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Scholar's outlook about influencing green supply chain practice on environmental performance

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Abstract

The primary objective of this study is to enhance understanding of the green supply chain practices (GSCP) and its correlation with sustainable performance. The primary objective of this study is to elucidate the relationship between (GSCP) and environmental performance (ENP), which is a crucial component of sustainable performance. Both researchers and business professionals are interested in understanding the potential impact of implementing a green supply chain on organizations' financial performance. This study investigates many aspects of green supply chain practices and their impact on environmental performance. Specifically, it explores environmental education, internal environmental management, green procurement, sustainable manufacturing, and eco-friendly distribution. A total of one hundred individuals with expertise in academia, including both international and local professionals, as well as those involved in transportation and logistics planning, were chosen via the use of an area sampling technique. The individuals were recruited subsequent to the administration of a questionnaire. The Partial Least Squares (PLS) - Structural Equation Model (SEM) approach was implemented using SmartPLS 4.0.9.4 software. This software facilitated the examination of both quantitative and descriptive aspects of the data. The study findings indicate that the implementation of internal environmental management, green procurement, green manufacturing, and green distribution practices might potentially provide substantial and advantageous outcomes in terms of environmental performance. The study did not investigate the expected correlation between environmental education and environmental performance. The data analysis has provided evidence that rejects hypothesis H5. This study presents a theoretical framework aimed at integrating Green Supply Chain Practices (GSCP) to establish environmentally sustainable operations. This strategy utilizes data derived from a diverse range of sources. This research investigates the operational strategies used by environmentally conscious firms in relation to internal environmental management, green procurement, green manufacturing, and green distribution.

Keywords: *Scholar, green supply chain practice, environmental performance, transporter, logistics.*

1. Introduction

There is a widespread consensus that the subject of global climate change is characterized by complexity and polarization. The influence of this phenomenon on the business sector has already been significant and is projected to continue expanding. Approximately 200 countries participated in "The Paris Accord" in December 2015 with the collective objective of

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addressing this pressing issue. The legislation was made compulsory in November 2016. The influence of industrial activity on the phenomena of global warming is addressed by the Paris Agreement, which establishes certain thresholds to restrict the increase in global temperature to below 2 degrees Celsius. Additionally, this international agreement requires world leaders to actively pursue the goal of reaching net zero emissions, ultimately leading to the gradual elimination of fossil fuel use. Hence, business entities in the United States exhibit their support of the Paris Climate Agreement. Approximately 350 enterprises reiterated their endorsement of the Agreement at the 22nd Conference of the Parties (COP22). In order to adhere to international agreements and achieve cost savings, an increasing number of organizations are exploring strategies to mitigate their carbon dioxide (CO₂) emissions. Companies that choose to implement a carbon strategy may have a competitive advantage over their counterparts who do not. In order to get a competitive advantage in the market, firms must adjust their strategies to effectively capitalize on emerging climatic conditions.

Due to the aforementioned challenges, corporations worldwide are increasingly adopting a phenomenon referred to as the "Green Concept." Many corporations prioritize the reduction of their environmental footprint, as well as the promotion of worker well-being and productivity. The fundamental emphasis of the manufacturing company is in the domain of supply chain management. Industrial organizations often employ Green Supply Chain Management (GSCM) initiatives in order to mitigate their environmental footprint via the reduction of emissions, pollution, waste, and the use of natural resources. The predominant emphasis of recent scholarly investigations pertaining to supply chain design has mostly revolved around ecological factors. Previous research has examined the emissions of Green-House Gases (GHGs) resulting from the use of energy-efficient technology in the industrial and transportation sectors (Wang et al., 2011; Pan et al., 2013). According to S. Kumar et al. (2011), the Green Supply Chain Strategy (GSCS) is characterized as a supply network management technique that incorporates environmental considerations. The emergence of environmentally aware buying and procurement techniques has been seen across many entities, such as governments, enterprises, and advocacy groups. The collaborative endeavor exemplifies their capacity to engage in negotiations and make purchases while prioritizing environmental considerations (Kannan et al., 2010; Massoud et al., 2010).

In order to achieve and sustain a competitive advantage, firms must prioritize the implementation of Green Supply Chain Management (GSCM) strategies (Zhu et al., 2008). GSCM has garnered significant attention worldwide, particularly in relation to the United States, the European Union, and Japan. Green Supply Chain Management (GSCM) is an advanced and systematic methodology for achieving environmental sustainability that is being adopted and used by forward-thinking companies worldwide (Bhool & Narwal, 2013). The discipline of Global Supply Chain Management (GSCM) is experiencing increasing popularity, although remains in its nascent stage within Vietnam (Do et al., 2020). In the contemporary business landscape, it is essential for organizations to adopt strategic approaches to effectively produce revenue, enhance brand recognition, create value, mitigate expenditures, and address risk management.

The main objective of this study is to investigate the impact of Green Supply Chain Management (GSCM) techniques on environmental efficiency. In order to accomplish this objective, an assessment will be carried out to gauge the extent of comprehension among scholars about the GSCM methodology. This study offers practical business concepts for the implementation of green supply chain management (GSCM) in order to support the pursuit of

sustainable development. The current research included data from prior studies conducted by Zhu et al. (2008); Green et al. (2012); Cankaya & Sezen (2018).

