

Impact of Determinants on the Sustainable Supply Chains of Community-Based Tourism Enterprises After Natural Disasters in Rural Vietnam

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ABSTRACT:

This study investigates the factors impact on sustainable supply chain of community-based tourism enterprises (CBTEs) in Rural regions after natural disasters and pandemics like Covid-19 pandemic. It also provides in-depth insights into how the maturity of the sustainable supply chain affects CBTEs' development. This study was conducted on a sample of 318 community-based tourism enterprises in 3 rural areas of Vietnam after Covid-19 pandemic. The data underwent two stages of processing, utilising the ordinal logistic regression model (OLR) to examine factors affecting the sustainable supply chains and the Maturity model to evaluate maturity of sustainable supply chain of CBTEs in rural Vietnam. Research findings indicate that strategies (1.832), customer and supplier management (1.381), sustainable governance (0.942) are the highest factors impacting on the sustainable supply chain. Besides, the maturity of CBTEs is about level 2. In addition, this paper proposes several policies to improve the sustainability of the supply chain for community-based tourism enterprises.

Keywords: Sustainable supply chain, Community-Based Tourism Enterprise (CBTE), Maturity model, OLR model, Natural disasters and pandemics.

1. Introduction

Community-based tourism is recognized as a tool to improve sustainable development, mitigate poverty and distribute advantages across localities by generating income and transitioning individuals from agricultural, forestry, and handicraft occupations to the tourism sector. By such means, it helps alleviate the challenges faced by marginalized communities and promotes the long-term viability of natural and cultural tourism assets. Furthermore, community-based tourism is recognized as a form of tourism that yields numerous advantages for local communities, fosters socio-economic progress, safeguards

ecological resources, conserves the environment, and highlights indigenous cultural characteristics. Implementing community-based tourism initiatives not only fosters the creation of distinctive tourism offerings but also bolsters the capacity to allure visitors to rural regions (Han et al., 2019). The natural disasters like Covid-19 pandemic cause significant disruptions to global supply chains, which reveals unprecedented vulnerabilities in numerous sectors including tourism. Facing the need to accommodate abrupt and profound shifts in both demand and supply, along with changes in tourists' behavior, those with limited links in the supply chain network

experience significant losses (Dubey et al., 2021a). Against the aforementioned background, building sustainable supply chains has recently garnered significant interest in both academic and professional circles.

A sustainable supply chain, or the dynamic capability of a supply chain, is crucial for a CBTE to sustain optimal performance while adapting to changes by reconfiguring assets, strategies, and operations (Chowdhury & Quaddus, 2016). The sustainability of the supply chain empowers CBTEs to efficiently recover or transition to an improved state in the face of disruptions caused by natural disasters. To enhance the sustainability, CBTEs need proactive capabilities, including flexibility, efficiency, storage capacity, integration, market advantage, and financial strength (Azadeh et al., 2014). Sustainable supply chain performance measurement in small and medium-sized enterprises also reveals overall associations between practices and performances (Prasanta, 2019). Despite this rising literature on supply chain integration among CBTEs, the sustainability and maturity level of the supply chain for CBTEs in rural areas after natural disaster remains unexplored. This paper aims to evaluate this relationship, using the ordinal logistic regression model (ORL) model and the maturity model, with sustainable supply chain as a latent variable and strategy, governance, product and services, customer and supplier management, and quality issues as its observable variables. The study also takes a further step, examining the maturity level of sustainable supply chain for these CBTEs. Rural Vietnam emerges as an ideal research context for this study, since its sustainable tourism movement is still in its early stages, and CBTEs in this country are generally young with low maturity level of sustainable supply chain to shocks.

The literature on the sustainable supply chain offers that a sustainable supply chain transparently integrates an organisation's social, environmental, and economic goals through the systematic coordination of inter-organisational business processes to improve the long-term economic performance of the organisation, its supply chain and stakeholders (Carter & Rogers,

