

Sustainable Development of Textile and Apparel Supply Chain for Garment Exporting Companies in Vietnam in the Current Green Context



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ABSTRACT: The textile and apparel supply chain in Vietnam is quite complex and this is an economic sector leading to a lot of environmental damage. Therefore, "greening" for sustainable development of the textile and apparel industry is becoming a trend, a call from customers around the world. When customers have strict requirements, requiring garment products to meet "sustainable" criteria, garment exporting companies in Vietnam cope with challenges. The article analyzes the advantages and challenges of garment export companies in Vietnam when participating in the global supply chain in the current green context. Recommendations are then proposed for garment export companies, the Vietnam Textile and Apparel Association and the Government to develop the sustainable textile and apparel supply chain, facilitating garment export companies to improve their capacity when participating in the chain.

KEYWORDS: sustainability, supply chain, textile and apparel, garment exporting companies, greening

I. INTRODUCTION

Vietnam has signed 17 bilateral and multilateral free trade agreements (FTAs) so far and is currently negotiating two more trade agreements (WTO center, 2024). In the context of such international integration, countries and businesses have become increasingly interdependent in global trade. Thanks to these agreements, textiles and garments, and other products have benefited from tariff incentives to boost export growth.

Currently, the textile and garment industry is one of Vietnam's key industries with exports reaching over 100 countries and territories (International Trade Center [Intracen], 2024) with the high export turnover is accounting for 12–16% of the country's total export turnover (Vietnam textile & apparel association [VITAS], 2024). In the structure of textile and garment exports, apparel products hold a significant share of the industry's total export turnover. As a result, the supply chain of garment export companies (GECs) has received considerable attention from various stakeholders, including the Vietnam government, VITAS, and businesses.

Moreover, with the growing trend of environmental protection linked to socio-economic development, major textile and garment importing markets of Vietnam have gradually set regulations to make a green textile and garment supply chain. This requires GECs to focus on environmental aspects such as green production processes and green product development in order to become priority partners for major manufacturers and distributors. Conversely, if they fail to meet the green trend, they will gradually lose their market share. Aziz Khan et al. (2024) demonstrated that market pressure and the rise of competitors in garment manufacturing drive businesses to implement environmentally friendly export strategies.

According to the authors' literature review, there are currently some research worldwide on the drivers and barriers of green textile supply chain such as Diabat et al. (2014), Gardas et al. (2018), and Caniato et al. (2015) and Aziz Khan et al. (2024). Studies in Vietnam related to the textile and garment supply chain have been carried out but in general, there are still few official studies about the textile industry or GECs on sustainable development linked to environmental concerns. Existing research on the industry's environmental aspects primarily evaluates the impact of various factors on the green transformation of enterprises (Binh & Trang, 2021; Linh & Binh, 2024); however, there is a lack of studies on the current sustainability of the supply chain and solutions for developing a sustainable supply chain for GECs. As the requirements for "greening," environmental considerations and sustainability in the textile and garment industry are no longer just trends but essential requirements, GECs must continuously seek solutions to develop appropriate strategies that meet importing markets' demands to participate more deeply and sustainably in the global textile and garment supply chain. This study aims to fill that gap.

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II. LITERATURE REVIEW

A. Supply chain

LaLonde and Masters (1994) define a supply chain as a network of businesses involved in the physical movement of goods from transporting raw materials and products to delivering them to the final consumers. Typically, multiple independent enterprises within the chain contribute to bringing products to customers, including raw material suppliers, manufacturers, wholesale and retail customers, and transportation companies. Following the same perspective, Lambert et al. (1998) define a supply chain as the collaboration of businesses to bring products and services to the market. Similarly, Mentzer et al. (2001) describe a supply chain as a network of at least three companies, where at least one company is directly connected to another in the forward or backward flow of products, services, information, or finances toward the customer.

Thus, a supply chain can be understood as a network that links upstream suppliers and downstream customers through processes and activities that create value for the products and services provided to customers in the market.

B. Sustainable supply chain

Sustainable Development

According to the World Commission on Environment and Development (WCED) of the United Nations, sustainable development is defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development must be based on three pillars: economic, social, and environmental, with none of these aspects being overlooked. Specifically, it involves: Further promoting economic development, ensuring ecological sustainability, achieving social equity by creating a more balanced distribution of opportunities to utilize natural resources. Sustainable development is not merely a trend but a necessity for business growth (Zejjari & Benhayoun, 2024).

