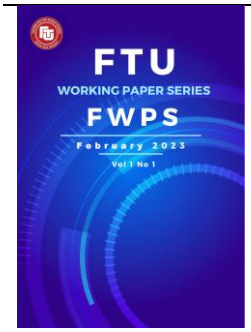

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QUẢN LÝ CHUỖI CUNG ỨNG XANH TRONG THƯƠNG MẠI ĐIỆN TỬ VÀ ĐỀ XUẤT GIẢI PHÁP CHO DOANH NGHIỆP VIỆT NAM

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Tóm tắt

Với sự phát triển nhanh chóng của nền kinh tế mạng và nhu cầu tiêu dùng xanh thì các quy định của chính phủ và việc thực thi nghiêm ngặt hơn trách nhiệm của doanh nghiệp đối với môi trường ngày càng cần được quan tâm. Bài nghiên cứu xem xét việc áp dụng quản lý chuỗi cung ứng xanh trong thương mại điện tử trong nền kinh tế toàn cầu; đưa ra đánh giá về hoạt động phát triển quản lý chuỗi cung ứng xanh (GSCM) trong thương mại điện tử Việt Nam dựa trên 4 yếu tố: rào cản kinh tế và giáo dục, luật và quy định liên quan, cơ sở hạ tầng kỹ thuật và khả năng đổi mới của GSCM; và đưa ra khuyến nghị cho các doanh nghiệp trong lĩnh vực thương mại điện tử tại Việt Nam.

Từ khóa: thương mại điện tử, quản lý chuỗi cung ứng xanh, GSCM.

GREEN SUPPLY CHAIN MANAGEMENT IN E-COMMERCE SECTOR AND RECOMMENDATIONS FOR VIETNAM'S CORPORATIONS

Abstract

With the rapid development of the cyber economy and green consumption demand, governments' regulations and stronger corporate mandates for environmental responsibility have become major issues. This paper examines the application of green supply chain management (GSCM) in E-commerce in the global economy; provides an assessment of GSCM development activities in Vietnamese E-commerce based on four factors: economic and educational barriers, relevant laws and regulations, technical infrastructure and innovative capability of GSCM; and gives recommendations for enterprises in the E-commerce sector in Vietnam.

Keywords: E-commerce, green supply chain management, GSCM.

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1. Introduction

In today's global economy, the economic and social impacts of supply chain management have gradually emerged as an issue of public concern. In other words, consumers are more sensitive to green products to fulfill their social responsibility. Many companies have undertaken green initiatives to take collective responsibility and establish a good corporate image among customers (Du *et al*. 2017). For instance, the Panasonic Group strives to achieve carbon neutrality together with society, by making impacts on CO2 reduction in homes, towns, mobility and supply chain and accelerate towards carbon neutrality together with society, setting environmental protection and green as the company's primary innovation goals; At the beginning of Haier's foundation, which ranked 1st of China's top 10 global brands by the Financial Times, Haier has managed to improve the environment by conserving energy and recycling old products. This great success results from Haier's strategy of sustainable development.

In the pursuit of green production, enterprises have inevitably increased their investments in green technology, resulting in an increase in production costs. Considering that, companies have been seeking more cost-effective ways of operating. On the one hand, product display and sales through E-commerce platforms can effectively reduce operating costs and relieve production pressure from manufacturers. On the other hand, with the continuous increase in consumers' awareness of environmental and health problems, their consumption habits have changed in favor of green products. In the Internet era, consumers not only prefer green products (Liu *et al.* 2012) but also increasingly rely on online shopping (Wang *et al.* 2015). Therefore, the development of online and offline supply chains has become one of the most urgent problems that enterprises must consider (Wang *et al.* 2018; Hua *et al.* 2010). At the same time, the emergence of E-commerce creates leverage for sustainable development of supply chains. As a result, manufacturers are shifting sales of green products from offline to online, and the E-commerce supply chain (ECSC), combining green supply chain management and e-platforms, is also gradually emerging.

The methods of doing business and managing the supply chain in Vietnam are changing. Popular e-commerce platforms such as Shopee, Lazada, and Tiki are rapidly expanding and achieving high customer satisfaction rates as a result of supply chain control, collaboration with significant brands, warehouse management, shipping, payment, and so on. The growth of delivery companies is increasing demand for last-mile vehicles. Laws in 100 cities around the world allow for a 30% increase in last-mile delivery truck emissions. The fact that Vietnamese businesses prioritize fast delivery has resulted in wasteful practices that have harmed the environment. Meeting consumers' green consumption expectations and adhering to sustainable supply chain principles are challenges for Vietnam's e-commerce industry.

2. Theoretical framework

2.1. Green supply chain management

2.1.1. Definitions

a) Supply chain management

Lee and Corey (1995) has defined that supply chain management (SCM) incorporates the integration of activities taking place among facilities networks that acquire raw material, transform them into intermediate products and then final goods, and deliver goods to customers through a system of distribution. The goal of supply chain management is to examine and manage supply chain networks. The concept's rationale is the opportunity (alternative) for cost savings and

improvement of customer service. Improving a corporate's competitiveness in the global marketplace in spite of hard competitive forces and promptly changing customer needs is also the important objective of SCM (Langley et al. 2008).

According to Christopher (1998) supply chain refers to the organization's network that is involved in the diverse processes and activities that generate value in the form of goods and services in the hands of the end customer. Supply chain management (SCM) is the management of the flow of goods and services and includes all processes that transform raw materials into final products.