2008). A feature of such a chain is the use of environmentally friendly resources to sustain its development in the long term. Sustainable supplier selection and order allocation are core activities in sustainable supply chain management that can significantly impact a company's efficiency and impact profitability, flexibility, and even agility (Hendiani et al., 2020). A sustainable supply chain means managing environmental, social, and economic impacts and encouraging good management practices throughout the life cycle of goods and services. A sustainable supply chain allows you to achieve organisational goals through the use of innovative technologies, but the implementation of sustainable supply chain management also requires overcoming barriers (Yadav & Singh, 2020). The most important internal barriers include cost, lack of legitimacy, lack of commitment and support from top management, and lack of training; while external barriers include regulation, weak supplier involvement, resistance to the adoption of advanced technologies, financial constraints, and industry-specific barriers. In general, the sustainable development of community-based tourism enterprises (CBTEs) within the supply chain involves investing in and adopting long-term strategies to gain operating benefits, establishing a competitive advantage over competitors during economic shocks (Pu et al., 2023). Datta (2017) explores the integration of supply chain strategies with relevant practices to maintain business performance in changing environments. CBTEs, to ensure sustainable development, must possess dynamic capability and adapt to dynamic environmental changes, implementing key strategies for long-term benefits. Cao et al. (2018) employ market performance indicators to explore variables affecting competitive advantages and sustainable development during shocks, encompassing sales growth, customer sustainability, net profit, and capitalization rate, defining sustainable development through market and financial performance.

Besides, the concept of the "maturity" of a sustainable supply chain (SSC) refers to the degree to which a company or supply chain

network has evolved in integrating sustainability into its operations, processes, and decision-making. The literature on this topic typically assesses how well organizations implement practices across environmental, social, and economic dimensions and how these are measured and optimized over time. Regarding the existent sustainability, they present significant differences in their various components, such as the number and characterization of maturity levels, their descriptors, and the elements used to analyze/measure (Correia et al, 2018). The improvement and validation process took place in two stages including the first stage of the validation process - the objective is to obtain contributions for the improvement and clarity of several aspects of the design and populate phases, namely such as in the validation of the areas, practices, and sub-practices; in the allocation of sub-practices to the evolution levels and maturity levels defined based on the literature review, and in the assessment process for determining the maturity level of the areas and the company; in the second stage of the validation process - the objective is to test the maturity model resulting from the previous phases and validate it based not only on its content such as areas, practices, and respective sub-practices but the maturity levels.

Additionally, Yimam (2008) argues that two alternatives can contribute to achieving the development of a company's maturity including developing the capacity to employ more advanced and effective practices, techniques, methods and tools; and systematizing and refining the processes that are explicitly defining and documenting, managing, standardizing, measuring, controlling, and continuously improving the organization's processes. Thus, maturity can be understood as an organization's ability to use more advanced and effective practices, tools, methods, techniques, and procedures, thereby improving the possibility of achieving process or knowledge goals. Maturity is a concept that indicates evolution and development. Moving from an initial to a more mature state means that the organization has greater sophistication, capability, or availability of

certain specific characteristics. In terms of sustainability, Göcer et al (2018) consider that maturity refers to the level that an organization can scan, seize, comprehend, disseminate, and control sustainability-related issues within itself, across the supply chain and even in the broad organizational environment. Rudnicka (2005) states that the maturity can be defended as a level of engagement of the whole network and quality of management of the sustainable development in SC. In this study, maturity can be understood as the level of the organization's ability to plan, implement and control different types of sustainability practices in its internal operations and in its supply chain to improve its sustainability performance. The maturity levels highlight predictable patterns about the present and future changes of the object under study (i.e., organization, individual, supply chain). Defining the number of maturity levels is another fundamental element of a maturity model. Eskildsen (2008) shows that the low maturity levels represent less complex sustainability practices' non-application or incomplete application. The higher levels of maturity represent the application of more complex practices and imply a more substantial involvement of the supply chain partners and other stakeholders.

In addition, several studies have shown different levels of supply chain maturity. According to the proposed maturity model, a company with a very low maturity level (level 1) is characterized by a focus mainly on internal and economic aspects of sustainability and a reactive attitude. The company is at this level when fewer than 90% of its sub-practices are associated with evolution level 1, and the different critical areas such as sustainability governance, product and process level, customer and supplier management, and stakeholder focus present an implementation level below 3. To reach higher levels of maturity, the company must implement more demanding and sophisticated practices that imply greater involvement with its partners in the supply chain. When a company reaches level 3, it means that the company has a more proactive attitude towards sustainability, a broader implementation

of internal sustainability practices and traditional partners and other stakeholders are engaged in a new collaboration on environmental and social issues (Thi et al, 2019).