Sustainable Supply Chain

According to Carter and Rogers (2008), a sustainable supply chain is one that integrates an organization's social, environmental, and economic objectives into the coordination of business processes. This ensures the effective management of raw materials, information, and financial flows related to procurement, production, and distribution of products or services to meet stakeholder demands. The supply chain must fully incorporate transparency, ethics, and environmental responsibility into a competitive model that drives success. In general, a sustainable supply chain refers to the integration of economic, social, and environmental practices into supply chain management. It must always be closely linked to environmental protection.

C. Supply chain of GECs in Vietnam

The textile and apparel supply chain is unique in that it is entirely influenced by buyers. To produce a finished product, raw materials must go through multiple production stages which are often carried out in different countries. The apparel supply chain consists of five fundamental stages: branding / design / sourcing (raw materials) / manufacturing (cutting-sewing-processing) / distribution (Goto, 2011). This classification also highlights the textile industry's role as the primary supplier of raw materials for the apparel industry, specifically through the sourcing stage in apparel manufacturing enterprises.

GECs adopt different approaches to entering the supply chain. Based on the stages they undertake within their operations, production-export methods can be classified into four main categories (Figure 1):

CMT (Cutting - Making - Trimming) method:

This is the most basic production method for entering the fashion market. The buyer provides raw materials along with product specifications, while the garment manufacturer is responsible for cutting, sewing, and processing the product.

OEM (Original Equipment Manufacturing) or FOB (Free on Board) method:

In this approach, the manufacturer takes on greater responsibility, including sourcing and negotiating with suppliers for raw materials, financing material purchases, and handling production as per customer requirements. The final products are then packed and delivered to the buyer as agreed. In some cases, the foreign buyers may designate specific material suppliers, but the garment enterprises remains fully responsible for all production activities and product completion.

ODM (Original Design Manufacturing) method:

The ODM manufactures manage the entire process of producing finished garments, including design/ sourcing raw materials/ cutting, sewing, packaging/ and distribution.

OBM (Own Brand Manufacturing) Method:

This method integrates the entire production process with brand creation, allowing enterprises to develop and market their own branded products.

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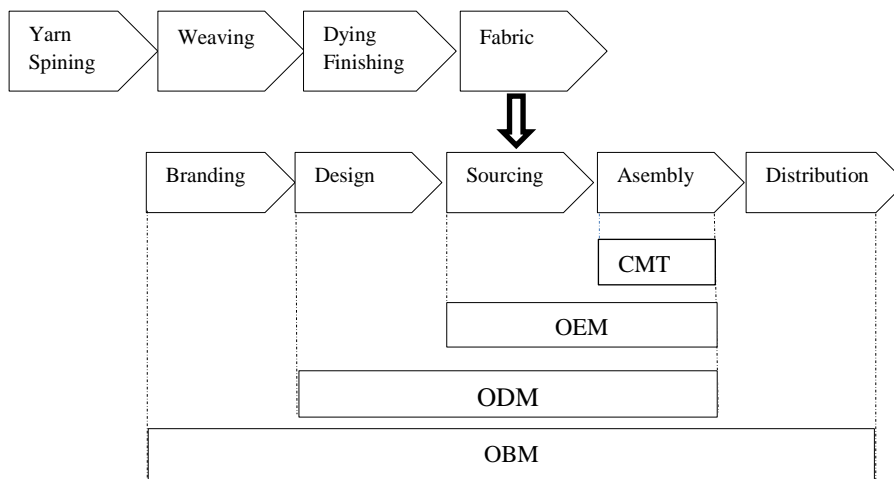


Fig. 1. Stages in the supply chain and garment production methods Goto (2011)

III. RESEARCH METHODOLOGY

The primary methodology used in the study is the document analysis method. The author synthesizes, systematizes, and analyzes secondary data collected from reports by VITAS, the Vietnam National Textile and Garment Group (Vinatex), the Vietnam General Department of Customs, and the annual reports of the Better Work Vietnam Program conducted by the International Labour Organization (ILO) on the textile and garment industry, along with other previously published studies from 2019 to 2024. Additionally, it references theories from recent studies in Vietnam and other countries, sourced from Scopus.com and reputable domestic journals.