2. Methodology

2.1. Sampling technique

This study included a survey of one hundred scholars from several academic fields, including sociology, economics, and logistics/transportation. The survey was conducted among respondents who had significant knowledge of the development and implementation of supply chain and logistics strategies. A meticulously designed questionnaire was used for data collection. The participants were chosen randomly using a stratified random selection technique. During a five-week period spanning from 15 December 2022 to January 24, 2023, QR codes were used as a means of gathering data inside various educational environments. International scholars were granted a two-week hiatus to participate in an overseas conference, whilst local scholars and the individual responsible for logistical operations were granted a three-week break. During the duration of the five-week data-collecting period, a sample size of 100 participants was obtained, resulting in an overall response rate of 85%. The survey included two distinct sections, in addition to a dedicated segment addressing potential confounding variables. The study investigated possible modifiers, namely categorical factors such as gender, age, and degree of education. The introduction and body sections were evaluated using a five-point Likert scale, where a score of 1 represented significant disagreement and a score of 5 represented strong agreement. At the outset of the study, a concise summary of the 33 criteria used in prior research (Xie & Breen, 2012; Ghobakhloo et al., 2013; Dadhich et al., 2015; Bu et al., 2020) to evaluate GSCP was provided. The classification of these items included the use of five dimensions: Internal Environmental Management (consisting of four objects), Green Procurement (consisting of five objects), Green Production (consisting of four things), Green Distribution (consisting of five objects), and Environmental Education (consisting of three objects). The sustainability performance of the second portion was assessed using a set of five environmental performance indicators.

3. 2.2. Literature Review

2.2.1. Green Supply Chain Practice

In academic literature, the words "green" and "sustainable" are sometimes used interchangeably, emphasizing their impact on the economy, society, and the environment (Dobers & Wolff, 2000; Saha & Darnton, 2005; Rahimifard & Clegg, 2007). The concept of Green Supply Chain Practice (GSCP) has been increasingly recognized and used in response to the rising awareness and concern for environmental issues (Srivastava, 2007). The GSCP emerged as a result of the influential "quality revolution" in the 1980s and the subsequent "supply chain revolution" in the 1990s. These two transformative movements together posed significant challenges to the prevailing norms and practices within the field of supply chain management. GSCP garners attention from scholars and professionals alike due to its emphasis on mitigating pollution and safeguarding valuable resources. There is a growing recognition that remanufacturing and eco-efficiency have the potential to enhance standard operations (Ashley, 1993; Srivastava, 2007). According to the authors, implementing environmentally friendly initiatives that save resources, reduce waste, and enhance productivity might provide a competitive advantage for a company in the marketplace. Hence, the adoption of

environmentally sustainable practices inside organizations may lead to a reduction in their environmental footprint, enhanced operational efficiency, and the emergence of novel competitive prospects Hajikhani et al. (2012).

GSCP involves the collaboration of many individuals and entities within the supply chain, such as producers, suppliers, and consumers, to ensure its effective implementation. These organizations participate in the practice of "green buying," which entails integrating environmentally sustainable practices into supplier transactions. The implementation of environmentally sustainable practices inside organizations may provide advantages, particularly when there is efficient management of their supply chains (Walton et al., 1998; Van Hoek, 1999; Zhu & Sarkis, 2004; Rao & Holt, 2005; Yu et al., 2013). Furthermore, the success of GSCP is contingent upon effective cooperation across many departments, aiming to optimize long-term benefits. The implementation of GSCP at the organizational level is recommended due to the collaborative nature and the need for effective communication in adopting environmentally sustainable practices (Apsan, 2000; Zhu & Geng, 2001; Mengying et al., 2018).

According to Lin & Ho (2008) and Seuring & Müller (2008), GSCP is a concept that is unfamiliar to several organizations operating in various industries and geographic regions. GSCP encompasses all aspects of business, including environmentally friendly manufacturing, packaging, distribution, and advertising. Multiple studies, such as Olugu et al. (2010); Govindan et al. (2013); Mengying et al. (2018) have shown the advantageous nature of GSCP. The implementation of GSCP has the potential to reduce energy consumption, emissions, and the generation of hazardous, chemical, and material pollutants. Van Hoek (1999) suggests that enterprises and their partners may achieve financial advantages by using "green supply chain management" practices, which include reducing their environmental footprint and enhancing their ecological efficiency. According to Zhu et al. (2008), industrial organizations that use GSCP should be recognized for their creative and proactive management approaches.

In recent times, there has been a noticeable increase in the level of attention given to the field of multidisciplinary GSCP by both scholars and enterprises (Sarkis et al., 2011). Regulation of natural resource use, solid waste management, and air pollution control are essential throughout the process of expansion (Zhu et al., 2007a). Businesses, governments, groups, and individuals that prioritize environmental concerns have devised procurement and purchasing strategies. This illustrates their capacity to participate in collective bargaining and use their buying power to get desired results (Kannan et al., 2010; Massoud et al., 2010). The basic tenet of GSCP is prioritizing product management above environmental effect assessment. In order to succeed in the present economic landscape, enterprises must effectively manage the delicate equilibrium between maximizing financial gains and safeguarding the natural environment (Ho et al., 2009; Luthra et al., 2013).

In contrast to conventional SCM, which often neglects the consideration of human toxicity (Beamon, 1999; Gilbert, 2000; Ho et al., 2009), GSCP emerges as a distinctly environmentally conscious, integrated, and sustainable alternative. In the realm of GSCP, there is a prevailing tendency to emphasize product control above environmental concerns throughout the many phases of manufacture and delivery. According to Ho et al. (2009) and Luthra et al. (2013), adherence to environmental product and manufacturing standards is vital for firms to sustain their viability and competitiveness within the market. The adoption of green supply chains is of paramount importance in attaining sustainability objectives as it confers a competitive advantage to enterprises by reducing expenses, generating novel revenue streams, exploring innovative sources of income, mitigating risks, enhancing employee motivation, and fulfilling

environmental compliance obligations (Tekin et al., 2020). The objective of Green Supply Chain Management (GSCP) is to enhance the effectiveness and efficiency of organizational operations while simultaneously prioritizing environmental sustainability.