In conclusion, in this research we will define supply chain management (SCM) as the management of the flow of goods and services and includes all processes that transform raw materials into final products. It involves the active streamlining of a business's supply-side activities to maximize customer value and gain a competitive advantage in the marketplace.

b) Green supply chain management

Supply chain management and environmental management as strategic organizational practices to create competitive advantage gained attention in the late 1980s and early 1990s. Supply chain sustainability management is one of four main corporate sustainability topics, according to research (United Nations, 2013b). Green and sustainable supply chains lack a consensus definition. In a review of green and sustainable supply chain definitions, 22 green and 12 sustainable definitions were found (Ahi and Searcy, 2013).

To help bound the scope of our research, we focus on the definition that the Green supply chain management (GSCM) is the approach that integrates eco-friendly methods into traditional supply chain management. Its goal is to reduce the impact of factors such as pollutants, deforestation, ozone depletion and global warming affecting the environment. Solutions could range from intelligent packaging such as from using right-sized packaging boxes, avoiding oversized boxes for smaller consignments to using recyclable paper pads as replacement for plastic packaging.

2.1.2. Role and position of GSCM in a global context

In general, GSCM has an important role and position in all of the countries in the world. Because both developed countries and developing countries are believed to deal with lots of environmental issues and depletion problems due to their increasing economic development.

While the trajectories of the supply chain are evolving, there are emergence of different green supply chain management (GSCM) solutions to help revolutionize the management of today's global supply chains. The following will dive deeper into the benefits for businesses to adopt a green supply chain approach, examples of some pioneers in this field and how these GSCM strategies ease the headache of businesses during their journeys of going "green".

GSCM is so important for business across different industries. To business owners, efficiency and productivity are the keys to growing a profitable business. In recent years, companies of different sizes are embarking on the journey towards a more sustainable supply chain. Not only does this trend alleviate the social and environmental risks, but such practice can also bring enormous benefits to businesses across industries, including economic returns and positive brand identity.

In general, there are 5 main advantages of green supply chain management to all of the companies and corporations in the world:

(i) Comply with International Principles and Standard

In the face of increasing scandals around the world concerning corporate ethics and corporate governance, many governments have responded with greater oversight of corporate activities. A lot of Multinational Corporates (MNCs) are striving to become the forerunner on the world stage by coming up with holistic sustainable strategies to comply with international principles and standards.

(ii) Increase Profitability

One of the essences of green supply chain management is to streamline business operations, such as better use of sustainable materials, ensuring a safe working environment, lean production, and quality management, etc. These approaches would result in cutting down unnecessary operational costs. By reducing costs, it also means increasing your ROI and revenue. In the long run, it translates into a higher valuation for businesses.

Apple Inc. disclosed environmental statistics, achievements, and aspirations on its website in a 2008 facilities report. They've applied GSCM in product design, purchasing, inventory management, packaging, transportation, consumption, and disposal. Return on equity is a good profitability metric (ROE). In the first six years of GSCM concentration, Apple's ROE climbed rapidly. Apple's efficiency and leverage are rising.

(iii) Fulfill Corporate Social Responsibility

A green supply chain has many dimensions. Other than the environmental aspect, issues around fair labor practices, anti-corruption, and human rights are also of paramount importance in practicing green supply chain. By incorporating these ethical practices, companies can rule out investors' concerns over these topics and ensure businesses are running with efficiency and transparency.

(iv) Build a Positive Brand Image

Not only does green supply chain practices streamline business operations and improve the quality of your product, but it is a powerful way to construct a positive brand image and create a unique or at least favorable brand identity in response to your green initiatives. In doing so, businesses can enhance their brand reputation, hence gaining consumers' trust and loyalty in the long run.

(v) Encourage Corporate Innovation

By implementing green supply chain management, companies are injecting new values and visions within the businesses. It can bring a positive impact to the company culture, where employees and managerial staff are more willing to innovate and explore different opportunities to develop new products and services revolving around sustainability.

2.1.3. Dimensions of green supply chain management

Green supply chain dimensions are those initiatives that any organization adopts to comply with environmental legislation, reduce its operations' negative impact on the environment and improve its performance. We will focus on those green supply chain dimensions that have been widely adopted and discussed in the extant literature which include: green purchasing, green-design, environmental cooperation and reverse logistics. The above 4 practices will become the independent dimensions for the theoretical model to be investigated.

(i) Green Design

Green Design (Eco-design) is an action taken during product development to minimize a product's environmental impact during its entire life cycle, from acquiring raw materials to disposing of it, without affecting performance and cost.

Eco-design is an important green supply chain initiative because it determines the type of raw material to be used, the energy consumed, and the waste generated. Product design affects the environment at every stage of the supply chain, from production to consumption to disposal. The product's attributes and materials determine how much energy it needs to function, what wastes it may generate, and how to dispose of them.

(ii) Green Purchasing

Green purchasing can be defined as an environmental purchasing initiative that aims to ensure purchased products and materials meet with environmental objectives set by the purchasing firm such as reducing sources of waste, encouraging recycling, reuse and substitution of materials. Green purchasing is receiving significant attention worldwide and businesses have become keener to evaluate their suppliers' environmental performance before taking any procurement decision.

