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The effect of green supply chain management practices on sustainability performance in Vietnamese construction materials manufacturing enterprises

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C H R O N I C L E

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A B S T R A C T

Growing environmental concerns and social responsibility push organizations into seriously considering their strategies in business operations. The implementation of green supply chain management (GSCM) is a vital strategy which enables organizations to focus on minimizing environmental issues, improving economic benefits and expanding social outcomes. The aim of this paper is to examine the relationship between GSCM practices and sustainable performance in Vietnamese construction materials manufacturing enterprises. Based on the data collected from a sample of 218 construction materials manufacturers in Vietnam, the study examines the impact of GSCM elements on firm performance including economic, environmental and social using structural equation modeling. The study finds that green design and green manufacturing had positive and significant effects on three categories of outcomes, whereas green procurement impact on economic and social performance but had no influence on environmental performance. The results also empirically prove that there was a positive relationship between green distribution and environmental performance which is not supported for economic and social perspective. The study also contributes significantly to an on-going research associated with GSCM practices on sustainable performance in developing countries such as Vietnam where very few studies of GSCM have been revealed.

1. Introduction

For sustainable development goal, businesses are increasingly interested in social parties and put more attention on corporate social responsibility and environmental practices. Social and environmental issues in supply chain have become the main concern of researchers. Green supply chain management (GSCM) is an extremely useful tool for sustainable development and improved awareness of environmental protection and social responsibility (Wang & Dai, 2017). Specially, in supply chain, focal companies need to take social and environmental responsibility and help other companies in supply chain to comply environmental standards. Any failure on such responsibilities may hurt firms' reputation and other members in supply chain (Burritt et al., 2011). Therefore, enterprises should implement GSCM practices to avoid and minimize the negative environmental and social effects of all members among the supply chain (Neumüller et al., 2016).

In recent years, some emerging economic countries have realized potential role of environmental protection and social responsibility in supply chain management such as Malaysia, Thailand, Egypt, Iran (Eltayeb et al., 2011; Zailani et al., 2012; Laosirihongthong, et al. 2013; Khaksar et al., 2016;

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Hamdy et al., 2018). Also, a few researches about GSCM practices in these countries from different industry have been prevailed (Laosirihongthong, et al., 2013). Nevertheless, relevant studies in Asian countries are not many (Arlbjørn & Lu¨ thje, 2012). For Vietnam, the adoptions of GSCM are still relatively rare.

Construction materials industry in Vietnam contributes to 7.5% of gross domestic product (GDP) and 9% of the total employment every year. However, Vietnamese construction materials manufacturing industry is one of the largest sectors consuming raw materials, energy and generating emission. Construction wastes which arise from business activities including supply, manufacture, transportation, create serious consequences for environment as well as economic and social impact. Therefore, saving resources and green producing are a survival matter. For this purpose, Vietnamese government issues regulations of 2014 on sustainable development planning of construction materials manufacturing industry in the period from 2020 to 2030. However, opinions of green supply chain as well as GSCM have not been received strong attention by policy makers, businesses and researchers. From literature, the study observes the elements of GSCM practices and dissociates their impact on firm performance in Vietnamese construction materials manufacturers. This study also significantly contributes to an on-going research that relates to GSCM practices on sustainable performance in developing countries like Vietnam where few researches of GSCM has been carried out.

2. Research Overview

GSCM practices

According to Zhu et al. (2008), GSCM has emerged as an effective management tool for proactive and leading manufacturing firms. Although, GSCM plays a very important role in integration of environmental and social issues into supply chain management in order to improve sustainable outcomes, definitions of GSCM has only emerged since the end of the 1980s (Maloni & Brown, 2006). Until the 1990s, researchers encouraged more responsible and comprehensive practices of environmental concerns in supply chain management (Shi et al., 2012). Nevertheless, according to Hajikhani et al. (2012), the implementation of GSCM actually occurred in 1994 beginning with green procurement. Later, due to growing social and environmental concerns, GSCM application is expanded in all phases of supply chain. GSCM is defined as the concept of environmental considerations in internal environmental management; green purchase; customer cooperation; eco design; investment recovery (Hamdy et al., 2018). Meanwhile Wibowo et al. (2018) argue that elements of GSCM practice in construction industry consist of green initiation; green design; green construction; green operation and maintenance; reverse logistics. Others such as Shukla (2017) claim that core GSCM practice identified are green building design, green purchasing; green transportation; green construction and end of life management. It seems that because of the conditions of different industries in various countries, GSCM practice implicate different elements.