2.2.2. Environmental performance

In order to enhance environmental performance, it is a prevalent practice to reduce factors like emissions, waste generation, and energy use. The study of Zhu et al. (2005) includes the inclusion of minimizing the use of hazardous products, mitigating air emissions, reducing water waste, and managing solid waste as supplementary elements of environmental performance. Based on previous studies (Rao, 2002; Zhu et al., 2005; Chiou et al., 2011; Lee et al., 2012), the environmental performance criteria included energy savings, waste reduction, pollution abatement, and emission reduction. According to empirical research, the adoption of environmentally responsible business practices across a firm's supply chain has been shown to have the potential to enhance its market share, production, and competitive advantage. Additional research is evidently required to ascertain the impact of green supply chain strategies on a company's capacity to sustain market competitiveness and enhance financial performance. Multiple empirical research indicates that the implementation of "green practices" is strongly associated with enhanced organizational performance, especially in terms of their environmental impact. Furthermore, obtaining data about a company's fiscal well-being and market efficacy might be a challenging endeavor (Rasheed, 2022).

2.2.3. The previous studies about GSCP and environmental performance

The study aims to examine the impact of global supply chain practices on environmental sustainability, contributing to the existing body of research on the subject of GSCP. Furthermore, the study examines the impact of five distinct GSCP strategies on the long-term viability of the organization. According to Schmidt et al. (2017), there exists a positive correlation between the implementation of GSCP procedures and improved market performance as well as enhanced financial outcomes. According to the findings of Paulraj (2011), there exists a strong positive relationship between the acquisition of environmentally friendly products and the advancement of environmental sustainability. Hence, it is feasible to enhance environmental sustainability by deliberate selection of products that include social, economic, and environmental considerations. The results of this research support the assertions made by Chan et al. (2012) on the potential enhancement of a company's sustainability performance after the establishment of an effective internal environmental management system. The studies conducted by Zsidisin & Siferd (2001) as well as N. Kumar et al. (2015) revealed that the implementation of green distribution networks had a substantial effect on the consumption of petroleum, mostly via the optimization of transit routes.

The implementation of GSCP has been shown to enhance environmental performance and is positively associated with favorable environmental outcomes, as evidenced by extensive scholarly research (Florida, 1996; Zhu & Sarkis, 2004). The implementation of collaborative research and development (R&D) initiatives and the establishment of supplier-consumer collaboration programs are expected to provide significant environmental benefits. In order to enhance their financial gains, an increasing number of corporations are embracing environmentally conscious strategies. There exists empirical data suggesting a positive correlation between corporate engagement in environmental initiatives and enhanced financial performance. According to Szwilski

(2000); Hajikhani et al. (2012) there is a contention that business policies that prioritize environmental responsibility may also exhibit characteristics of innovation and strategic utility. Liu et al. (2012) argue that GSCP places a high importance on environmental factors across the whole supply chain. This requires strategic cooperation among all partners involved in the supply chain. According to Mohanty & Prakash (2013), the Global Sustainable Consumption and Industrial (GSCP) program is a collaborative initiative aimed at enhancing industrial practices while concurrently safeguarding the environment. The authors assert that the adoption and integration of GSCP methodologies resulted in increased productivity and enhanced environmental sustainability. The use of theoretical analysis has been employed to evaluate the environmental initiatives implemented throughout various stages of the supply chain. In contrast to the aforementioned benefits, Sarkis (1999); Bowen et al. (2001) contend that the sustainability of the supply chain is insufficient in terms of environmental protection. The establishment of green buying practices may have a significant impact on businesses' environmental objectives (Min & Galle, 1997). Sroufe (2006) conducted comprehensive research and established a robust framework with the aim of enhancing the competitiveness of enterprises and mitigating hazards. The framework included several eco-friendly measures, a supplier evaluation system, and environmental key performance indicators.

The research revealed that individuals exhibit less inclination to positively engage with a firm's promotional incentives when they possess knowledge about the company's inadequate dedication to environmental sustainability. This study reveals a significant association between a company's sustainability activities and the extent of sustainability endorsement received from its clients. The studies conducted by Yu & Ramanathan (2015) as well as Zhu et al. (2012) both demonstrate a positive correlation between the implementation of sustainable supply chain management (SSCM) methods and improvements in environmental performance. The study conducted by Zhu et al. (2008) demonstrates that the integration of eco-design approaches into supply chain management has promise for enhancing environmental performance.