Some authors go beyond that to consider evaluating second level suppliers' environmental performance as well. For example, second level suppliers environmental performance as the second important evaluation criteria when it comes to evaluating supplier's environmental performance. Large organizations such as Ford, General Motors, Xerox and International Business Machines consider green purchasing as a key element in their environmental management systems, as such they enforce their suppliers to develop environmental strategies that encompass green purchasing and consequently obtain ISO 14001 certification as a green label for their environmental responsibility.

(iii) Reverse Logistic

Reverse logistics is the returning or taking back of products and materials from the point of consumption to the forward supply chain for the purpose of recycling, reusing, remanufacturing, repairing, refurbishing or safe disposing of the products and materials. Like other green supply chain initiatives, reverse logistics plays a key role in enhancing the organization's operational efficiency, improving its competitiveness and reducing costs. Perotti *et al.* (2012) included reverse logistics along with other GSCM initiatives in their study of some logistics providers in Italy to assess the adoption level of such initiatives and their potential impact on different corporate performance dimensions. From a performance measurement perspective, reverse logistics was one of the GSCM initiatives that Hervani *et al.* (2005) looked at, aiming to propose a model for a performance measurement system.

(iv) Environmental cooperation

Greening the supply chain requires internal and external cooperation. In manufacturing, purchasing, marketing, production, and human resources must work together to achieve environmental goals. Similarly, external cooperation between stakeholders in the supply chain, including the raw material supplier, the manufacturer, the logistics provider, and the customer, is needed to introduce an eco-friendly design for a safe and recyclable product (Gonzalez 2008). Internal and external cooperation require "buy in," commitment, and support from senior management to achieve environmental goals.

GSCM has used environmental cooperation in two ways. That's with suppliers or customers. Environmental cooperation refers to working with suppliers or customers. Lee et al. (2012) examined the impact of environmental cooperation on electronic firms in Korea.

2.2. General introduction to E-commerce and E-commerce businesses

2.2.1. What is E-commerce?

There were no restrictions in determining the E-commerce of scientists, researchers and other authors. It is therefore necessary to make a brief overview of the existing definitions of this term.

According to Clark (2019), E-commerce is defined as the trading of goods and services through telecommunication and telecommunication tools. Ellison (2019) also defines E-commerce as an electronic contract for the exchange of values using information and communications technology.

Anil Khural defines E-commerce as the use of computer, Internet and general software to send and receive product specifications and drawings; applications, purchase orders and invoices; and any other type of data that needs to be passed on to customers, suppliers, employees or the public (Anil, 2019).

Summarizing all the studied definitions and existing concepts, we can define that electronic commerce (ecommerce) refers to the act of buying and selling goods and services over the Internet. Ecommerce operates in different types of market segments and can be conducted over computers, tablets, smartphones, and other smart devices. Nearly every imaginable product and service is available through ecommerce transactions, including books, music, plane tickets, and financial services such as stock investing and online banking. As such, it is considered a very disruptive technology.

2.2.2. What are E-commerce businesses?

E-commerce business is a business model where the buying and selling of goods or services is done over the internet. E-commerce businesses will digitally transfer money and data to execute these online transactions.

This is the most popular concept of e-business. However, if this definition of commerce is used, the term electronic commerce would be fairly narrow. Thus, many use the term e-business instead. E-business refers to a broader definition of EC, not just the buying and selling of goods and services, but conducting all kinds of business online such as servicing customers, collaborating with business partners, delivering e-learning, and conducting electronic transactions within an organization. However, others view e-business only as comprising those activities that do not involve buying or selling over the Internet, such as collaboration and intra-business activities; that is, it is a complement of the narrowly defined E-commerce.

2.2.3. A brief evolution process of E-commerce

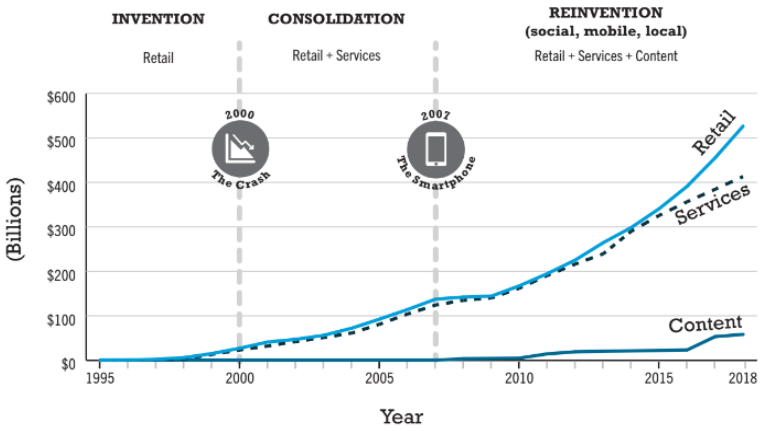

Figure 1. Periods in the development of E-commerce

Source: E-commerce 2021-2022

First, Invention, from 1995 to 2000, involved selling retail goods online with static ads and weak search engines. Most big companies had simple, static websites to represent their brands.

In 2001-2006, consolidation prompted a reevaluation of E-long-term commerce's prospects. Large companies learned how to use the Web to improve their market positions or brand expansion and emphasized a "business-driven" strategy. Besides retail goods, e-commerce included travel and financial services.

E-commerce underwent another transformation in 2007 with the release of smartphones and continues today due to the explosive growth of technologies that allow users to create content, such as social networks, blogs, Wikipedias, websites, and mobile devices like smartphones and tablets. Entertainment content has become a major source of E-commerce revenue on mobile devices.

