considering moderators and using a longitudinal study approach. The Ministry of Economic Affairs and National Environment Commission are recommended to create awareness among industries about the GSCM and also to develop GSCM policy for industries to gear towards sustainability and greening the supply chain. More research and efforts in the GSCM field is required to substantiate the findings and to understand GSCM in depth.

The limitation of the study is that the study is limited to the large and medium industries under the Production and Manufacturing sector only. On top of that, the GSCM practices and drivers assessed for the study may not be exhaustive since there are no standard GSCM practices in Bhutan and also because the study lacks deep user interviews to generate exhaustive GSCM practices and drivers. Another limitation of the study is data were collected from respondents' self-assessment which may lead to respondent bias.

## References

Achillas, C., Bochtis, D. D., Aidonis, D., & Folinas, D. (2019). *Green Supply Chain Management.* Routledge.

Altaf, B., Ali, S. S., & Weber, G. W. (2020). Modeling the relationship between organisational performance and green supply chain practices using canonical correlation analysis. *Wireless Network*, 5835-5853. https://doi.org/10.1007/s11276-020-02313-3

Azevedo, S. G., Carvalho, H., & Machado, V. C. (2011). The influence of green practices on supply chain performance: A case study Approach. *Transportation Research Part E: logistics and transportation review*, *47*(6), 850-871. https://doi.org/10.1016/j.tre.2011.05.017

Chan, R. Y., He, H., Chan, H. K., & Wang, W. Y. (2012). Environmental orientation and corporate performance: the mediation mechanism of green supply chain management and moderating effect of competitive intensity. *Industrial Marketing Management*, *41*(4), 621-630. https://doi.org/10.1016/j.indmarman.2012.04.009

Cooper, D. R., & Schindler, P. S. (2006). *Business research methods*. McGraw-Hill.

Diabat, A., Khodaverdi, R., & Olfat, L. (2013). An exploration of green supply chain practices and performances in an automotive industry. *International Journal of Advanced Manufacturing Technology*, *68*(1), 949-961.

ElTayeb, T. K., Zailani, S., & Jayaraman, K. (2010). The examination on the drivers for green purchasing adoption among EMS 14001 certified companies in Malaysia. *Journal of Manufacturing Technology*, *21*(2), 206-225. https://doi.org/10.1108/17410381011014378

Eltayeb, T. K., Zailini, S., & Ramaya, T. (2011). Green Supply Chain Initiatives Among Certified Companies in Malaysia and Environmental Sustainability: Investigating the Outcomes. *Resources Conservation and Recycling*, *55*(5), 495-506.

Geng, R., Mansouri, S. A., & Aktas, E. (2017). The relationship between green supply chain management and performance: A meta-analysis of empirical evidence in Asian emerging economies. *International Journal of Production Economics*, *183*, 245-258.

Green, K. W., Zelbst, P. J., Meacham, J., & Bhadauria, V. S. (2012). Green supply chain management practices: impact on performance. *Supply Chain Management: An International Journal*, *17*(3), 290-305. https://doi.org/10.1108/13598541211227126

Gross National Happiness Commission. (2019). *Twelfth Five Year Plan 2018-2023 Volume I: Main Document.* https://www.gnhc.gov.bt/en/wp-content/uploads/2019/05/twelve-five-year-web-version.pdf

Holt, D., & Ghobadian, A. (2009). An empirical study of green supply chain management practices amongst UK manufacturers. *Journal of Manufacturing Technology*, *20*(7), 933-955.

Hu, A. H., & Hsu, C. W. (2010). Critical factors for implementing green supply chain management practice: An empirical study of electrical and electronics industries in Taiwan. *Management Research Review,* *33*(6), 586-608. https://doi.org/10.1108/01409171011050208

Hulin, C., Netemeyer, R., & Cudeck, R. (2001). Can a Reliability Coefficient Be Too High? *Journal of Consumer Psychology*, *10*, 55-58. https://doi.org/10.2307/1480474

Islam, S., Karia, N., Fauzi, F., & Soliman, M. (2017). A review on green supply chain aspects and practices. *Management and Marketing*, *12*(1), 12-36. https://doi.org/10.1016/j. resconrec.2017.12.015

Laosirihongthong, T., Adebanjo, D., & Tan, K. C. (2013). Green supply chain management practices and performance. *Industrial Management & Data Systems, 113*(8), 1088-1109. https://doi.org/10.1108/IMDS-04-2013-0164

Nelson, D. M., Marsillac, E., & Rao, S. S. (2012). Antecedents and Evolution of the Green Supply Chain. *Journal of Operations and Supply Chain Management*, 29-43. https://doi.org/ 10.12660/joscmv1n1p29-43

Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance? *International Journal of Operations & Production Management*, *25*(9), 898-916. https://doi.org/10.1108/01443570510613956

Rasool, Y., Iftikhar, B., Nazir, M. N., & Kamran, H. W. (2016). Supply Chain Evolution and Green Supply Chain Perspective. *International Journal of Economics, Commerce and Management*, *4*(10), 717-724.