Table 1. Factors and Item GSCM

Factors	Items	Code	Sources
Internal Environment Management	Commit GSCM from senior managers	IEM1	Zhu et al. (2008); Huang et al. (2012); Kuei & Lu (2013); Cheng et al. (2014); Feng et al. (2015)
	Support to GSCM from mid-level managers	IEM2	
	Establish a cross-functional cooperation team	IEM3	
	Take criteria to measure green quality	IEM4	
Green Procurement	Ensure suppliers meet their environmental objectives	GP1	Min & Galle (1997); Rao & Holt (2005); Salam (2008); Zhu et al. (2008)
	Require suppliers to have ISO 14000	GP2	
	Purchase materials with green attributes	GP3	
	Purchase equipment that saves energy	GP4	
Green Manufacturing	Ensure product have recyclable contents	GM1	Carter et al. (2000); Zhu & Sarkis (2004); Rao & Holt (2005); Schmidt et al. (2017); Al-Sheyadi et al.
	Minimize the use of materials in packaging	GM2	
	Encourage reuse of products and recycled materials	GM3	

Factors	Items	Code	Sources
	Use Life Cycle Assessment to evaluate environmental load	GM4	(2019)
Green Distribution	Recyclable whether reusable packages or containers in logistics	GD1	Chin et al. (2015); Cankaya & Sezen (2018)
	Reuse of valuable components of an end-of-life product	GD2	
	Select a method for cleaner transportation	GD3	
	Identify defective merchandise to reuse	GD4	
Environmental Education	Participate in non-government and government-subsidized programs about GSCM and sustainability	EE1	Cankaya and Sezen (2018)
	Participate in training courses on GSCM and sustainability for executives	EE2	
	Participate in training courses on GSCM and sustainability for managers and members	EE3	
Environmental Performance	Optimize process for waste and emission reduction, pollution control	ENP1	Rao (2002); Zhu et al. (2005); Chiou et al. (2011); Lee et al. (2012)
	Recognize products of eco-labeling, recycled material, and design-for-assembly	ENP2	
	Save energy consumption and recycling process	ENP3	
	Encourage green and clean technology use	ENP4	

Source: Authors' synthesis, 2023

2.2.4. Research hypothesis

During this part of the project, an extensive examination of the literature pertaining to GSCMP methods was conducted, including a comprehensive analysis of several instances of supply chain management. Several writers have conducted prior studies on GSCP, such as Ninlawan et al. (2010); Green et al. (2012); Lee et al. (2012); Laosirihongthong et al. (2013); A. C. Thoo et al. (2014). Holt & Ghobadian (2009) identified many significant responsibilities within the field of GSCP. These include logistics, supplier assessment and evaluation, green logistics and procurement regulations, supplier education and mentoring, and industrial networks. According to Ninlawan et al. (2010) and A. C. Thoo et al. (2014), the implementation of GSCP practices, including green production, distribution, and logistics, is crucial for industrial sectors to enhance their sustainability performance. Green et al. use several strategies, such as internal environmental management, eco-design, eco-information systems, green purchasing, customer engagement, and investment recovery, among others. According to Lee et al. (2012), certain corporate and operational strategies, including internal environmental management, environmentally conscious procurement, customer interaction, and eco-design, are considered integral components of GSCP operations. The study conducted by C. Thoo et al. (2015) examined four primary approaches of GSCP, including internal environmental management, green procurement, green manufacturing, green distribution, and environmental education.

Internal environmental management, in collaboration with senior and lower-level managers, prioritizes environmental sustainability as a key focus inside the organization. The aforementioned assertion is corroborated by a series of investigations conducted by Zhu et al. (2005); Ann et al. (2006); Yang et al. (2010); Kim et al. (2011); Huang et al. (2012); Kuei & Lu (2013); Cheng et al. (2014); Feng et al. (2015).

H1: *Internal environment management impacts positively on environmental performance*

GSCMP seeks to attain a closed-loop system in accordance with supply chain principles through the incorporation of green purchasing and integrated supply chains, including suppliers, manufacturers, consumers, and logistics. GSCP has the potential to have a significant impact on the financial performance, operational performance, and inventory management of a company, regardless of its precise definition, according to Zhu & Sarkis (2004). Cost reduction in material purchases, energy consumption, and waste management may have a significant impact on a company's financial performance.

H2: *Green procurement impacts positively on environmental performance*

The term "green manufacturing" refers to a production strategy that seeks to reduce the negative environmental impacts associated with manufacturing processes. Environmental sustainability incorporates a variety of practices designed to minimize ecological impact, including the implementation of the "3Rs" - namely, reducing, reusing, and recycling. In addition, it includes measures such as increasing energy efficiency and reducing the use of hazardous substances. Green manufacturing, according to Green et al. (2012) and Lee et al. (2012), necessitates the efficient use of energy and basic resources, as well as the elimination or significant reduction of hazardous compounds throughout the production process. Several stakeholders, including the economy, the environment, and the competitiveness of businesses, benefit from the implementation of green manufacturing techniques.

H3: *Green manufacturing impacts positively on environmental performance*

Examples of green distribution methods include the use of environmentally friendly items, the support of recycling and reuse techniques, the adoption of consistent packaging across several suppliers, and the encouragement of the use of returnable packaging. These solutions also seek to minimize packaging material requirements as much as possible. The use of recyclable pallets has the potential to effectively reduce refuse generation, speed up packaging and repackaging operations, and reduce warehouse energy consumption.

H4: *Green distribution impacts positively on environmental performance*

According to Cankaya & Sezen (2018), the implementation of environmental education is essential for the formulation of a society that is both equitable and sustainable, which will ultimately lead to an improvement in the well-being of the general population. Recent empirical research demonstrates that environmentally responsible business practices have become significantly more significant over the past few decades. Environmental education can only be successful if each employee has a thorough understanding of the environmental criteria that apply to their workplace. Individuals are also capable of establishing a deeper and more reliable connection with global society by modifying their behavior.