In general, the maturity of a sustainable supply chain is often conceptualized as a continuum that reflects the degree to which sustainability practices are integrated into supply chain activities. Companies move through, from initial awareness of sustainability to advanced integration and optimization. The framework provided by Carvalho & Cruz-Machado (2011) is frequently cited, identifying five levels of maturity including 5 stages. At the first stage, companies react to sustainability challenges only when forced by external pressures, such as regulations or customer demands. Sustainability initiatives are not systematically implemented but rather ad hoc. In the second stage, organizations start complying with sustainability regulations but do not yet consider sustainability a strategic priority. Basic environmental and social measures are implemented, mostly to meet regulatory requirements. In the third stage, sustainability becomes integrated into strategic planning. Organizations start defining clear sustainability goals, engage suppliers in sustainability practices, and develop initial monitoring systems for sustainability performance. The fourth stage, sustainability is now embedded in the company's core strategy, and SSC management is formalized. The organization actively manages sustainability metrics, optimizes resource usage, and engages in continuous improvement in collaboration with supply chain partners. In the fifth stage, sustainability across the entire supply chain. Sustainability is deeply embedded in both the organization's values and its supply chain relationships (Correia et al 2023, Santos et al. 2019).

Moreover, Community-based tourism (CBT) has various definitions, with France (1997) characterizing it as a form of tourism controlled and operated by the local community, encompassing economic and social benefits. Phuong et al (2020) highlight CBT as a key approach to sustainable development, emphasizing economic gains, environmental

protection, and preservation of cultural values. Recognized for its sustainable tourism principles, CBT focuses on local cultures to prevent community decline, strategically enhancing social and ecological system resilience for stable development (Ruiz-Ballesteros, 2011). Usmonova et al (2022) elaborate on the community-based tourism supply chain, comprising all suppliers meeting tourist needs, from upstream services like infrastructure and food production to basic services like transportation and accommodation. This supply chain underscores a holistic perspective, acknowledging the interconnected relations of various actors, including tourists, tourism management, and micro-market entities, fostering a balanced sustainable development of the economy, ecology, and environment (Glenn et al, 2009). Additionally, Dikgang et al (2017) stress the importance of analyzing the structure, market relations, and performance measurement in a community-based tourism supply chain.

According to Zapata (2011), Community-Based Tourism Enterprises (CBTEs) are characterized by their emphasis on community ownership, control, and benefits. These enterprises are typically established with the involvement of local communities, where decision-making is often participatory and inclusive. The primary goal of CBTEs is to ensure that the economic, social, and cultural benefits of tourism are equitably shared among community members, rather than external stakeholders. Besides, Goodwin (2008) shows that CBTEs often promote sustainable tourism practices that preserve natural resources, cultural heritage, and local traditions, while creating employment opportunities and enhancing the community's overall well-being. Additionally, they tend to foster strong partnerships with external organizations, such as NGOs or government bodies, to provide training, marketing, and other support necessary for long-term success. CBTEs emphasize the protection and promotion of local cultural heritage. The economic benefits of tourism are distributed within the community. This can be through direct employment (e.g., as guides or in hospitality services), as well as through the purchase of local

goods and services by visitors. Successful CBTEs demonstrate resilience by adapting to changes such as fluctuating tourist numbers, economic challenges, or environmental changes. Flexibility in offering services and diversifying income sources are key strategies for resilience (Asker et al, 2010).

Furthermore, some studies research about factors impact on maturity of sustainable supply chain including management, product and services, quality issues factors... (Evans et al. 2017, Tasnim et al, 2023). Sustainability and the supply chain is grounded in a sustainability value proposition within an integrated business model that takes in stakeholder engagement, collaboration, and a network view that denotes a new paradigm in managing supply chains (Beske & Seuring, 2014). The resulting evolution of practice then occurs in terms of both the orientation and strategic management of the supply chain. Strategies are being redesigned to integrate sustainability due to the established need for a holistic, systemic approach to help CBTEs to develop new products and services (accommodation, food and beverage, handicrafts, activities and entertainment) as well as makes the network system more clear (local travel organization and booking). This requires a shift in mindset from shareholder as to stakeholder value due to increased emphasis on interrelationships and the need for collective action. Therefore, focus shifts from the supply chain as linear to a system view of the network of relationships and the management processes (Evans et al. 2017). For CBTEs, an efficient strategy facilitates the development of new products and services, clarifies network systems with local travel organizations and bookings, and ensures effective communication among employees, suppliers, and customers, including the local community, tour operators, and homestays. Halstead (2003) further emphasizes that strategy enables CBTEs to communicate their future vision with suppliers regarding market development for agricultural products, art and culture, and handicrafts.