3. Application of Green supply chain management in E-commerce

3.1. Current application of GSCM in E-commerce

3.1.1. Benefits of implementing GSCM in E-commerce

Because the E-commerce sector uses a medium that already contributes to a healthy environment by reducing the cost of stores and merchants, green supply chain is increasingly crucial in this sector. As the packaging is the aspect that informs the consumer about the green SCM of any firm, it is increasingly crucial for the E-commerce sector to utilize natural, biodegradable, and recyclable materials.

Industries may be influenced by a variety of factors to adopt green supply chain management. According to research, businesses decided to use GSCM procedures since there is a positive correlation between their economic success and the environment. In addition to environmental benefits, implementing GSCM has significant advantages for businesses:

(i) Businesses may cut down on the supply chain waste of materials, food, energy, and gas, which will lower the additional costs from their earnings.

(ii) In order to be more environmentally friendly, businesses aim to use less materials and take shorter routes. Lower fuel and vehicle maintenance costs are the outcome of this.

(iii) Consumer perception can affect businesses that don't adopt sustainability. However, businesses that use GSCM may significantly influence this leveling in customers' minds.

3.1.2. Challenges when applying GSCM in E-commerce

Additional Expense

The main issue is the additional expense related to the GSCM procedures, which small production units view as a nuisance and try to avoid since it reduces their profit margins. On the other side, industry heavyweights and significant manufacturers can afford the additional expense of the GSCM. The procedures that are regarded as environmentally friendly take time and additional manpower and financial resources from the firm to implement. The industry faces a challenge in educating employees about environmental sustainability practices and integrating them into organizational culture. The governments of less developed nations are not concerned with the implications of the laws, and they do not maintain any kind of check and balance about such implications.

Technological limitations and lack of resources

Owing to technological limitations and a lack of resources, every SCM cannot be converted to GSCM. There is no denying that the green supply chain management has many benefits for both the business and the environment, but there are also many issues that are being brought up by many researchers, one of which is the cost. When compared to the traditional supply chain, the green supply chain takes longer to install and is less quick and flexible. The early stage of the GSCM will have high manufacturing costs, which will lead to high pricing. Due to the cheap prices charged by traditional SCM rivals, the buyers do not appreciate or accept the high pricing of the green products. It will take time for all business units in the sector to turn on the green supply chain and for everyone to produce green products at the same cost.

Indifference of the customers and the entrepreneurs about environmental issues

Customers may not believe in the effectiveness of the company's green strategies. Many customers may not be willing to pay a higher price for green products, which can affect business profitability. In addition, companies that practice Green SCM also have to go to great lengths to convince stakeholders and often there are some who simply do not believe and do not cooperate.

There is therefore a lack of motivation or awareness on the part of business leaders to go green or select and implement the appropriate green supply chain strategies to make their business competitive in this globalized business era.

Impact of globalization

In the 21st century, changes in the business environment have contributed to the development of supply chain networks. Technological changes, especially the dramatic decrease in communication costs (an important component of transaction costs), have led to changes in the coordination between supply chain network members (Coase, 1998).

3.2. Requirements for E-commerce enterprises to adopt GSCM strategies

Organizational factor

Adoption of GSCM is influenced by organizational internal variables. The characteristics that are utilized to assess and contrast an enterprise's success are determined by internal variables, including human resource management, technology, organizational goals, and vision statements. Production capacity, marketing tactics, management, the age of the business, the owner's or manager's experience, and organizational culture are all significant factors that affect a company's internal structure. Since it is directly related to an organization's performance, staff strength is a crucial internal business component.

Customer factor

The profitability and growth of the business also heavily depend on the consumer. Because better levels of customer happiness are linked to greater levels of customer loyalty, which may translate into higher profitability for the organization, customer satisfaction has become an essential part of corporate strategy. Lv and Li (2021) investigated how environmentally conscious customers influenced business green innovation. Customers thus play a crucial role in GSCM. Previous studies have shown that customer participation benefits production and consumption as well as the growth of the business. Additionally, GSCM adoption can raise customer satisfaction levels.

Marketing factor

A marketing plan is frequently a key component of an enterprise's overall performance. Customers, sustainable production, and consumption are significantly impacted by marketing elements including price, distribution, promotion, and adaptability. A plan to broaden the garment market was put up by Valor et al. (2022). In this research, there was a substantial connection between GSCM and the marketing approach. The marketing factor and GSCM adoption both significantly improved the performance of the business and promoted sustainable production and consumption.

Operational factor

The performance of the business also heavily depends on the operational component. The "management of systems and procedures involved in the manufacturing of commodities" is a definition of an enterprise's operations. Numerous operational aspects influence enterprises and boost their output. The development of the business is mostly dependent on operational elements, which have an impact on decision-makers' plans. The operational component enhances economic and environmental performance. They are closely related to GSCM and the production and consumption of the company. Additionally, using green supply chain management techniques can improve the efficiency of operational variables.

4. Green supply chain management in E-commerce in Vietnam

4.1. Development of E-commerce in Vietnam

4.1.1. E-commerce appears and develops in Vietnam

In Vietnam, E-commerce activities started to emerge in the early years of the decade. After extensive research, the government published an E-commerce decree. And finally, in 2013, E-commerce activities received official legal recognition.