Rokka, J., & Uusitalo, L. (2008). Preferences for green packaging in consumer product choices- Do consumers care? *International Journal of Consumer Studies*, *32*(1), 516-525. https://doi.org/10.1111/j.1470-6431.2008.00710.x

Royal Government of Bhutan. (2016). *Economic Development Policy*. Thimphu: Royal Government of Bhutan. https://www.moea.gov.bt/wp-content/uploads/2017/07/Economic-Development-Policy-2016.pdf

Sezen, B., & Çankay, S. Y. (2019). Effects of green supply chain management practices on sustainability performance. *Journal of Manufacturing Technology Management, 30*(1), 98-121. https://doi.org/10.1108/JMTM-03-2018-0099

Shan, W., & Wang, J. (2018). Mapping the Landscape and Evolutions of Green Supply Chain Management. *Sustainability*, *10*(3), 597. https://doi.org/10.3390/su10030597

Srivastava, S. K. (2007). Green supply chain management: A state-of-the-art literature review. *International Journal of Management Reviews*, *9*(1), 53-80. https://doi.org/10.1111/j.1468-2370.2007.00202

Stead, W. E., & Stead, J. (1992). *Management for a Small Planet.* Sage Publications.

Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical Education*, *2*, 53-55. https://doi.org/10.5116/ijme.4dfb.8dfd

Thamsatitdej, P., Boon-Itt, S., Samaranayake, P., Wannakarn, M., & Laosirihongthong, T. (2017). Eco-design practices towards sustainable supply chain management: Interpretive structural modelling (ISM) approach. *International Journal of Sustainable Engineering*, *10*(6), 326-337. https://doi.org/10.1080/19397038.2017.1379571

Walker, H., Sisto, L. D., & McBain, D. (2008). Drivers and barriers to environmental supply chain management practices: Lesson from public and private sectors. *Journal of Purchasing and Supply Management*, *14*(1), 69-85. https://doi.org/10.1016/j.pursup.2008.01.007

Zailani, S., Jeyaraman, K., Vengadasan, G., & Premkumar, R. (2012). Sustainable supply chain management (SSCM) in Malaysia: A survey. *International Journal of Production Economics*, *140*(1), 330-340. https://doi.org/10.1016/j.ijpe.2012.02.008

Zhu, Q., & Sarkis, J. (2004). Relationship between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operations Management,* *22*(3), 265-289. https://doi.org/10.1016/j.jom.2004.01.005

Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: Drivers and practices. *Journal for Cleaner Production*, *14*(1), 472-486. https://doi.org/10.1016/j.jclepro.2005.01.003

Zhu, Q., & Sarkis, J. (2007). The moderating effects of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research*, *45*(18-19), 4333-4355. https://doi.org/10.1080/00207540701440345

Zhu, Q., Geng, Y., Fujita, T., & Hashimoto, S. (2010). Green supply chain management in leading manufacturers Case studies in Japanese large companies. *Management Research Review*, *33*(4), 380-390. https://doi.org/10.1108/01409171011030471

Zhu, Q., Joseph, S., & Geng, Y. (2005). Green supply chain management in China: pressures, practices and performance. *International Journal of Operations & Production Management*, *25*(5), 449-468. https://doi.org/10.1108/01443570510593148

Zhu, Q., Sarkis, J., & Lai, K. (2007). Initiatives and outcomes of green supply chain management implementation by Chinese manufacturers. *Journal of Environmental Management*, *85*(1), 179-189. https://doi.org/10.1016/j.jenvman.2006.09.003

Zhu, Q., Sarkis, J., & Lai, K. (2012). Green supply chain management innovation diffusion and its relationship to organisational improvement: An ecological modernization perspective. *Journal of Engineering and Technology Management*, *29*(1), 168-185. https://doi.org/10.1016/j.jengtecman.2011.09.012

Zhu, Q., Sarkis, J., Lai, K., & Geng, Y. (2008). The Role of Organisational Size in the Adoption of Green Supply Chain Management Practices in China. *Corporate Social Responsibility and Environmental Management*, *15*(1), 322-337. https://doi.org/10.1002/csr.173

Zsidisin, G. A., & Hendrick, T. E. (1998). Purchasing's involvement in environmental issues: a multi-country perspective. *Industrial Management & Data Systems*, *98*(7), 313-320. https://doi.org/10.1108/02635579810241773