Besides, a sustainable supply chain thus consists of a CBTE that coordinates a set of suppliers and

customers to deliver a product or service of the expected quality at the expected time and speed. Competitors and top management also play a role. Beyond the issue of pressure and the types of stakeholders pressuring the sustainable supply chain, few scholars have investigated in detail the relations between stakeholder theory and supply chain management and the impacts of stakeholder pressure along the sustainable supply chain (Seles et al., 2016). Stakeholders' effects on sustainable supply chain are most often considered in terms of environmental practices such as eco-design, responsible procurement, green manufacturing or green logistics) adopted as a result of stakeholder pressure (Graham, 2020). These reactive approaches reveal stakeholders' failures to deliberately consider and become actively involved in sustainable supply chain development strategies, which sometimes lead to unethical and unsustainable practices in different sustainable supply chain operations (Fritz, 2022).

Sustainable supply chain is related to the management of information as well as collaboration among the organizations along the supply chain, while integrating the three-stream selection elements including the three aspects of sustainable development: economic, environmental and social performances. Kibicho (2008) highlights the link between community-based tourism and supply chain management, emphasizing the comprehensive impacts of tour operators, encompassing raw material use, processing, production, and transportation. In community-based tourism supply chains, a significant portion of individuals is directly involved in creating the holiday experience. The sustainability of such products hinges on environmental considerations, working conditions, safety, waste handling, and resource use efficiency (Tasnim et al, 2023). Won et al. (2007) affirm a positive correlation between membership in supplier associations and supplier productivity, emphasizing strategic linkages in the supply chain. Supplier linkage involves establishing and evaluating successful relationships between providers and recipients,

addressing communication and timely delivery of products and services locally and globally.

Simultaneously, collaboration encompasses cooperation, integration, or coordination, interchangeably used based on the primary goal of ensuring effective flows of products and services, information, money, and decisions, providing maximum value to the customer (Flynn et al., 2010). Stakeholder inclusion in community-based tourism development serves as the foundational block for community development. Improving collaboration among stakeholders in CBTEs' supply chain enhances information sharing with customers and distributors, ensuring facilities like wifi, medical services, and information availability. Collaborative efforts in the supply chain enable CBTEs to enhance demand forecasting with key partners, establish order systems with suppliers quickly, involving transportation service providers, homestays, and inbound services (Gupta & Singh, 2015). Efficient collaboration with suppliers enhances the benefits of cooperation. Identifying key and potential stakeholders is vital for effective collaboration in promoting community-based ecotourism, with each community member and organization playing a distinct role in advancing community-based tourism development (Wagner et al., 2002).

Carter and Roger (2008) show that a sustainable supply chain includes a strategic, transparent integration and the achievement of the organization's social, environmental and economic goals in coordinating the inter-organizational business processes in order to improve the long-term economic efficiency of each company and its supply chain. The sustainable supply chain is based on three key points and four supportive aspects of sustainability such as risk management, transparency, strategy and culture. Parallel to that, Sustainability in the system as an CBTEs that can grow indefinitely toward greater human utility, greater efficiency of resource use, fewer non-renewable resources, the interaction of the environment and a balance with the environment, which is favorable to humans and to most other species, is structured in accordance

with human goals. Sustainability is very important to maintain the value, awareness, society and business reputation as well as to enhance the business environment and cooperation in the CBTE supply chain. In addition, the implementation of sustainability in the CBT supply chain can be considered as an effective way to engage stakeholders to cooperate to achieve the common goals (Arruda et al., 2019).

Parallel to that, a socially responsible supply chain refers to the concept of corporate social responsibility, quality issues and is defined as a union of its participants who jointly adapt, implement, and coordinate values, strategies, and tactics to combine all levels of social responsibility with business processes in the chain (Li et al., 2021). The concept of corporate social responsibility was incorporated into the supply chain by Carter and Jennings (2002) arguing that suppliers may be in a better competitive position due to the increased involvement of buyers in socially responsible activities. In turn, Carter and Rogers (2008) emphasises that the integration of environmental, social, and economic criteria in supply chain management allows an organisation to achieve long-term economic profitability. Supply chain management means taking into account such aspects as, among others: social issues as a priority during purchasing processes; the impact of modern-day slavery and how organisations should deal with it in their supply chains and how ethical issues are dealt with in the context of the supply chain (Liu et al, 2018). Thus, a sustainable supply chain focuses on the development and implementation of practices that serve the main economic goals of the company, while taking into account legal, ethical, and discretionary obligations in the supply chains.