With 50 million smartphone subscribers and 53% of the population using the internet in Vietnam today, the country's E-commerce business is expected to expand after several years of operation. The Vietnam E-commerce Association's (VECOM) survey findings showed a 25% rise in the growth of E-commerce from 2016 to 2017. Additionally, the data from thousands of E-commerce websites reveals that the revenue growth rate for the online retail industry climbed by 35% in 2017.

Unexpectedly, the market has seen the entry of many big players in recent years, with lotte.vn and aeoneshop.com entering in early 2017. In 2018, Amazon entered the Vietnamese market to help SMEs to export goods. Delivery speed and quality are increasingly important to both customers and sellers.

When the Covid-19 pandemic occurred, Vietnam's E-commerce saw an astonishing 18% rise, reaching a market value of 11.8 billion USD and making up 5.5% of the country's total retail sales of products and services. Vietnam is reportedly soon overtaking other Southeast Asian countries as the "hot piece of cake" for E-commerce thanks to its impressive growth.

The reason for this breakthrough is the government's severe social distancing regulations, which have pushed customers to adapt to online purchasing without leaving their homes. Under the COVID-19 pandemic's visible effects, there were some changes in Vietnamese consumers' purchasing habits. Customers limit their use of traditional markets, supermarkets, and other outside shopping venues. Instead, they tend to spend more time on searching for items online.

Vietnam is the second fastest-growing E-commerce market after Indonesia according to eConomy reports by Google and Temasek, and this market is expected to reach US$15 billion by 2025. Besides, according to the Vietnam Logistics Business Association (VLA), the logistics industry in Vietnam accounts for about 20 to 25% of GDP with a growth forecast of about 12% per year in the near future. It is increasingly clear that the long-term prospects of Vietnam's E-commerce lie on developing a good logistics system to facilitate this industry.

4.1.2. Big E-commerce enterprises in Vietnam

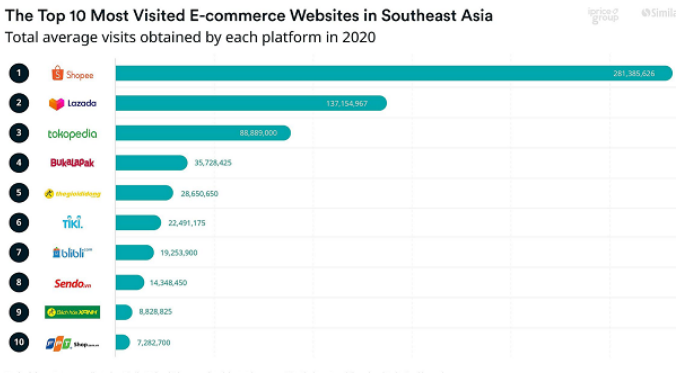

Figure 2. Top 10 E-commerce websites in Southeast Asia in 2020

Source: campaignasia.com

Although many small and large companies have participated in the present marketplace, Tiki, Shopee, Lazada and Sendo continue to have the greatest market and consumer influence in Vietnam. They also represent the development of E-commerce in Vietnam when entering top 10 most visited E-commerce websites in Southeast Asia.

Table 1. Comparisons of the four most popular E-commerce platforms in Vietnam

	Shopee	**Lazada**	**Tiki**	**Sendo**
Quantity of goods	Largest	Relatively large	Not as much as other E-commerce sites	Quite large
Main products	Fashion items, fashion accessories, beauty care, toys, etc.	Products of engineering, electronics, assembly accessories with a rich source of goods from China.	Have a variety of products but the two most strong fields of Tiki are books and gift items.	Fashion and non-tech, electronics
Quality	Shopee have guaranteed items on ShopeeMall, but other shops with externally linked sellers are	Relatively high-quality products, but there still remain some fake items.	Because of the strict censorship stage, the quality of goods is the best. Customers can also check the reviews, and feedback from	There are many poor-quality goods here besides some good ones, so buyers also need

	Shopee	Lazada	Tiki	Sendo
	not guaranteed.		others to decide whether to buy or not.	to consider and consider a detailed review.
Price	Shopee has competitive prices. At the same time, Shopee is also a platform with many promotions and freeship programs.	Relatively similar to other E-commerce platforms. If there is a fluctuation, it is on the occasion of big sales, so the price difference is big.	In general, the price of Tiki is quite stable and the number of goods is not as diverse as other exchanges, so the price is also higher.	The price is quite similar to other exchanges but the refund price is quite high up to 20%.
Sales event	Shopee has strong sales during Black Friday, October 10, November 11 and December 12; deals of VND 1000, VND 10,000. It also has daily minigames accumulating points to reduce prices when buying.	Lazada's sales events often focus on year-end occasions like the other two platforms, including 11/11, 12/12, and Black Friday. The famous sales campaign is the shock deal 0 VND	Tiki's big sales occasions in the year include: September 9, October 10, November 11, and Tiki's birthday March 19. In particular, at Tiki, there is a huge sales program of up to 91%.	There are also big sales occasions during the year like other exchanges. In addition, Sendo does not have its own special promotions.
Shipping fee	Orders on Shopee will be split into many sellers and bear the shipping fee of each seller. This fee depends on each item size and the distance.	The shipping fee is quite high, higher than other platforms	Tiki's shipping fee is calculated based on each order. If buying a Tikinow membership package, buyers will receive free shipping on all orders regardless of the item or the seller.	Delivery charges are high and delivery time is also not guaranteed.
Delivery time	Speed is also quite fast. Shopee also has a fast delivery feature like Tiki which is 4h	Pretty fast. Lazada is also rolling out an express delivery service to keep up with Tiki's	The delivery time of Tiki is very fast. In particular, Tiki has its own delivery team that is extremely	The delivery problem has many shortcomings, causing difficulties for

	Shopee	Lazada	Tiki	Sendo
	delivery but not as outstanding.	2-hour fast delivery.	active. If buyers order Tiki Now fast delivery, they can receive the goods within only 2 hours.	both sellers and buyers.