IV. THE CURRENT STATE OF VIETNAM'S GARMENT SUPPLY CHAIN

A. Advantages of GECs in participating in the global textile and garment supply chain

Currently, the textile and garment industry is receiving significant attention from the Vietnam government. At the end of 2022, the government issued “the development strategy for Vietnam’s textile, garment, and footwear industry until 2030 with a vision to 2035”. This strategy clearly emphasizes the perspective of developing fashion design capabilities, creating Vietnamese brands to dominate both the domestic and export markets and developing in alignment with ecological environmental protection, fulfilling social responsibilities and obligations, ensuring compatibility with sustainable development goals and international commitments. (Government, 2022).

Vietnam's textile and garment industry has a high export turnover. With advancements in science and technology, along with the support of VITAS and the government, garment enterprises have improved productivity and production quality, enabling exports to demanding and developed markets such as the UK, the US, Japan, and the EU. Currently, Vietnam's garment industry heavily relies on foreign markets, with approximately 90% of its output dedicated to exports, while only 10% is consumed domestically. In the total export turnover of the textile and garment sector, garment products account for over 80-85% while the remaining 15-20% comes from the export of yarn, fabric, and accessories as Table 1 (Vietnam customs, 2023). The industry's export turnover in recent years has reached impressive figures with the figure of 2024 at 44 billion USD (a 9.2% increase compared to 2023) and aiming to reach 68-70 billion USD by 2030.

Table. 1: Vietnam’s garment export turnover (2018-2023)

	2018	2019	2020	2021	2022	2023
Total export turnover of textiles and garments (billion USD)	36.00	39.00	34.98	40.40	44.00	40.3
Export turnover of garments (billion USD)	30.48	32.85	29.81	32.75	37.57	33.33
Rate of garments (%)	84.67 %	84.23 %	85.22 %	81.06%	85.39 %	82.70%
Export turnover of others (billion USD)	5.52	6.15	5.17	7.65	6.43	5.54
Rate of others (%)	15.33 %	15.77 %	14.78 %	18.94 %	14.61 %	13.75%

Source: Compiled by the author from Vietnam customs (2024) and WTO center (2024)

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The signing of new-generation FTAs has facilitated Vietnam's textile and garment exports, notably the Vietnam-EU Free Trade Agreement (EVFTA) and the Regional Comprehensive Economic Partnership (RCEP). Under EVFTA regulations, apparel tariffs gradually reduce to 0% when exported to the EU, provided that rules of origin are met. RCEP, with its more flexible rules of origin, allows raw materials to be sourced from any contracting country provided that garments are produced in Vietnam. This helps textile and garment exporters benefit from tariff reductions, enhancing competitiveness in ASEAN markets, as well as in China, South Korea, Japan, Australia, and New Zealand.

Most raw materials for Vietnam's garment exports are imported from China. Previously, garments exported to the high-potential Japanese market had to prove that raw materials originated from ASEAN or Japan. With RCEP in place, raw materials imported from any RCEP member country are now accepted (The Ministry of Industry and Trade of Vietnam, 2023).

U.S.-China trade tensions have led to high import tariffs on goods from China. As a result, U.S. fashion companies, one of Vietnam's largest export customers, continue to reduce their reliance on China and shift sourcing to other Asian countries, with Vietnam being one of the top preferred choices (Aslam, 2019; Purwono et al., 2022)

Political instability in Bangladesh has led to a decline in the production capacity of its textile and garment industry, the country's most valuable sector, accounting for nearly 85% of its export revenue. This led to the increase in production lead time, delayed shipments, hampered work environment, and not achieving the exporting rate (Papon et al. 2017). As a result, global importers are losing confidence and may shift their orders to other countries to compensate for the shortfall. Additionally, Bangladesh will face pressure to increase wages for textile workers, reducing its advantage of low labor costs. Consequently, Vietnam's textile and garment industry may benefit from this shift (Vietnam News, 2024)

Vietnam's garment industry contributes to reducing the unemployment rate and provides income-generating jobs for over 3 million workers. GECs are increasingly paying attention to corporate social responsibility (CSR) and worker welfare. Customers in developed countries place great emphasis on human rights and the CSR practices of exporting companies. Specifically, European and U.S. buyers often set out Codes of Conduct (COC) or their national standards for enterprises and only place orders after evaluating whether GECs meet these requirements. To support businesses in the industry, VITAS continuously works to raise awareness of CSR among enterprises. As a result, most GECs have labor unions that represent workers' voices and help prevent and resolve conflicts between employees and businesses. Nearly all enterprises comply with the state-mandated minimum wage regulations, ensure timely wage payments, provide employee benefits, and safeguard worker health. They do not engage in forced labor or child labor. Additionally, workplace conditions, factories, walkways, cafeterias, and meal quality have been improved. Some companies even provide worker housing (International labour organization [ILO], 2023).