Overall, some of those studies did examine the impact of factors on sustainable supply chain such as product, services, strategy, governance, customer and supplier management, quality in the enterprises, not even one emphasized impact of factors on sustainable supply chain for CBTEs in rural Vietnam as well as evaluating the sustainable supply chain. Our study addresses a significant gap in the literature and offers actionable

strategies to enhance supply chain sustainability for CBTEs. The post-pandemic landscape presents an exciting opportunity for CBTEs to harness the groundbreaking advancements of Industry 5.0. By optimizing their supply chain operations through sustainable strategies, these CBTEs can not only enhance efficiency but also champion sustainability initiatives that resonate with today's eco-conscious tourists. This forward-thinking approach cultivates resilience and sets the stage for these companies to emerge as trailblazers in the quest for a sustainable future. Furthermore, it situates its findings within a comparative framework, yielding insights that are not only relevant to Vietnam but also applicable to other emerging economies.

2. Methodology

2.1. Procedure and sample

To optimize data collection from CBTEs in three key regions including the southern region (Can Tho, Ca Mau, Hau Giang, An Giang), the central region (Binh Dinh, Phu Yen), and the northern region (Hoa Binh, Dien Bien) after the end of Covid-19 pandemic from 467-481. These regions were selected as they are major CBTE hubs in Vietnam, significantly impacted by the natural disasters like the COVID-19 pandemic. Subsequently, we randomly sampled registered CBTEs from comprehensive lists provided by local authorities in each area, resulting in the selection of 318 CBTEs. These selected enterprises, situated in three rural areas of Vietnam (the northern region, the central region, and the southern region), had a minimum age of 5 years, employed at least 5 laborers and their field of business is in cultural tourism (63.4%). Local authorities facilitated interviews at the district people's committee office, where CBTEs were grouped into APS level and executive level groups. Face-to-face interviews were conducted to gather information on the impact of the factors on the sustainable supply chain of CBTEs. Then, completed questionnaires from the survey were subsequently incorporated into the data analysis. The geographical focus of the analysis encompassed the northern region (115 CBTEs, 36.16%), the central region (102 CBTEs,

32.67%), and the southern region (101 CBTEs, 31.17%).

2.2. Research methods and measures

There have been some previous studies on the factors that influence the sustainable supply chains (Robinson et al 2006, Meza et al 2017). Building on the foundation of previous research, we also employ ordinal logistic regression (OLR) model to examine factors affecting the sustainability in the supply chains of CBTEs in rural Vietnam. The response variable (the sustainability level) is a polychotomous variable having five categories including much of factors affecting the level of sustainability in the supply chains of CBTEs in rural Vietnam with 5 levels (very low, low, moderate, high, sustainability). So we use ordinal logistic regression to identify factors affecting the sustainable supply chains in Viet Nam with group factors (product and services, sustainable governance, customer and supplier management, quality issues). Let P_{ij} ($j = 1, 2, 3, 4, 5$) the level of sustainability in the supply chains of CBTEs in Viet Nam, i with: $j = 1$ if the level of very low level, $j=2$ if the level of low, $j=3$ if the level of moderate, $j=4$ if the level of high, $j=5$ if the level of sustainability. Then, the ordinal logistic regression model is given by:

$$P_{ij}(j = kXi) = \frac{\exp(\beta kXi)}{\sum_{j=1}^4 \exp(\beta jXi)} (j = 1, 2, 3, 4, 5) \quad (1)$$

In order to make the model identified, β_j is set to zero for one of the categories, and coefficients are then interpreted with respect to that category, called the reference or base category (Cameron and Trivedi, 2005). Thus, set β_j to zero for one of four groups, then the ordinal logistic regression model for each group can be rewritten as:

$$P_{ij}(j = kXi) = \frac{\exp(\beta kXi)}{\sum_{j=1}^2 \exp(\beta jXi)} (j = 1, 2, 4)$$

$$\text{and } P_{ij}(j = 3Xi) = \frac{1}{\sum_{j=1}^4 \exp(\beta jXi)} (j = 1, 2, 3, 4)$$

which can be estimated using the method of maximum likelihood.