4.2. Characteristics of the green supply chain in the Vietnamese E-commerce sector

4.2.1. Current situation of GSC in Vietnam's E-commerce sector

E-commerce uses more warehouses and retail visits depend more on transportation than traditional retailing, which burdens environmentalists who initially believed E-commerce was a green solution (Matthews et al. 2001). E-global commerce's reach allows for quick exchanges across national and cultural boundaries. Air freight totals 435.0 grams per tonne-km, compared to 80.0 for trucks, 7.9 for bulk carriers, 5.9 for oil tankers, and 3.0 for very large container vessels. These numbers show the environmental impact of this genre.

In 2019, according to the Global E-waste Statistics Partnership, out of 514,000 E-commerce products in the market, Vietnam generated 257,000 metric tons of e-waste. The White Book on Vietnamese E-Business 2022 of the Ministry of Industry and Trade shows that the E-commerce sector is expected to reach 16.4 billion USD in revenue by the end of 2022, with 57–60 million online shoppers. The reasons given by these people in Vietnam for using online platforms in to trade rather than traditional ways are various; some can be listed as follows: (1) the credibility of E-commerce websites; (2) quick and flexible forwarding; (3) a plethora of discount programs; (4) lower prices; (5) variety of commodities; (6) authentic and qualified products; (7) ease to keep on track with the order; (8) user-friendly websites; (9) well–defined customer service; (10) information security; but there is no indication of concern about the environmental impacts of e-trading.

Green Design

E-commerce companies in Vietnam have been applying several actions in order to "greening" their supply chain management, and one measure that is the most popular among the sector recorded is to replace the packaging to one that is more environmentally-friendly. These can be seen in multiple big players of the market, and the most intriguing cases would be Tiki and Lazada.

From September, 2019, Tiki, one of the biggest Vietnamese original E-commerce corporations, started the "Go Green" campaign. 85% of non-biodegradable plastic packaging materials were replaced with environmentally friendly ones with much shorter decomposition time. The company once again affirms their goal in a 258 million USD fund raised to invest in logistics that bring about more sustainable values to Vietnam users and businesses.

Another key player in the sector, Lazada Vietnam started to provide environmentally friendly delivery services from 2021, with packaging from green materials through Lazada's shipping service (fulfilled by Lazada) for partners. These "green" parcels use FSC-certified cartons, made from recycled paper instead of plastic. Ever since 2017, Lazada has been promoting the use of electrical bikes in deliveries and received several remarkable results during the trial phase. Based on that, Lazada officially put into operation these electrical bikes and expanded into an official delivery team.

Green Purchasing

Facing the environmental problems, The Vietnam Ministry of Industry and Trade takes into action the national action program on sustainable production and consumption to 2020, vision to 2030, in which implementing "Enabling the distribution system and developing the supply chain towards more environmentally friendly products and services". In addition, the Ministry also built a system of criteria for evaluation and certification of green retail distribution systems in Decision No. 2308/QD-BCT dated June 8, 2016 of the Minister of Industry and Trade on approving the budget for tasks in 2017 to implement the national action program on sustainable production and consumption to 2020, with a vision to 2030. The "Guidebook for environmental management in goods distribution establishments" was published to form an overview of environmental issues in the operation of the distribution system and management organization. Companies have been following these guidelines but little results and information have been shown to the public. As green purchasing needs a bigger budget, e-commerce companies are still hesitant to seek for green supply.

Reverse Logistics

The birth of E-commerce enables the development of reverse logistics. About the policy for reverse logistics process, in August 2013, the Prime Minister issued Decision 50/2013/QD-TTg on recall and treatment of discarded products; the consumer delivers the discarded product at the point of recall. However, there are no specific guidelines applicable to e-commerce businesses in Vietnam.

Logistics costs and especially reverse logistics costs is one of the top issues and accounts for a large proportion of total e-commerce business costs. Currently, Vietnamese enterprises can only recover and process a small part of discarded products and waste in industries, businesses, shops and households.

In addition, in Vietnamese e-commerce enterprises, reverse logistics only focuses on recovering products from customers for exchange. Enterprises do not have a deep awareness of the role of reverse logistics in creating competitive advantages and sustainable development of enterprises. Forward or reverse logistics activities of e-commerce enterprises still depend on the association with other logistics enterprises. Many companies leave their logistics operations to third-party logistics service providers to help them set up reverse logistics operations.

The Vietnamese legal system regulating logistics in e-commerce activities is not synchronized, inconsistent in responsibility and management limits among state agencies in the management of logistics activities. Currently, Vietnam does not have a law specifically for e-commerce logistics. For example, a financial invoice is a required document when goods are in transit. However, with e-commerce and VN's characteristic of delivery and collection, goods on the road are not a successful transaction. Therefore, there is not enough basis to issue that invoice. Another obstacle is that in Vietnam, there is no formal education system for the logistics industry.