B. Challenges of GECs when participating in the global textile and apparel supply chain

Besides the advantages that GECs enjoy when joining the current supply chain, they also encounter numerous obstacles to achieving sustainable development.

The added value of garments created within the supply chain of Vietnam's GECs is low. The main reason is that most GECs currently produce based on customer orders under two common models including CMT which accounts for 65%, and FOB which accounts for 25%. The OBM model still exists but is very limited, mainly adopted by enterprises that have developed domestic markets and sell under their own brands. As a result, the added value generated by the Vietnam garment industry remains low. Consequently, like other countries in the region, Vietnam is positioned at the bottom of the global textile and apparel supply chain, as it primarily undertakes the manufacturing stage (cutting and sewing) (Figure 2).

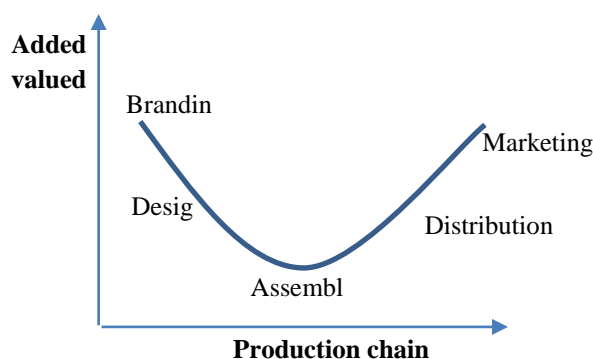


Fig. 2. Stages of the production process

Source: Developed by the author based on Shih (1996)

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From a social perspective, although the CMT model sustains employment in Vietnam's garment industry, its reliance on low-cost labor limits long-term sustainability, profitability, and worker benefits. With a large number of CMT orders and limited orders under higher-value production models (FOB, ODM), the supply chain struggles to achieve sustainability because CMT has low entry barriers, and its competitive advantage mainly relies on low-cost labor - a factor that will gradually diminish as wage levels in the region equalize. Since CMT does not generate high profits for enterprises, the actual revenue earned remains low, making it difficult to improve worker benefits and bonuses.

The import market face challenges and declining orders. According to VITAS, Vietnam's textile and garment export turnover in 2023 decreased by 20% compared to 2022. Major export markets such as the U.S., EU, South Korea, Canada, and Japan all saw declines. The main reasons include geopolitical conflicts that have led to increased interest rates and inflation, resulting in reduced global consumer demand. Many countries are also concerned about rising unemployment rates. Customers now prioritize price above all. Some U.S. brands are shifting orders, especially small ones, to geographically advantageous countries like those in Central and North America (Reuter, 2024; Inverto, 2025).

Origin requirements for preferential tariffs under FTAs should be met. To benefit from tariff advantages under FTAs, Vietnamese garments must meet origin requirements. Most FTAs apply the "cut-and-sew" rule, meaning that garments made in Vietnam qualify for preferential tariffs if the cutting and sewing processes occur in Vietnam. Similarly, under RCEP, Vietnam can import fabric from anywhere, as long as the cutting and sewing take place domestically. However, stricter agreements such as AJCEP (ASEAN-Japan), VJEPA (Vietnam-Japan), and EVFTA (EU-Vietnam) require materials to be sourced from within the agreement's member countries. The most stringent is CPTPP, which follows the "yarn forward" rule, requiring yarn production, weaving fabric, dyeing, and cutting-sewing to occur within CPTPP countries for preferential tariffs to apply.

Stricter human rights compliance in the supply chain is imposed. Major apparel import markets have introduced mandatory regulations on human rights compliance. For example, the U.S. passed Uyghur Forced Labor Prevention Act and bans cotton from Xinjiang due to concerns over forced labor. Any apparel entering the U.S. must not contain materials from Xinjiang unless proven without forced labor (Jessie Yeung (2022)). Currently, over 60% of fabric used in Vietnam's garment industry is sourced from China, making it difficult to verify whether raw materials originate from Xinjiang.