Besides, some studies applied the Maturity model to gauge the maturity level of sustainable supply chains (Thi et al 20219, Soroush et al 2019,

Tontini et al. 2019). This study also employs the Maturity model, utilizing a set of variables, to assess the maturity level of sustainable supply chains for 318 CBTEs in rural Vietnam. The Maturity model is designed to facilitate CBTEs in evaluating the maturity of their operations if CBTEs progress through several maturity levels before reaching advanced stages. The maturity level (MD) of each dimension is derived from the weighted average of all maturity items (MDIi) within the respective dimension, with the weighting factor (gDIi) representing the average importance rating from all 318 experts for each item. The maturity level is computed using the following formula:

$$M_D = \frac{\sum_{i=1}^n M_{DIi} * g_{DIi}}{\sum_{i=1}^n g_{DIi}}$$

In which:

MD: Maturity

DIi: Dimension

gDIi: Weighting factor

n: number of maturity item

Besides the demographic factors (age, education, gender, types, revenue, job level), the dependent variables in this study are 5 group factor including product and process factor, sustainable governance factor, customer and supplier management factor, quality issues factor.

Table 1. Operationalization of variable

Variables	Definition
Age	Respondent's actual age (years)
Education	Actual schooling years
Gender	1 = Male 2 = Female
CBTEtypes	1 = Crop 2 = Pet 3 = Seafood 4 = Agricultural services
Revenue	Monthly revenue (million VND) 1 = > 100 million VND 2 = from 100 to 500 million VND 3= 500 – 1000 million 4= < 1000 million
Labor	1= APS level 2 = Executive level
Region	1 = The Northern region 2 = The Central region 3 = The Southern region
Working years	The time since the business was established

Variables	Definition
Maturity of sustainable supply chain	Sustainable supply chain with 5 level relates to incorporating environmental, social, and economic considerations into its management practices to achieve long-term sustainability including very low, low, moderate, high, sustainability
Product and Services	The sustainability on environmental considerations, working conditions, safety, waste handling, and resource use efficiency
Strategy	An efficient strategy facilitates the development about strategy of network system, new products and services, communication and direction of the corporation, sharing vision strategy
Sustainable governance	Corporate environment, corporate social governance, reporting and performance management
Customer and supplier management	Distribution channels; Market information; Financial resources; Digital marketplaces, risks management.
Quality issues	Improving operational standards (accommodation, food and beverage, handicrafts, activities, and entertainment, inventory) including: assurance, certification, reliability, innovativeness, R&D

Source: Synthesis of the author group (2025)

Furthermore, factors related to the level of sustainable of supply chain in CBTEs were assessed using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The results show the respondent's actual age is about 31.98, labor is male with 62.13%, education is over 15 year- schooling, and CBTEs having production related to farming are higher with 2.04. According to the Survey, the results also show that number of years from the time the business was established are over 8 years. The average revenue of these CBTEs per year is about 467-481 million per month in three areas.

3. Results

3.1. Results of factors impact on the sustainable supply chains of CBTEs

Table 2 presents the results of the ordinal logistic regression model on factors affecting the sustainable supply chains of CBTEs in rural Vietnam. The variables, which are age, education, labor, region, working years have meaning in explaining the positive impact of sustainable supply chains of CBTEs. Besides, product and services, strategy, governance, customer and supplier management, quality issues also have impact.

Table 2. Factors impact on the level of sustainability in the supply chains of CBTEs

Variable	Coef.	Std.Err	p-Value
Age	0.012	0.008	0.003
Gender	- 0.167	0.142	0.621
Education	0.031	0.051	0.320
Type	-0.994	0.213	0.120
Labor	0.012	0.013	0.271
Region	0.213	1.861	0.002

Variable	Coef.	Std.Err	p-Value
Working year	0.079	0.543	0.006
Product and Services	0.681	0.532	0.009
Strategy	1.832	0.551	0.001
Sustainable governance	0.942	0.547	0.012
Customer and supplier management	1.381	0.609	0.004
Quality issues	0.303	0.547	0.003

Source: author's survey (2025).