Many studies have provided various definitions for GSCM. In some instances, GSCM is add "green" component to all phases of product's life cycle from procurement, design, production and distribution in order to maximize the performance in all dimensions (Yu, 2014; Dadhich et al., 2015). GSCM implies that all components of the supply chain have the responsibility of minimizing negative impacts to ensure long term benefits (Dadhich et al., 2015). As a result, the scope of GSCM practice ranges from green procurement, green design, green manufacture to green distribution (Zhu et al., 2008; Ghobakhloo et al., 2013; Hamdy et al., 2018). However, GSCM adoption is facing challenges when individual stage in supply chain can impact on performance of other members. For example, green procurement not only has a profound impact on core enterprise's outcomes but also affects to supplier's performance. Core enterprises should extend management boundaries from traditional to supply chain partners (Kytle & Ruggies, 2005; Wang & Dai, 2017). Building elements of GSCM practice is essential in order to establish theoretical basis and to develop suitable research model especially when the scope of GSCM in the literature is confused. Various studies can contribute comprehensive framework of GSCM constructs which is enable us to detect appropriate constructs for specific sectors. Based on our understanding of GSCM practice in construction materials manufacturing sector, we identify and classify relevant green practice into four elements relating to supply chain stakeholders (suppliers, designers, manufacturers, customers).

Green Procurement: The implementation of green purchasing is adopted first in GSCM practice (Hajikhani et al., 2012). This definition indicates that the environmental considerations are linked to purchasing planning, program and action (Varnäs et al., 2009). Green procurement involves the purchasing of environmentally friendly products and the cooperation with suppliers for environmental objectives. To meet suppliers' environmental goals, buying enterprises needs collaboration activities such as information sharing, joint research and training (Laosirihongthong et al., 2013). Similarly, environmental integrations into purchase stage require that suppliers should possess ISO14001, ISO9001 or EMS certification (Zhu et al., 2008; Laosirihongthong, et al. 2013; Esfahbodi et al., 2016). In the selection phase, providing eco design specification to suppliers that include environmental requirements for purchased items is allocated to the green aspects of the project (Zhu et al., 2008; Esfahbodi et al., 2016).

Green Design: Designing green products creates chances to reduce the environmental effects in constitution of new products or new production processes (Wibowo et al., 2018). Eco-design is associated with health safety, product life cycle and sustainability (Chowdhury et al., 2016). Typically, eco-design can help to diminish waste processing and recycling costs (Chen & Sheu, 2009). The significant role of green design is supported by Büyüközkan and Çifçi (2012) disclosing that about 80% of product impacts on the environment comes from design stage. Therefore, organizations make positive and proactive plans to use recycled, reused and recovery components. Moreover, it is important for organizations to ensure that design of products can reduce the consumption of hazardous products.

Green Manufacturing: The major target of green manufacturing is the deduction of resources consumption with the aim of minimizing the amount of wastes by using appropriate materials, optimal processes and cleaner technologies (Chowdhury et al., 2016; Wang & Dai, 2017; Wibowo et al., 2018). Green production is a kind of production process that uses input with high efficiency and less environmental effects (Amemba et al., 2013). In addition to that, enterprises increase production and environmental efficiency in green manufacturing (Wibowo et al., 2018). Thanks to green production, emissions and wastes are treated and disposed by environmental control equipment meanwhile through cleaner technologies such as recycling, reuse or process innovation, emissions and wastes also are decreased, changed and prevented (Ghobakhloo et al., 2013).

Green Distribution: According to Ghobakhaloo et al. (2013), green distribution is one of significant components of GSCM because of its potential for positive environmental influence. Green distribution can be defined as coordination for green packaging with customers (Zhu et al., 2008; Perotti et al., 2012; Laari, 2016; Hamdy et al., 2018), upgrade freight logistics and transportation systems (Esfahbodi et al., 2016; Laari, 2016) or track and monitor emissions in distributing products (Esfahbodi et al., 2016).