H5: *Environmental education impacts positively on environmental performance*

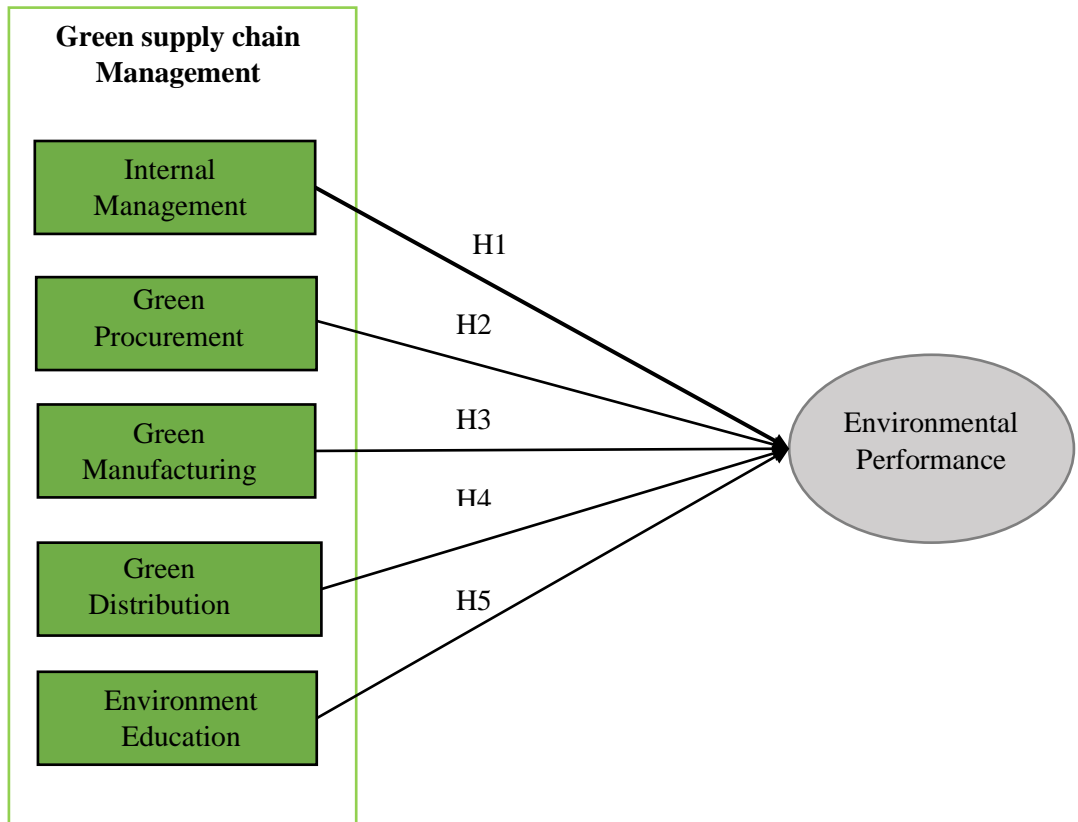


Figure 1. Conceptual framework

3 Result analysis

Table 2 presents an overview of the age distribution, gender composition, marital status, educational attainment, and commencement year of employment for the academic cohort. Upon first observation, individuals within the age range of 36 to 49 exhibit the most pronounced degree of engagement in academic pursuits, with a participation rate of 50%. Conversely, a mere 18% of students fall within the age range of 50 years or older. About a third of the participants (32%), are considered to be young adults. The survey results indicate that 73% of the respondents identified as male, while 27% identified as female. There exists a significant disparity between genders in the academic community in terms of marital status, as shown by the survey results. Specifically, 85% of the respondents reported being married, while the remaining 15% identified themselves as single. According to the statistics presented, the segment of the sampling observation with the largest proportion is comprised of individuals holding doctorate degrees, accounting for 43%. On the other hand, the segment with the lowest proportion consists of those possessing bachelor's degrees, representing 11% of the population. Master's degrees comprise around 33% of the total number of degrees awarded, positioning them as the second most prevalent category of degrees, surpassed only by "other" degrees, which constitute 11% of the overall degree distribution. Furthermore, a majority of first entrants into the workforce, namely 55%, may be classified as those who are domestic scholars. Approximately 23% of instructors are individuals who are foreign scholars.

Approximately 22% of the survey participants are employed within the transportation/logistics industry.

Table 2. Basic information of scholars

Description	N	Percentage (%)
<i>Based on Age</i>		
≤35	32	32.00
36-49	50	50.00
≥50	18	18.00
<i>Based on Gender</i>		
Male	73	73.00
Female	27	27.00
<i>Based on Marital status</i>		
Single	15	15.00
Married	85	85.00
<i>Based on the Academic level</i>		
University	11	11.00
Master	33	33.00
Doctor	43	43.00
Others	13	13.00
<i>Based on original professional</i>		
Domestic Scholar	55	55.00
Foreign Scholar	23	23.00
Transporter/Logistics	22	22.00

Source: Field Survey Data, 2023

Table 3 displays the differences in perspectives among different groups of scholars regarding the correlation between GSCP and Environmental Performance (ENP). The Analysis of Variance (ANOVA) method was used to test the hypothesis of differences in the mean values of scholar groups in different fields. The results showed a statistically significant difference at the 1% level between scholar groups regarding two aspects of the study: Internal Environmental Management (IEM) and Environmental Performance (ENP). This was demonstrated by the Sig value of Levene's test, which was 0.003 for IEM and 0.006 for ENP. This means that scholar groups have different perspectives on how to manage the internal environment and its impact on environmental effectiveness. Specifically, the logistics/transportation group had the highest mean value for IEM (4.42b), while the domestic group had the lowest mean value (4.15a). In terms of environmental performance, the foreign group had the highest mean value (4.54c), while the domestic and logistics/transportation groups had the lowest mean values at 4.15a and 3.99a, respectively. This indicates that the foreign group has a higher evaluation of environmental performance compared to the logistics/transportation and domestic groups. However, there was no statistically significant difference between scholar groups regarding other aspects of GSCP, including green procurement, green manufacturing, green distribution, and environmental education. This can be explained by these factors not reflecting a clear distinction of objects according to academic fields.