The results show that customer and supplier management is one of the highest factors impacting Vietnamese CBTEs in the Rural region with 1.381. The other factors affected to the level of sustainability in the supply chains of all CBTEs is reporting and strategy sustainable governance, quality issues with 1.832, 0.942, 0.303 respectively for CBTEs. Strategy enables CBTEs to invest in sustainable infrastructure, technologies, and practices while managing risks and ensuring ethical sourcing. Besides, sustainable governance in CBTEs with 0.942 also plays a critical role in driving sustainable supply chains by providing the tools and metrics needed to monitor, measure, and optimize operations. Product and service are factors impacting on sustainability of supply

chain for rural CBTEs. The table 2 also shows that by improving product and services, a sustainable supply chain for CBTEs can increase the level of sustainability by 0.681 in CBTEs and other CBTEs respectively.

3.2. Results of the assessment of the maturity level for the sustainable supply chain of CBTEs

This paper presents findings from a case study involving 318 CBTEs in rural Viet Nam. We will provide a detailed overview of the assessment and calculation of the "sustainable" dimension to enhance comprehension of the sustainable supply chain's systemic aspects. In Figure 1, the line chart is used to depict the overall result.

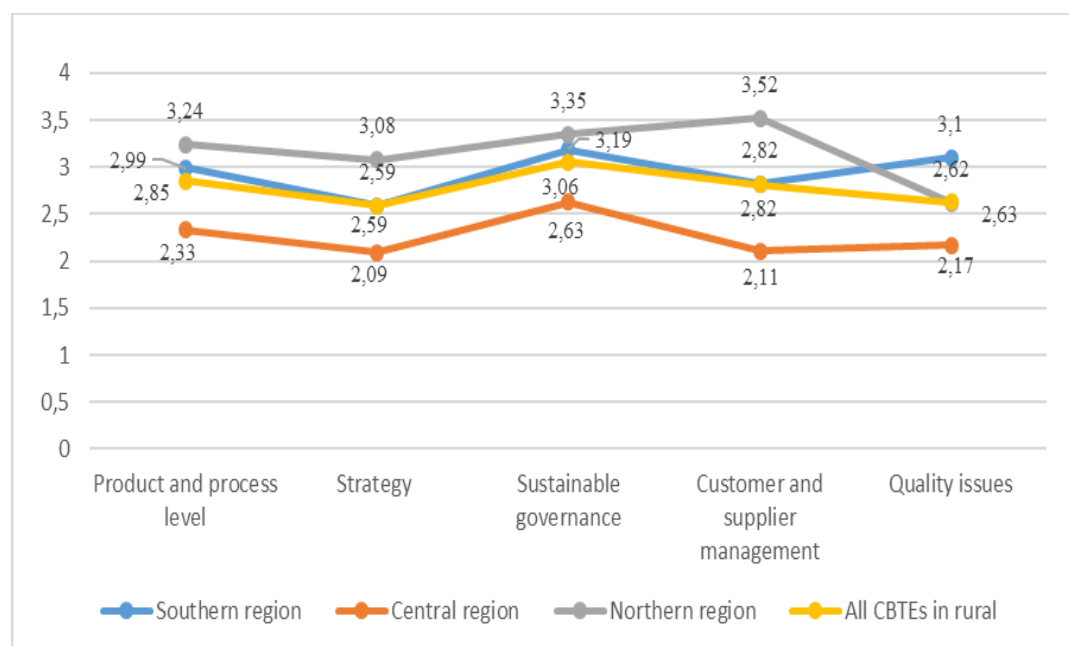


Figure 1. The level of maturity of the sustainable supply chain of CBTEs

Source: author's survey (2024)

The various facets and significance of the subject highlight the necessity of giving specific attention to the maturity of sustainable supply chain of CBTEs by using ordinal logistic regression model. The outcomes of implementing this model in the supply chains of rural-CBTEs achieved the highest scores in sustainable governance (3.06), product and process (2.85). Besides, the findings indicate that the maturity level of supply chain maturity scored lowest in customer and supplier management (2.82) and quality issues (2.63). Besides, the maturity of the sustainable supply chain for CBTEs in Northern region with lever 3 is higher than Southern region and Central region.

In Rural Vietnam, CBTEs gain the 3 levels in sustainable governance (3.06). This means that senior managers are centrally involved in processes that define entrepreneurship for innovation. Besides, the results show that product, process and customer, supplier management gain 2.85 and 2.82 respectively, are pivotal stages for any rural CBTEs striving to introduce innovation to the agricultural sector. The process commences with identifying the needs and challenges within the agricultural domain, such as enhancing crop yield, minimizing environmental impact, or optimizing supply chain efficiency. Quality issues is the lowest level with 2.63 in rural CBTEs.