Performance in adopting GSCM practice

GSCM practice is to incorporate environmental considerations into all stages of products through purchase, design, production and distribution. Numerous studies have investigated the effects of individual stage on corporate performance. For example, the findings of Shukla (2017) confirm that the implementation of GSCM had a positive impact on environmental and economic performance while Wang and Dai (2017) concur that there was a significantly positive relationship between GSCM practice and environmental and social performance. Former articles suggest that three dimensions of performance for GSCM applications consists of environmental, economic and social (Wang & Dai, 2017; Das, 2018). Nevertheless, different studies focus on GSCM for one or two of the performance. According to Laosirihongthong et al. (2013), most previous researchers focus primarily on environmental and economic outcomes such as Zhu et al. (2008), Green et al. (2012) and De Giovanni and Vinzi (2012). Few papers consider all dimensions of sustainability simultaneously (economic, environmental and social) (Wang & Dai, 2017). Furthermore, the impact of GSCM practice on social dimension has been discussed in the literature mainly in relation to developed countries while this relationship in developing economies remains relatively unexplored (Laosirihongthong et al., 2013). This paper aims to analyze the relationship between GSCM practice and a variety of corporate sustainability performance in Vietnamese construction materials manufacturers.

Environmental Performance: Previous researches have offered insights into the potential role of GSCM practice for improving environmental performance (Eltayeb et al., 2011; Green et al., 2012; Lee et al., 2012). Khaksar et al. (2016) state that GSCM is one of the central issues debated in operation management and directly affects to environmental results. Environmental performance is measured by several items which reflect through reduction of wastes, decrease of consumption for hazardous/harmful/toxic materials and energy (De Giovanni & Vinzi, 2012; Yang et al., 2013; Laari, 2016). According to Zhu et al. (2008) and Das (2018), reduction in the frequency of environmental accidents is another item of environmental performance. Moreover, improvement of an enterprise's environmental situation is supported by Esfahbodi et al. (2016).

Economic Performance: Viewpoints on GSCM practice having a negative or positive relationship with economic performance are still confused (Wagner et al. 2002). Green et al. (2012) suggest that GSCM practice by manufacturing organizations leads to improved environmental performance and economic performance. These results are also confirmed by the studies of Yang et al. (2013) and Perotti et al. (2012). However, according to Esfahbodi et al. (2016), adoption of GSCM results in higher levels of environmental performance of manufacturers in China and Iran, but does not necessarily lead to improved economic performance which is accepted by the results of De Giovanni and Vinzi (2012). Economic performance implies in terms of saving costs including cost for materials purchasing, cost for energy consumption, fee for waste treatment, fee for waste discharge and decrease of fine for environmental accidents (Zhu et al., 2008; Zailani et al., 2012; Green et al., 2012; Das, 2018). Further, improving profits is utilized by Laari (2016), Yang et al. (2013). Increasing market share is recommended by Wagner and Schaltegger (2004); Perotti et al. (2012); De Giovanni & Vinzi (2012).

Social Performance

Social performance in supply chain management has received increasing attention due to increasing awareness on health and safety, education in organizations (Seuring & Muller, 2008; Eriksson & Svenssion, 2015). GSCM looks to improve social performance of companies in supply chain (Wang & Dai, 2017). However, most of the empirical studies focus on GSCM deal with environmental and economic sectors (Golicic & Smith, 2013). There are few empirical studies associated with social sustainability in supply chain management (Mani et al., 2016a; 2016b). For example, Esfahbodi et al. (2016) confirm the positive impact of GSCM on environmental and cost performance and did not incorporate social performance. Thus, comprehensive GSCM practice performance model is proposed and empirically assessed for Vietnamese construction materials production firms. Social performance is measured in terms of increasing health care facilities to the local community (Hutchins & Sutherland, 2008; Main et al., 2016a, b, Das, 2018). According to Das (2018), social performance is also reflected in improving employment/business opportunities to community. On the other hand, vocational/primary education of the surrounding people advanced is supported by a few studies of Zhu et al., 2016; Das, 2018.