Corporate social responsibility (CSR) should be met. CSR criteria remain inconsistent among businesses. A socially responsible enterprise must ensure fair wages, reasonable working hours, and legal employment contracts while complying with labor regulations (as per ILO's Better Work program). While some businesses actively uphold labor rights, many still see CSR as a burden rather than an opportunity for long-term growth. Compliance with CSR requirements is often reactive, driven by customer demands. Reports indicate that 12% of surveyed factories fail to pay social insurance on time, 45% do not compensate for overtime work properly, 66% exceed the maximum working hours permitted by law (ILO, 2023)

The "green" transformation has been a mandatory long-term trend. What was once a qualitative expectation is now being quantified through specific regulations on textile waste, emissions, and sustainability standards. Foreign buyers increasingly favor manufacturers with eco-friendly facilities, energy-efficient production, and minimal emissions (Centre for the Promotion of Imports [CBI], 2021). For instance, the EU mandates that exported garments must use cotton, polyester blended with recycled fibers, or repurposed textile waste, contribute to the creation of a circular economy for textiles (European Parliament, 2025)

V. RECOMMENDATIONS FOR ENHANCING THE COMPETITIVENESS OF VIETNAM'S APPAREL INDUSTRY

Alongside certain advantages, Vietnam's textile and garment industry in general, and GECs in particular, will continue to face numerous challenges in coming years. Based on an analysis and forecast of domestic and international conditions, this article proposes several implications for GECs to participate sustainably in the supply chain.

A. For GECs

Enterprises need to increase the proportion of OEM, FOB, and ODM orders in their order structure and diversify their markets. OEM and ODM production models create higher value compared to basic processing. The ODM model has enabled many companies to grow into well-known and successful businesses, such as Việt Tiến, May 10, TNG, Phong Phú, Đông Xuân, Thái Tuấn, An Phước, Phương Đông, and others. Vinatex PD&B, newly established in 2024, primarily focuses on developing FOB, ODM, and OBM products for both export and domestic markets (Vinatex, 2024). Customers now tend to prefer suppliers with integrated supply chains and comprehensive services that meet their needs quickly, conveniently, and accurately while providing added value, rather than just basic processing factories. Therefore, GECs need to strengthen their expertise, gain experience in handling orders, build relationships with suppliers, and confidently negotiate with buyers to secure more high-value orders, starting with OEM. To transition to the ODM model, GECs must further enhance their capabilities by investing in workforce training in areas such as marketing and product design. In addition to maintaining relationships with traditional customers, GECs should take

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advantage of domestic and international trade promotion programs organized by VITAS to connect with potential clients, promote their companies, and explore new markets.

GECs need to focus on digital transformation to enhance efficiency. Enterprises must first maintain strict control over production processes, ensure product quality, adapt to fast delivery requirements, and minimize waste and production costs. Given the current global economic challenges, with consumers in many countries reducing spending and prioritizing price, businesses should invest in digital management, automate certain production lines, and improve worker skills. While the initial investment may be a challenge, it will ultimately increase productivity and overall manufacturing efficiency in the long run.

Business leaders need to change their mindset on CSR. Business leaders must recognize that implementing CSR is an internal driving force and an ethical obligation for businesses. Therefore, they should actively seek to understand and seriously comply with CSR requirements from customers. It is essential to acknowledge that responsible business practices may increase costs in the short term but will bring significant long-term benefits. These include stronger collaboration with employees and customers, meeting international buyer requirements, enhancing corporate reputation, expanding export market opportunities, and improving the company's position in the global value chain. Moreover, if businesses approach CSR with a reactive mindset - only adjusting operations to pass customer audits or factory inspections - it can lead to unsafe working conditions and undermine sustainable development efforts.

Businesses need to prioritize sustainability. As the Vietnamese government has strongly committed to achieving net-zero emissions by 2050 at the COP26 conference (Vietnam plus, 2023), the trend of greening the textile and garment industry is becoming increasingly important for businesses to meet both current and future requirements. To integrate into a sustainable global textile supply chain, alongside factors such as pricing, product quality, and delivery time, the "green" criterion is equally crucial. To reduce carbon emissions and ensure compliance with international sustainability standards, obtaining green certifications for exported goods is essential. One key solution is the installation of rooftop solar energy systems. For example, Thanh Cong Textile Company in the Phu Hoa Industrial Park, Vinh Long Province, implemented a rooftop solar energy model that generates approximately 48.5 million kwh of electricity, covering 66% of the company's production energy needs and reducing 44,281 tons of CO₂ emissions, equivalent to planting over 2.6 million trees. Similarly, Saigon 3 Garment's solar power system not only helps the company cut long-term electricity costs and lower CO₂ emissions but also enhances its reputation and brand image in the eyes of customers and business partners. A newly established company in 2024, Vinatex PD&B, has prioritized sustainability from the outset. It is one of the pioneering enterprises to obtain the Gold Lotus green building Certification, aligning with its strategy to contribute to Vietnam's net-zero emissions goal.