Table 3. Awareness of scholars about GSCM and ENP

Variables	Domestic (n=55)	Foreign (n=23)	Trans/Log (n=22)	ANOVA Sig.F ≤0.05	Robust Test Sig. Welch ≤0.05
Internal environment management (IEM)	4.10 ^a	4.59 ^b	3.90 ^a	***	
Green procurement (GP)	3.86 ^a	4.51 ^b	4.03 ^a	***	
Green manufacturing (GM)	4.07 ^a	4.50 ^b	4.00 ^a	**	
Green distribution (GD)	4.25 ^a	4.60 ^b	3.92 ^c	***	
Environmental education (EE)	4.02 ^a	4.12 ^a	4.54 ^c		***
Environmental performance (ENP)	3.91 ^a	4.63 ^b	3.93 ^a	***	

Source: Output data Author, 2023.

Note: *, p-value < 0.1; **, p-value < 0.05; ***, p-value < 0.001. Significant at the 0.05 level. If the value of Levene is less than 0.05, the Robust test is used. If the value of Levene is more than 0.05, the Anova test is used. The numbers in the same row followed by different letters are significant at the 5% level via the statistical Anova or Robust test

This study adopts an interdisciplinary approach to examine the relationship between GSCP and ENP. The purpose of doing an Analysis of Variance (ANOVA) is to assess the hypothesis that there exists a statistically significant variance in the means of scores obtained by several groups of academics operating within separate areas. At a significance level of 1%, the findings suggest that there are variations in academic perspectives about green supply chain management and environmental performance (ENP). The results of Levene's test indicate that the significance values for each group are as follows: the IEM group has a significance value of 0.035, the GP group has a significance value of 0.076, the GM group has a significance value of 0.347, the GD group has a significance value of 0.293, the EE group has a significance value of 0.35, and the ENP group has a significance value of 0.384. The significance values shown provide support to the assertions put forward. The disparities between the domestic and foreign scholar cohorts in terms of internal environmental management (IEM), green procurement (GP), green manufacturing (GM), and environmental performance (ENP) are evident, as seen in Table 3.

The green distribution (GD) elicits varying perspectives among the three distinct academic cohorts. The foreign group exhibits the highest average GD value (4.60b), while the domestic group follows closely behind with an average GD value of 4.25a. The Log/trans group, on the other hand, has a somewhat lower average GD value of 3.92c. This finding indicates that professionals employed in other nations have a more favorable perception of environmentally sustainable distribution techniques compared to their counterparts in the United States or inside logistics and transportation organizations. The findings of the study revealed that the Log/Trans group had distinct viewpoints towards environmental education (EE) in comparison to the local and foreign groups. Nevertheless, there was no observable disparity in educational achievement between pupils who were native-born and those who were non-native. The average cost for the Logistic/Trans group is 4.54c, which exceeds the average cost for the domestic group (4.02a) and the international group (4.12a). Logisticians and freight forwarders, due to the nature of their occupations which need more outdoor engagement, have a greater inclination towards prioritizing environmental education variables that are associated with their success in this domain, as compared to their domestic and foreign counterparts.

Table 4. Reliability analysis

Variables	Cronbach's α
Internal Environment Management	0.672
Green Procurement	0.718
Green Manufacturing	0.660
Green Distribution	0.679
Environmental Education	0.695
Environmental Performance	0.784

Source: Field Survey Data, 2023

Factor loading, Composite Reliability (CR), and Average Variance Extracted (AVE) are three metrics often used in the evaluation of convergent validity. According to Hsieh & Hiang (2004) and Hashmi et al. (2021), it is necessary for a variable and its associated factor to have a correlation coefficient of 0.40 or above in order to compute the factor loading. According to the studies conducted by Hashmi et al. (2021), it is recommended that composite dependability should be above a threshold of 0.70. Factor analysis is recommended when the AVE derived from the variables exceeds 0.50, as proposed by Fornell & Larcker (1981); S. Khan et al. (2022a) in their respective studies. The demonstration of convergence validity is shown in Table 5. In order to meet the criterion of being bigger than 0.5, a number must fall between the range of 0.538 to 0.622. The AVE value exceeds the minimal threshold of 0.5. In a similar vein, it can be seen that the absolute value of the composite dependability index CR exceeds the recommended cutoff threshold of 0.70. The findings are concisely summarized in Table 5. Factor loading refers to the correlation coefficient that measures the relationship between a variable and its associated factor, as shown by the research conducted by Hsieh and Hiang (2004) and Hashmi et al. (2021). In order to be deemed significant, the factor loading must exceed a threshold of 0.40. Based on the data, no factor loading values below 0.60 were identified. Based on the results obtained, it can be concluded that there exists substantial evidence supporting the convergent validity of the various measures used to assess Internal Environmental Management (IEM), Green Procurement (GP), Green Manufacturing (GM), Green Distribution (GD), Environmental Education (EE), and Environmental Performance (ENP).