3. Research methodology and model

Many researchers have integrated environmental practice into supply chain management. GSCM is an innovative tool to achieve sustainable development (Zhu et al., 2012; Chowdhury et al., 2016). Although, GSCM practice is established by several theories, application of GSCM impacting on performance depends on type of industries and different context (Chiou et al., 2011). For example, Khaksar et al. (2016) only analyzed the impact of green supplier and green innovation on environmental outcomes. Perotti et al. (2012) and Hamdy et al. (2018) examined how GSCM practice could contribute to improve company performance from an environmental viewpoint as well as economic and operational. On the other word, Zailani et al. (2012) select a research model which green procurement and green packaging positively affect sustainable supply chain performance including operational, economic, environmental and social performance. In the context of Vietnamese construction materials industry, this study is conducted to investigate the relationship between GSCM practice and sustainable performance (see Fig. 1). While the elements of GSCM practice consist of Green Procurement (GPR), Green Design (GDE), Green Manufacturing (GMA), Green Distribution (GDI), sustainable performance is measured by three sectors including environmental, economic and social performance.

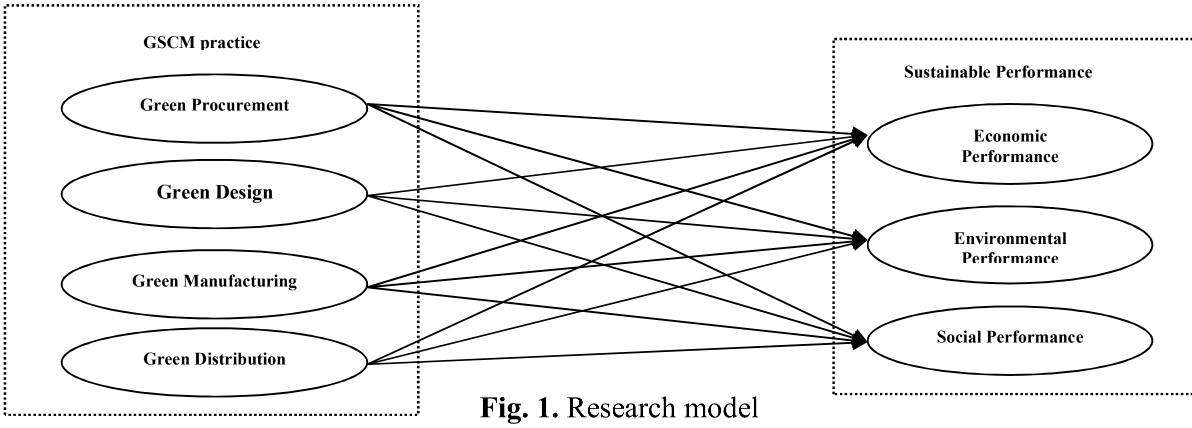

Fig. 1. Research model

Table 1
Scales of GSCM elements

Item	Description	Sources
Green Procurement (GPR)		
GPR1	Green label of products	Vachon & Klassen (2008), Zhu et al. (2008), Perotti et al. (2012), De Giovanni & Vinzi (2012), Esfahbodi et al. (2016), Laari (2016), Hamdy et al. (2018)
GPR2	Collaboration with suppliers for environmental targets	
GPR3	Require suppliers to adopt an environmental management system (eg. ISO 14001, ISO 9001, EMS)	
GPR4	Demand suppliers to provide design specification including environmental requirements for purchased item	
Green Design (GDE)		
GDE1	Products designed to reduce consumption of material/energy	Zhu et al. (2008), Esfahbodi et al. (2016), Hamdy et al. (2018)
GDE2	Products designed to reuse, recycle, recovery of material, component parts	
GDE3	Products designed to avoid or reduce use of hazardous products	
GDE4	Cooperation with customers for eco design	
Green Manufacturing		
GMA1	Optimization of manufacturing processes to reduce air emissions, water use, solid waste, and/or noise reduction	De Giovanni & Vinzi (2012), Zailani et al. (2012), Wang & Dai (2017)
GMA2	Use of cleaner production technologies and best practices	
GMA3	Establish the recycle system of waste products	
Green Distribution		
GDI1	Coordination with customers for green packaging	Zhu et al. (2008), Green et al. (2012), Perotti et al. (2012), Yang et al. (2013), Esfahbodi et al. (2016), Laari (2016), Hamdy et al. (2018)
GDI2	Reform logistics and transportation systems	
GDI3	Track and monitor emissions caused in distributing products	

A five-point scale: 1= not at all, 2= to a small extent, 3= to a moderate extent, 4= to a relatively great extent, 5= to a great extent