Additionally, GECs can build "green factories" through various initiatives. These include replacing fluorescent lights with high-efficiency LED lights, upgrading or replacing energy-intensive equipment, and adopting new energy-saving technologies. Another key measure is transitioning from coal-fired boilers in kitchen areas to electric boilers, which helps reduce CO₂ emissions. Furthermore, businesses should implement an energy monitoring system in production to detect and address inefficiencies, such as idle-running machines, steam leaks, or system malfunctions. These insights serve as a foundation for improving energy efficiency across machinery and equipment. By obtaining global renewable energy certifications such as the International Renewable Energy Certificate (I-REC), GECs can meet the strict sustainability standards required by major export markets like Europe, the U.S., and Japan.

B. For the Government

Developing raw material sources in the supply chain to enhance localization. The government should collaborate with VITAS and local authorities to research and develop raw material areas, strengthen the domestic supply chain, and address the long-standing shortage of locally sourced materials. This aligns with the global trend of importers shifting from multi-country supply chains to more centralized supply chains. Additionally, it will help meet strict origin-tracing standards. Without a domestic raw material supply, Vietnam's textile industry will remain dependent on imports, making it difficult to reduce costs, shorten production timelines, meet origin requirements, and take full advantage of tariff reductions under FTAs that require fabric to be sourced from Vietnam. The government should create mechanisms to attract both domestic and foreign investment in textile-related industries, including fabric production, dyeing, fiber manufacturing, and textile accessories. This requires policies that support land allocation, investment in industrial clusters for fiber, weaving, and dyeing, and the removal of barriers to investment in these sectors at the local level.

Prioritizing investment in sustainable raw materials. The government should focus on attracting investment in sustainable fabric production, including recycled fabrics, bamboo fiber, mint fiber, and coffee grounds-based textiles. This is essential for exporting apparel, particularly to comply with the EU's carbon border adjustment mechanism (CBAM). Policies of credit support

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for green investments is crucial, as funding plays a significant role in the early stages of sustainable textile development. GECs that implement green production strategies and meet environmental investment project criteria under the environmental protection law should be granted priority access to green credit policies.

C. For the Vietnam Textile and Apparel Association (VITAS)

VITAS should guide and support GECs in formulating and adjusting their business strategies and production plans. It should also provide trade promotion and export assistance tailored to each company's needs and capabilities while aligning with market trends. VITAS should organize seminars to analyze customer demands regarding CSR and invite experts to assess the importance of genuine CSR compliance in business operations. The association must actively update and proactively share CSR requirements from different customers with businesses in the industry to ensure they are well-prepared when engaging with new clients.

It is crucial to monitor trends in sustainable and green exports and promptly convey relevant information and guidance to member enterprises. VITAS should facilitate connections between domestic enterprises and foreign-invested companies to establish a more integrated supply chain and expand export markets. Additionally, the association should collaborate with reputable international organizations to implement support programs for businesses in areas such as management, green transition, and new technologies.

VI. CONCLUSION AND LIMITATION

To achieve sustainable development and enhance participation in the global supply chain in line with the green economy trend, GECs must first transition to higher-value production models such as OEM, ODM, and OBM. They should take advantage of opportunities to promote their brand, expand customer networks, and diversify markets. Additionally, businesses must focus on self-innovation by investing in workforce training, adopting digital technologies for production control to reduce costs and improve efficiency, and implementing green production measures to conserve energy and reduce CO₂ emissions. Furthermore, government support is essential in developing raw material areas and implementing favorable policies for green investment financing. Lastly, but equally important, VITAS must provide timely information, guidance, and support regarding sustainable supply chains and green-oriented policies to help businesses adapt effectively.

A limitation of this study is that it relies on secondary data analysis, statistics, and descriptive methods. In the future, the author should conduct qualitative studies through in-depth interviews with GECs to ensure more reliable and comprehensive results.

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