Environmental cooperation

E-commerce corporations are trying their best to integrate the efforts between different departments in the company to pursue environmental cooperation. The trends can be seen in the technology department of these companies, going digitized to cut the generated emissions.

In 2018, Logivan Technology Co., Ltd. connected more than 22,000 transport partners, 10,000 shippers registered on the system of artificial intelligence applications, truck and price matching algorithms to optimize the use of empty trucks.

In 2019, T&T Group decided to cooperate with YCH Group (Singapore) to invest in developing an international logistics center and inland port, applying artificial intelligence (AI) and connecting 4.0 technology in Vietnam. This is to provide a complete supply chain solution for customers, businesses with manufacturing plants in Vietnam, providing comprehensive solutions for all stages, making the work at the inland port become more efficient during operation.

In 2019, Truong Hai Automobile Company (Thaco) invested in the development of Chu Lai Logistic - the leading Logistics service center in the Central region in order to gradually improve the entire business system oriented towards the forwarding - transportation model. Technology transformation to ensure synchronization with the digitized management system of automobile production and business, and e-commerce, in line with new technology trends; provide full logistics services with optimal solutions, reasonable costs for customers. The goal of Chu Lai Logistic is to gradually improve the value chain to develop the materials growing area for the Central region, the Central Highlands, Laos and Cambodia, to develop agricultural and refrigerated transport services.

The most common method of delivery used by Vietnam E-commerce corporations is self–organizing logistics (in house delivery), accounting for 69% (Figure 3), in which each corporation would individually handle their own supply chain process, from packaging, delivery and reverse logistics. These small and individualized systems eventually lead to the problem of Less-Than-Truckload, which results from vehicle trucks running partially filled (Daudi and Thoben, 2019) and in turns, more trucks running on the roads mean that more gas emission and other contamination to the environment.

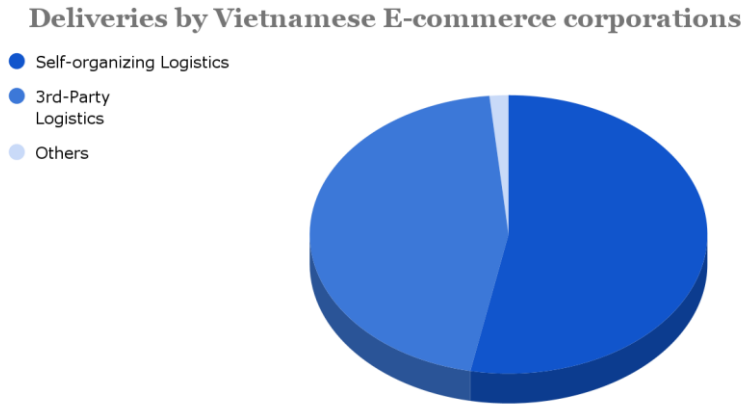

Figure 3. Deliveries by Vietnamese E-commerce corporations

Source: Author

4.2.2. Development trend of GSC in Vietnam's E-commerce sector

Higher EPR from the government

EPR stands for Extended Producer Responsibility, which is a policy approach under which producers are given a significant responsibility – financial and/or physical – for the treatment or

disposal of post–consumer products. EPR has been regulated since 2005 through The Law on Environmental Protection of Vietnam stipulating the responsibility of recalling discarded products for manufacturers for some types of products. In 2020, the Law on Environmental Protection No. 72/2020/QH14 was approved by the National Assembly on November 17, 2020 (effective from January 1, 2022), which has more detailed regulations, and a more synchronized system. Article 54 stipulates the recycling responsibilities of producing and importing organizations and individuals and Article 55, Responsibilities for waste collection and treatment of producing and importing organizations and individuals.

Packaging technology innovation has opened up new distribution channels

This reduces food waste, allowing goods to be stored for long periods of time and transported over long distances. Thanks to the packaging, goods and valuable resources are protected and costs remain under control. However, pollution from improper packaging is an increasingly serious problem and urgently needs to be addressed by designing products to be easier to recycle and investing in collection and disposal systems. These systems cannot be established without a strong coordinating body, with transparent and stable sources of funds. Circular economy is an economic model that promotes more efficient use of resources by applying three key principles of 'reduce', 'reuse' and 'recycle' to create a value chain cycle. Contrary to the traditional model that focuses on the extraction, processing, distribution, consumption and ultimately disposal of resources, the circular economy encourages the circular life cycle of resources in the economy. This helps to maximize the available resources while minimizing the negative impact on the environment. Therefore, the need to manage waste according to the EPR model has become a concern of organizations.

Little or no information about environmental performance of E-commerce applications

Even though consumers' awareness of environmental issues has been raising extensively in recent years, these issues are not the core interest of these consumers. One of the reasons for this situation is the fact that E-commerce companies provide less and less information available about their environmental performance. There are no alternative options for the consumers who want to be environmentally-friendly, and E-commerce companies' efforts to adapt green supply chain management are too minor compared to the damage they cause to the environment.

People these days are living at a relatively fast pace, which results in needs for more convenience in services. Currently, there are no solutions that bring no trade-off between convenience and sustainability of the supply chain in Vietnam.

5. Recommendations for Vietnam's E-commerce corporations

5.1 Assessment of GSCM development activities in E-commerce in Vietnam

5.1.1 Opportunity

Consumer preferences

Since the beginning of E-commerce, customers have been searching to buy products online rather than traditional brick-and-mortar stores. Especially, the Covid 19 pandemic has helped create a leap forward 5 years for the E-commerce industry. E-commerce is experiencing robust and steady growth globally, amounting to nearly $3.46 trillion in 2019 and estimated to reach more than $6.5 trillion by 2023.