The instrument used for this study has been established according to literature. Each construct consists of multiple items using five-point scale. In order to maintain that GSCM is applied and implemented by respondent enterprises, the sample population is limited to construction materials manufacturers receiving ISO 14001 or/and ISO9001 certification or/and setting environmental management system (EMS) in Vietnam. The survey questionnaires are sent to managers relating to GSCM practices and firm performance by email and directly. In original sample of 450 enterprises, we obtained 218 useful and complete votes and response rate was by 48.44%. It is considered sufficient for implementing the research hypotheses. Respondents were asked to indicate to what extent of GSCM practices implemented and describe performance results in their enterprises based on a five-point Likert ranging from 1 to 5. The measures are presented in Table 1 and Table 2. Collected data is processed by SPSS 22.0 software which provide reliability testing, factor analysis, correlation analysis and regression analysis.

Table 2

Scales of GSCM performance

Item	Description	Sources
Economic Performance (EP)		
ECP1	Increase Profit	Wagner and Schaltegger (2004), Zhu et al. (2008), Perotti et al. (2012), De Giovanni & Vinzi (2012), Green et al. (2012), Yang et al. (2013), Esfahbodi et al. (2016), Laari (2016), Das (2018)
ECP2	Save cost	
ECP3	Increase market share	
Environmental Performance (EP)		
ENP1	Reduce wastes (such as air emission, solid wastes, waste water, noise pollution)	Wagner and Schaltegger (2004), Zhu et al. (2008), De Giovanni & Vinzi (2012), Perotti et al. (2012), Yang et al. (2013), Esfahbodi et al. (2016), Laari (2016), Das (2018), Hamdy et al. (2018)
ENP2	Decrease consumption for hazardous/ harmful/toxic materials and energy	
ENP3	Reduce the frequency off environmental accident	
ENP4	Improve enterprise's environmental situations	
Social Performance (SP)		
SOP1	Increase health care facilities to the local community	Hutchin & Sutherland (2008), Main et al. (2016a,b), Wang & Dai (2017), Das (2018)
SOP2	Enhance opportunities for employment and business to the surrounding community	
SOP3	Improve professional education of the surrounding people	

A five point scale: 1=not at all, 2=a little bit, 3= to some degree, 4= relatively significant and 5=significant

4. Research results

Measurement scales

Cronbach's Alpha, Corrected Item-Total Correlation and Cronbach's Alpha if Item Deleted are selected to test the reliability of the scales. In Table 3, Cronbach's Alpha of each construct ranges from 0.852 to 0.930, corrected Item-Total Correlation value of the variables from 0.573 to 0.866 is greater than 0.3 and Cronbach's Alpha if Item Deleted value in this study between 0.738 and 0.948 is greater than 0.6. It is indicated that all scales are acceptable with good reliability degree (Hair et al., 2014).

Table 3

Measurement scales

Item	Cronbach's Alpha	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	KMO	Extraction Sums of Squared Loadings	Factor loading
Green Procurement (GPR)						
GPR1	0.913	.796	.892	0.788	79.757%	.904
GPR2		.774	.899			.889
GPR3		.833	.875			.880
GPR4		.820	.881			.876
Green Design (GDE)						
GDE1	0.926	.846	.897	0.855	81.857%	.868
GDE2		.842	.899			.867
GDE3		.840	.899			.866
GDE4		.785	.918			.861
Green Manufacturing (GMA)						
GMA1	0.852	.573	.948	0.632	78.726%	.932
GMA2		.791	.738			.924
GMA3		.837	.684			.517
Green Distribution (GDI)						
GDI1	0.889	.821	.808	0.735	81.865%	.920
GDI2		.741	.878			.849
GDI3		.791	.835			.769
Economic Performance (ECP)						
ECP1	0.910	.840	.855	0.740	85.958%	.946
ECP2		.866	.843			.935
ECP3		.784	.921			.900
Environmental Performance (ENP)						
ENP1	0.869	.672	.855	0.825	72.102%	.871
ENP2		.759	.817			.865
ENP3		.723	.833			.848
ENP4		.747	.822			.811
Social Performance (SOP)						
SOP1	0.930	.860	.897	0.767	87.795%	.939
SOP2		.855	.900			.936
SOP3		.856	.900			.936

In factor analysis, we use KMO value; extraction sums of squared loadings and factor loadings. KMO value considers the appropriateness of factor analysis which is acceptable when it is greater than 0.5. Table 3 shows that KMO values of all the seven constructs are higher than 0.5 with Sig. values of