Table 5. Convergent validity

Variables	Items	Factor Loading	AVE	Composite Reliability
Internal Environment Management	IEM1	0.655	0.538	0.776
	IEM2	0.820		
	IEM3	0.715		
Green Procurement	GP1	0.768	0.640	0.842
	GP2	0.810		
	GP3	0.820		
Green Manufacturing	GM1	0.801	0.591	0.812
	GM2	0.715		
	GM3	0.786		
Green Distribution	GD1	0.812	0.605	0.821
	GD2	0.786		
	GD3	0.734		
Environmental Education	EE1	0.817	0.622	0.831
	EE2	0.793		
	EE3	0.754		
Environmental Performance	ENP1	0.812	0.607	0.861
	ENP2	0.780		
	ENP3	0.753		
	ENP4	0.771		

Source: Field Survey Data, 2023

The present study used previous scholarly contributions (Fornell & Larcker, 1981; S. Khan et al., 2022b) to investigate the discriminant validity of the measurement tools employed. In order for this procedure to be effective, it is necessary for the correlation coefficient between any two variables to exceed the square root of the average variance extracted (AVE). The results are succinctly shown in Table 6. The elements along the diagonal of the matrix represent the square root of the Mean Squared Error (MSE). The table displays the square root of AVE, indicating that the minimum value observed along the diagonal is 0.733%. Nevertheless, it is noteworthy that the minimum value on the diagonal exceeds the maximum correlation value ($R=0.716$). It may be inferred that the correlation between any two independent variables is consistently lower than the value on the diagonal. The measures used in this research demonstrate discriminant validity since they effectively capture diverse constructs.

Table 6. Discriminant validity

Construct	EE	ENP	GD	GM	GP	IEM
EE	0.788					
ENP	0.531	0.779				
GD	0.709	0.624	0.777			
GM	0.716	0.501	0.561	0.769		
GP	0.702	0.701	0.611	0.702	0.800	
IEM	0.602	0.622	0.556	0.621	0.611	0.733

Source: Field Survey Data, 2023

This study investigates the impact of green supply chain management on environmental efficiency. The method used is correlation coefficient analysis and regression analysis to test the hypotheses. The results presented in Table 7 show a close and statistically significant relationship between the independent variables and the dependent variable. The coefficient of determination R^2 is 0.593, indicating that 59.3% of the variation in Environmental Performance is explained by the independent variables. Among the independent variables, Internal Environmental Management (IEM) and Green Procurement (GP) have a positive and statistically significant impact on Environmental Performance (ENP). This is consistent with previous studies. Specifically, the regression coefficient β of Internal Environmental Management (IEM) is 0.187, with a P value less than 0.05. The regression coefficient β of Green Procurement (GP) is 0.291, also with a P value less than 0.05. Therefore, hypotheses H1 and H2 are accepted. In addition, the study also explores the role of Green Manufacturing (GM) and Green Distribution (GD). The detailed results are as follows: H4: Green Manufacturing has a positive impact on environmental efficiency ($\beta = 0.250$, $P < 0.05$), H5: Green Distribution has a positive impact on environmental efficiency ($\beta = 0.147$, $P < 0.05$). Therefore, hypotheses H3 and H4 are accepted. On the other hand, Environmental Education (EE) has no statistically significant impact on Environmental Performance (ENP). The regression coefficient β of Environmental Education (EE) is 0.034, with a P value greater than 0.05. Therefore, hypothesis H5 is rejected.

Table 7. Summary of the structural model

Path	Estimate β	T statistics	P-Value	Hypothesis	Hypothesis Result
IEM \rightarrow ENP	0.187	2.060	0.039	H1	Accepted
GP \rightarrow ENP	0.291	3.175	0.002	H2	Accepted
GM \rightarrow ENP	0.250	3.082	0.002	H3	Accepted
GD \rightarrow ENP	0.174	1.974	0.048	H4	Accepted
EE \rightarrow ENP	0.222	1.186	0.236	H5	Rejected
R-square					0.593
R-square adjusted					0.571