In addition, consumers' environmental awareness is increasing and their expectations in this respect will grow. The Green Generation report shows that some e-customers are willing to wait longer for the delivery, if it is due to the e-store's care for greener delivery, and to pay extra for foil-free packaging. According to Nielsen, businesses' commitment to environmental responsibility also affects the purchasing decisions of 62% of Vietnamese consumers. Consumers are now willing to pay more for food packaged with eco-friendly materials, even millennials agree to pay 10% more.

Government policy

The Government pays special attention to promoting energy transformation towards greening, encouraging the development of clean and environmentally-friendly energy sources associated with economical and efficient use of energy in the spirit of Resolution 55 of the Politburo. Recently, Vietnam has committed at the United Nations Climate Change Conference 2021 (COP 26) to achieve net zero emissions by 2050. This is a cross-cutting premise for Vietnam's logistics industry to transform and adapt.

5.1.2 Challenge

Transport

Many people place an order via E-commerce thanks to convenience - they can order at any time, anywhere with access to the Internet and the most important is that customers can get the goods without leaving their home at all. By not moving, the customer does not release any pollutants and does not consume much energy or natural resources.

However, shippers have to deliver the product, and as we know, transport (especially road transport) increases pollution, emissions and congestion, which negatively affects the environment. According to the United Nations Environment Programme, the transport sector is responsible for 23-24% of global CO2 emissions from fossil fuel combustion and is expected to grow to one third by 2050.

Infrastructure

Transport infrastructure supports green logistics and affects green transport. Rail and sea transport are Vietnam's least polluting and most environmentally friendly modes of transport, but roads connect industrial parks and seaports. This reduces Vietnam's green logistics.

Vietnam's road network is 206,633 km long, and 60% of it is mountainous, according to the World Bank (World Bank 2013). 20% of national highways have poor or very poor surfaces, 37% are average, and 43% are good. Less than 80% of the 7,200 road bridges are good quality.

Vietnam's two main freight routes are National Highway 5, which connects industrial parks to Hai Phong port, and National Highway 5, which connects Ho Chi Minh City to Cai Mep port - Thi Vai. The overloaded truck system affects the quality of roads. As the North attracts more manufacturing, traffic on roads to Hai Phong's ports worsens. HCMC's national highways connecting ports, ICDs, production areas, and logistics centers are also congested. There are not many overpasses for vehicles to merge into another road system seamlessly. Highways are still not designed to handle today's heavy vehicle loads, such as 45-foot container trucks.

Return

Another issue related to greenhouse gas emissions is the return of products. E-commerce return rates are between 20% and 30%, which is more than double the 9% traditional retail return rate. Returns may concern damaged products and those to be repaired. Most frequently, goods purchased via the Internet are returned because they do not meet the buyer's expectations, have technical faults, are delayed or ordered by mistake.

Returns require additional processes. The goods must first be picked up by a shipper, then transported to the seller or a company that handles returns. The products are then prepared for resale, which sometimes requires repairs or refreshment. Additionally, returns are a challenge for logisticians because it is difficult to plan and forecast them in the supply chain. Since returns are an inherent part of E-commerce, they need to be properly addressed.

5.2 Recommendations for Vietnam's E-commerce corporations

It is a fact that implementing green supply chain in Vietnam E-commerce needs a lot of work to be done. We need actionable solutions that can help us pass over challenges and enhance weaknesses. We recommend simultaneous solutions to tackle the above issues:

5.2.1 Create a favorable policy for E-logistic (In the short run)

Firstly, the number of returns can be limited. Is important to have an accurate description of the sizes, including the length, width and height of individual items. It is also advisable to present accurate photographs without unnecessary retouching, as well as three-dimensional visualizations. This gives the customer more information and allows him/her to experience the products, thus reducing the number of returns.

Secondly, as E-commerce generates a very large amount of packaging waste in the form of additional packaging, fillers, foils, tapes, ... there is a need to introduce reusable packaging that will be utilized by all stakeholders in the ecosystem. Packaging made from sustainable materials also helps to further reduce the environmental impact and reduce waste, while demonstrating to customers that the company uses ethical and thoughtful practices.

5.2.2 Invest in Infrastructures and Technology (In the middle run)

The Government and related organization need to review the planning and build E-logistics centers to effectively coordinate, operate and connect with the systems of international (and domestic) seaports, warehouses, roads, forming convenient, highly efficient freight transport routes and meets the requirements of technology, storage space and diversification of transport of the market.

The important role of the government should be promoted in supporting investment in science and technology, in research and development (R&D), and in training people to help businesses improve public capacity, and apply technology towards greening in practical production and business activities.

It is necessary to design incentive policies and develop the science and technology market to encourage enterprises to invest in science and technology and enhance the application of science and technology in practice. Policies such as incentives on taxes, fees, access to capital, land, etc. can be applied as incentives for businesses and households to implement greening, production and business activities in product chains.

5.2.3 Educating employees to comply with environmentally friendly principles (In the long run)

Each enterprise needs to regularly train employees on the effects of climate change on socio-economic development and human life, thereby enhancing its role in joining hands in environmental protection. This is a lesson that has never been old in all business enterprises and is increasingly urgent in the context of green supply chains, green growth, and sustainable development.

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