Barlett's tests by 0.000 (less than 0.01) proposing that factor analysis is appropriate. The scales for *Green Procurement* construct explain 79.757% of the total variance in the data. The values for other constructs are greater than 50% as follows: *Green Design (81.857%); Green Manufacturing (78.726%); Green Distribution (81.865%); Economic Performance (85.958%); Environmental Performance (72.102%); Social Performance (87.795%) respectively*. The values of extraction sums of squared loadings are higher than the recommended critical value of 50% which confirm appropriate exploratory factor analysis. In addition to that, factor loadings of all seven constructs are greater than 0.7 expectation of GMA3 (factor loading = 0.517) and at significant level of 0.01 indicating that the observed variables have a close correlation with the factors for very good statistical significance (Hair et al., 2014).

Correlation analysis

The study also examines whether there are significant correlation relationships between constructs. As indicated in Table 4, all constructs are related to each other exception of *Green Procurement* and *Green Design* which have no correlation due to Sig. value by 0.055 greater than 0.01. *Green Procurement* have weak relationships with different constructs (Pearson Correlation < 0.5). The remaining constructs have significant relationships (Pearson Correlation > 0.5). Especially, all three dimensions of GSCM performance are highly correlated to each other. These imply that GSCM practices have an influence on one dimension of performance are likely to impact on other dimensions.

Table 4
Correlation Analysis

Correlations								
		GPR	GDE	GMA	GDI	ECP	ENP	SOP
GPR	Pearson Correlation	1						
	Sig. (2-tailed)							
GDE	Pearson Correlation	.130	1					
	Sig. (2-tailed)	**.055**						
GMA	Pearson Correlation	.206**	.513**	1				
	Sig. (2-tailed)	.002	.000					
GDI	Pearson Correlation	.188**	.507**	.522**	1			
	Sig. (2-tailed)	.005	.000	.000				
ECP	Pearson Correlation	.341**	.706**	.562**	.512**	1		
	Sig. (2-tailed)	.000	.000	.000	.000			
ENP	Pearson Correlation	.271**	.548**	.601**	.563**	.666**	1	
	Sig. (2-tailed)	.000	.000	.000	.000	.000		
SOP	Pearson Correlation	.309**	.764**	.561**	.526**	.914**	.727**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

Regression analysis

This study adopts regression analysis to explore whether GSCM practices affect to dimensions of performance. The first set of hypotheses investigates the relationships between four elements of GSCM and economic performance as showed in H_1 to H_4. Adjusted R^2 value is of 0.599 (> 0.5) which points out the close relationships among constructs. The value of d in Durbin - Watson test is less than 2 showing there is no autocorrelations among the residuals. Table 5 displays that Green Procurement; Green Design, Green Manufacturing have significant and positive relationships with Economic Performance. which support for H_1, H_2, H_3. In contrast, the findings indicate that Green Distribution have no relationship with Economic Performance because of Sig. value of 0.056 (less than 0.01).

Table 5

Regression model between GSCM practices and economic performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	99.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	-1.385	.327		-4.241	.000	-2.234	-.536		
	GPR	.274	.057	.213	4.834	.000	.127	.422	.949	1.054
	GDE	.580	.058	.527	9.955	.000	.428	.731	.658	1.519
	GMA	.339	.095	.194	3.590	.000	.094	.585	.635	1.575
	GDI	.127	.066	.103	1.919	**.056**	-.045	.299	.644	1.554

Adjusted R^2 = 0.599; Sig. F change = 0.000; Sig. Anova = 0.000; Durbin-Watson = 0.550

The second model is assessed by examining the impact of GSCM practices on environment performance (H_5 to H_8). Results of testing the hypotheses from Table 6 show that environmental performance was positively related to green design, green manufacturing as well as green distribution. Consequently, the findings support H_6, H_7, H_8. The fifth hypothesis (H_5) is not accepted indicating that there is no relationship between green procurement and environmental outcome (Sig. value of 0.012).