Source: Field Survey Data, 2023

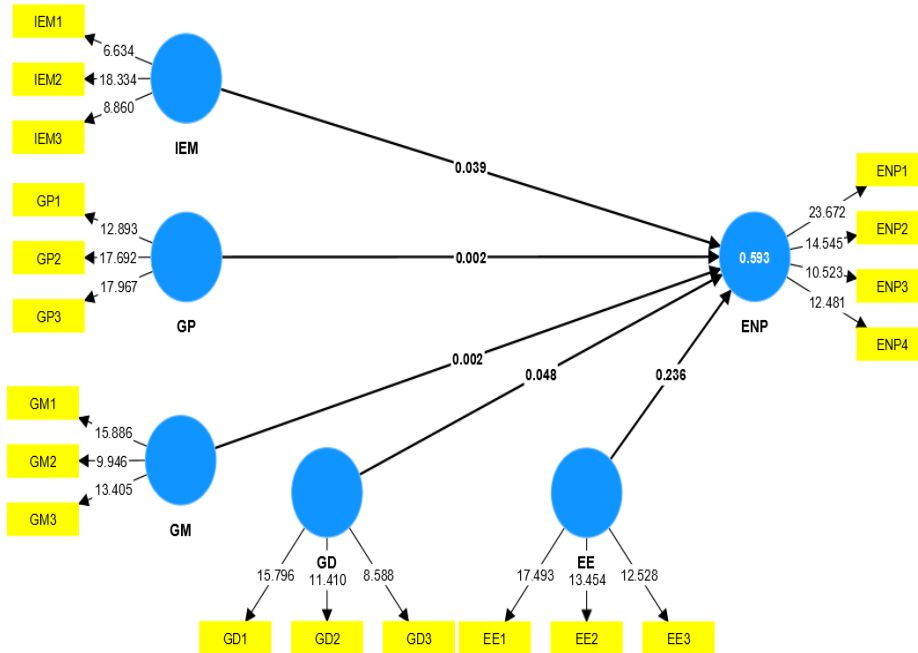


Figure 2. PLS-SEM model of GSCP and ENP

4. Discussion

This study has provided evidence of the beneficial impact that efficient internal environmental management may have on environmental outcomes. Both of these factors have been shown to have a positive and statistically significant influence on ENP, as seen by the findings of this study. This finding is consistent with the results reported in previous investigations. Authors such as Afum et al. (2021); Benedict et al. (2022) have put out the proposition of using internal environmental management methods as a means to enhance an organization's environmental performance. The study undertaken by Hossain et al. (2021) investigates the impact of effective environmental laws and third-party audits on the valuation of American corporations and the level of investor support for these enterprises. This study adds to the existing literature on the potential advantages of implementing green supply chain management for all stakeholders.

The study used structural equation modeling to examine the impact of eco-friendly purchasing on environmental output. The outcomes of our study align with the research undertaken by Nagurney & Li (2016); Zhu et al. (2017), who conducted investigations that were equivalent in nature. The authors demonstrated that enhancing the environmental performance of the supply chain has the potential to enhance a company's profitability and market share via the use of green procurement practices. The results of the research indicate that the evaluation of the purchasing function's performance is crucial in achieving supply chain excellence and organizational objectives in supply chains that use green procurement practices.

This study focuses on examining the relationship between green manufacturing and environmental performance. The findings indicate a statistically significant and positive association between the two variables. The study conducted by Duque-Grisales et al. (2020) placed significant emphasis on green production activities and the performance of

environmental sustainability. Our results align with the conclusions drawn in their research. The research of Ha et al. (2023) has received support from Duque-Grisales and other scholars in the academic community. This suggests that the implementation of process optimization and the use of environmentally friendly materials serve as instances of manufacturing processes that are ecologically sustainable. These techniques not only contribute to the preservation of the environment but also provide financial benefits for enterprises, resulting in cost savings and increased profitability. However, the study also showed that the use of environmentally friendly distribution systems resulted in enhanced efficiency without any detrimental effects on the environment. Several studies, such as Rezaei & Ortt (2018), and Cankaya & Sezen (2018), have identified that the implementation of green distribution methods has the potential to enhance the environmental performance of firms and industries. These solutions have the potential to minimize greenhouse gas emissions, energy use, noise pollution, and air pollution. The study found no statistically significant association between individuals' exposure to environmental education and the occurrence of favorable environmental outcomes. This conclusion contradicts of investigation's findings of Cankaya & Sezen (2018). Additional research is necessary in order to conduct a comprehensive evaluation.

5. Conclusion

This study contributes significantly to the extant corpus of knowledge regarding the relationship between the GSCP and sustainability-related outcomes. This study investigates the relationship between the GSCP principles and long-term success in the context of environmental issues. To begin with, it is essential to construct and evaluate a theoretical framework that analyzes the extent to which GSCP principles contribute to the progression of sustainable development. This instrument facilitates the evaluation and adoption of environmentally sustainable supply channels within businesses, from a commercial perspective. In addition, it offers a structure that facilitates the incorporation of GSCP principles and the development of environmentally responsible practices. This strategy utilizes information collected from a variety of sources.

The study highlights a variety of environmentally responsible strategies employed by green organizations, such as internal environmental management, environmentally conscious purchasing, eco-friendly production, and sustainable distribution. These strategies aid businesses in obtaining a competitive edge in the market, while also protecting the environment and slowing the rate of climate change. To effectively meet the expectations of consumers and succeed in the post-COVID-19 environment, businesses must employ these concepts systematically and consistently. Moreover, it is essential for e-commerce businesses to increase the cost and quality competitiveness of environmentally responsible products. In addition, it is essential that they allocate additional resources towards enhancing the distribution and marketing of these products. In addition, it is essential to address issues such as establishing consumer trust and mitigating any potential risks they may face. Moreover, it is essential for these businesses to increase consumer contentment by providing greater value through the adoption of green consumption practices, specifically by offering a broader selection of eco-friendly products. It is essential to take these steps in order to incentivize people to purchase environmentally sustainable products.

There is no correlation between ecological education and environmental efficacy that can be identified. All participants were considered experts in their respective fields, which included economics, logistics/transportation, the social sciences, and the disciplines. Therefore, the findings

of this study are somewhat unanticipated. Several variables, including environmental education, influence the perspectives of academics on the environment. The primary purpose of environmental education is to improve the public's understanding, attitudes, and actions regarding environmental issues. Other variables that may have an effect include gender, age, academic discipline, professional background, and information sources. In order to effectively satisfy the demands of sustainable development in the economic, environmental, and social domains, it is imperative for higher education institutions to prioritize the following five criteria. Educators who employ internal environmental management strategies use a variety of methods to reduce energy consumption, minimize waste production, and mitigate pollution. These projects include initiatives aimed at reducing energy consumption, instituting more efficient waste management practices, and minimizing the discharge of potentially hazardous compounds. In contrast, "green procurement" refers to the selection of environmentally sustainable products and services for purchase by academic institutions. This requires consideration of the manufacturing process, composition, and environmental sustainability of products and services.

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