Table 6

Regression model between GSCM practices and environmental performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	99.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
2	(Constant)	-1.106	.273		-4.059	.000	-1.814	-.398		
	GPR	.120	.047	.126	2.539	**.012**	-.003	.243	.949	1.054
	GDE	.196	.049	.241	4.032	.000	.070	.322	.658	1.519
	GMA	.416	.079	.321	5.272	.000	.211	.621	.635	1.575
	GDI	.228	.055	.250	4.138	.000	.085	.372	.644	1.554

Adjusted R^2 = 0.490; Sig. F change = 0.000; Sig. Anova = 0.000; Durbin-Watson = 0.817

Sig. value of green distribution and social performance is equal to 0.47 (> 0.01). As a result, this relationship is not statistically significant and failed to support for H_{12}. Due of Adjusted R^2 in the third model by 0.656 (greater than 0.5), the effect of green procurement, green design and green manufacturing to social performance is positive and significant, supporting H_9 to H_{11}.

Table 7

Regression model between GSCM practices and social performance

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	99.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
3	(Constant)	-2.000	.335		-5.977	.000	-2.869	-1.130		
	GPR	.254	.058	.178	4.361	.000	.102	.405	.949	1.054
	GDE	.740	.060	.608	12.402	.000	.585	.895	.658	1.519
	GMA	.312	.097	.161	3.225	.001	.061	.564	.635	1.575
	GDI	.136	.068	.099	2.002	**.047**	-.040	.312	.644	1.554

Adjusted R^2 = 0.656; Sig. F change = 0.000; Sig. Anova = 0.000; Durbin-Watson = 0.672

Table 8 summarizes the results of research hypotheses which confirms 9 hypotheses and rejects 3 hypotheses. Meanwhile, Fig. 2 presents the influent level of each element in GSCM practices to each dimension of GSCM performance.

Table 8
Results of research hypotheses

Hypotheses	Description	Result
H_{1GPEC}	Green procurement effects to Economic Performance	Accepted
H_{2GDEEC}	Green design effects to Economic Performance	Accepted
H_{3GMEC}	Green manufacturing effects to Economic Performance	Accepted
H_{4GDIEC}	Green distribution effects to Economic Performance	Not accepted
H_{5GPEN}	Green procurement effects to Environmental Performance	Not accepted
H_{6GDEEN}	Green design effects to Environmental Performance	Accepted
H_{7GMEN}	Green manufacturing effects to Environmental Performance	Accepted
H_{8GDIEN}	Green distribution effects to Environmental Performance	Accepted
H_{9GPSO}	Green procurement effects to Social Performance	Accepted
$H_{10GDESO}$	Green design effects to Social Performance	Accepted
H_{11GMSO}	Green manufacturing effects to Social Performance	Accepted
$H_{12GDISO}$	Green distribution effects to Social Performance	Not accepted

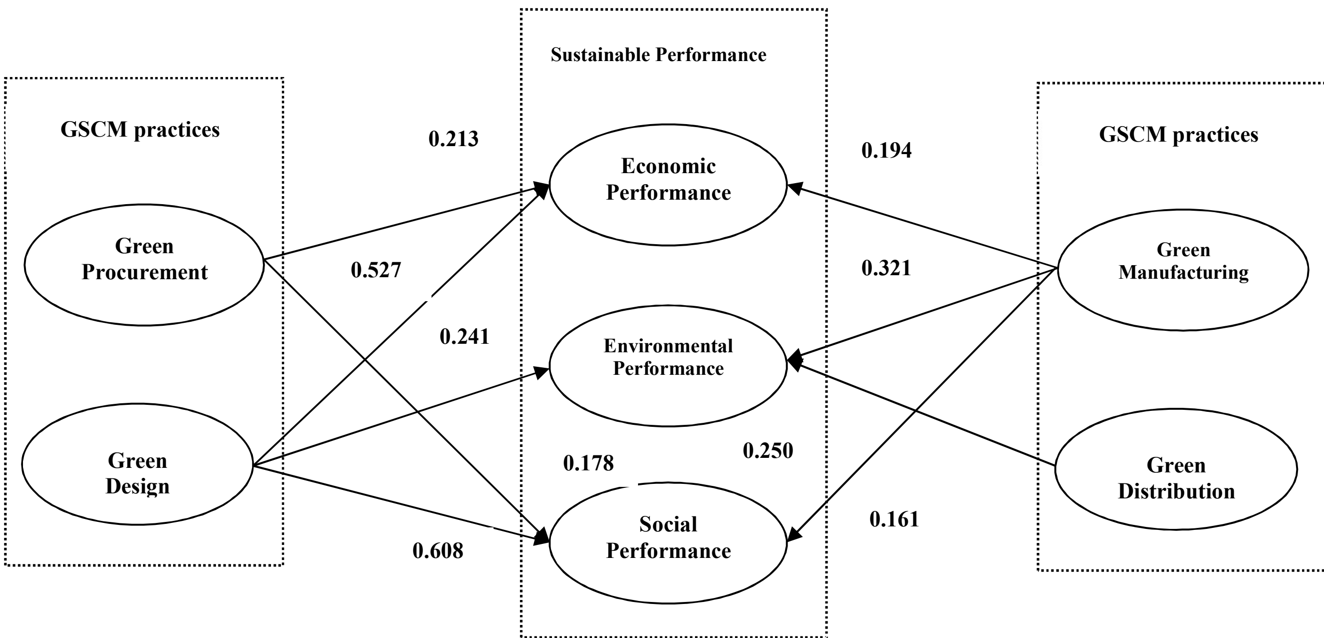

Fig. 2. The influent level of GSCM practices to sustainable performance

5. Conclusions

In recent years, a growing focus on social and environmental issues as well as increasing trend among countries and organizations towards to sustainable development has required us to set some new strategies. GSCM practices is an innovative strategy in flexible operational management with aim of enhancing economic, environmental and social benefits. Although, numerous studies focus mainly on GSCM and outcomes of its practices. However, the impact of elements in GSCM practice on sustainability performance has not been clearly observed. This study has filled the gap in the literature in attempting to examine the relationships between four basic elements of GSCM practice including green procurement, green design, green manufacturing as well as green distribution and three firm performance consisting of economic, environmental and social. The findings in this study indicate that applying GSCM practices would improve enterprise's sustainable performance. The results have demonstrated that green procurement had positive impacts on economic and social performance in line with the results from Zailani et al. (2012). The results have also shown that enterprises conducting green procurement can effectively improve economic outcome. Green procurement can help to increase their image and reputation with community as agreed by Zailani et al. (2012). Green procurement has no direct effect on environmental performance in Vietnamese construction materials industry contradicting the findings of Björklund (2011); Laosirihongthong et al. (2013), Khaksar et al. (2016), Esfahbodi et al. (2016), Shukla (2017) also concluded that focusing on purchasing functions could increase their contribution in reducing the negative influences on the environment.

It is debated that there is the significantly positive relationship between green design and sustainable performance. Enterprises explore opportunities in their eco design that would ensure improved profitability (economic perspective) meanwhile reduce environmental impacts (environmental perspective) and increase social responsibility (social performance). The findings of this research are in line with previous literature such as Laosirihongthong et al. (2013). In addition to that, green manufacturing has positive and significant influences on economic, environmental and social performance. This suggests that green manufacturing such as optimization of manufacturing processes, adoption of cleaner production not only decreases negative environmental impacts but only reduces costs and increases profits. Through green manufacturing, enterprises can also enhance health care, employment opportunities to community and education of the surrounding people. It is confirmed that construction materials manufacturing enterprises in Vietnam are more concerned about environmental collaboration in green design and manufacturing.

In other words, green distribution only directly impacts on environmental performance which has also been discussed in the study of Esfahbodi et al. (2016). According to Green et al. (2012), Esfahbodi et al. (2016), practice of sustainable distribution is focused on decreasing the levels of environmental pollutants, which potentially has the capacity to enhance the environmental performance. The conclusion finds that the enterprises with good green distribution have more environmental benefits but do not create economic and social benefits. The results are not confirmed by Zailani et al. (2012) who stated "thank for green sustainable packaging, organizations reduce costs from an economic point of view and fulfill external societal drivers such as customer, public and non-government".

On the other hand, the study has important managerial implications for developing countries such Vietnam where very few studies on GSCM have been revealed. Enterprises should deeply understand the potential positive effects of GSCM adoption to sustainability performance and pro-actively apply in practices. To enhance strong and rapid sustainable performance, all GSCM's elements including green procurement, green design, green manufacturing and green distribution should be integrated. Each element will support together and their collaboration creates the success of GSCM. For example, when core enterprises implement an environmental management system (e.g.: ISO 14001, ISO 9001, EMS) which also demand suppliers of their possession for designing green products, they choose cleaner production technologies in effort to reduce wastes, save costs and increase community benefits.

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