4. Discussion

The results of the OLR model show that customer and supplier management is one of the highest factors impacting Vietnamese CBTEs in the Rural region. Rural CBTEs in rural region can improve the level sustainability in supply chain by enhancing source of suppliers because the source of suppliers is a key component of a sustainable supply chain in CBTEs, as it ensures that the processes used to produce agricultural goods and related products are environmentally friendly, socially responsible, and economically viable. Sustainable suppliers emphasize the use of energy-efficient processes and machinery, reducing the overall energy footprint of production. This is particularly important for

CBTEs seeking to minimize operational costs and environmental impact (Graham, 2020).

The other factors affected to the level of sustainability in the supply chains of all CBTEs is reporting and strategy sustainable governance, quality issues. Strategy enables CBTEs to invest in sustainable infrastructure, technologies, and practices while managing risks and ensuring ethical sourcing. According to Tseng et al (2019), the right strategies help create a sustainable supply chain that is not only economically viable but also socially and environmentally responsible. Strategy backing helps CBTEs scale their operations in a sustainable manner. Expanding while adhering to environmentally friendly practices requires significant investment, particularly in training, certification, and compliance with sustainability standards. For CBTEs that wish to reach global markets, financial resources help with meeting international sustainability standards, certifications, and building partnerships that adhere to ethical practices (Walker et al., 2008).

Sustainable governance in CBTEs also plays a critical role in driving sustainable supply chains by providing the tools and metrics needed to monitor, measure, and optimize operations. Through the effective use of sustainable governance, CBTEs can improve resource efficiency, reduce environmental impact, enhance supply chain resilience, and achieve long-term sustainability goals while staying competitive in the agricultural market. By regularly monitoring supply chain performance, CBTEs can identify potential risks and disruptions, such as climate-related events, supply shortages, or changes in consumer demand. Effective performance management allows CBTEs to build more resilient supply chains that can adapt to these challenges while maintaining sustainability (Erol et al., 2011).

Furthermore, product and service are factors impacting on sustainability of supply chain for rural CBTEs. By improving product and services, a sustainable supply chain for CBTEs can increase the level of sustainability. Previous studies have echoed our conclusion on the role

of the factors. Correia et al (2018) has proved sustainable production plays a critical role in enhancing the sustainable supply chain of CBTEs by addressing environmental, social, and economic impacts throughout the lifecycle of agricultural products. Sustainable product and services promote optimizing the entire supply chain, from production to delivery. CBTEs can leverage local sourcing, shorter distribution channels, and farm-to-table logistics for greater efficiency.

Simultaneously, the various facets and significance of the subject highlight the necessity of giving specific attention to the maturity of sustainable supply chain of CBTEs. The outcomes of implementing this maturity model in the supply chains of rural-CBTEs achieved the highest scores in sustainable governance, product and process. However, the findings indicate that the maturity level of supply chain maturity scored lowest in customer and supplier management and quality issues. Community-Based Tourism is a powerful tool for rural development, poverty alleviation, and cultural preservation. However, many CBT enterprises face governance challenges that undermine long-term sustainability. Strengthening governance systems is vital to ensure transparency, equity, and resilience.

In Rural Vietnam, CBTEs gain the 3 levels in sustainable governance. This means that senior managers are centrally involved in processes that define entrepreneurship for innovation. Sustainability is considered in the management process, for suppliers, and in reporting metrics. Customer management is included in process improvement efforts and customer satisfaction begins to show marked improvement. Standards related to sustainability are accepted for relevant management processes and are used to improve the business operation in the supply chain to meet requirements for sustainability (Thi et al, 2019). Sustainable governance is the foundation for long-lasting CBT success. Policies foster inclusive, accountable, and resilient management systems to empower communities, protect cultural heritage, and sustain local economies. CBTEs develops informal electronic channels to

support the exchange and sharing of technical-scientific information about products and processes. Existing competing products are assessed according to a sustainable process. Customer locations are visited by designers before initiation of design. Users are involved in the design process. Besides, CBTEs also has metrics to understand the correct way to conduct the learning process, considering the specific social and cultural realities of the organization.

The results show that product, process and customer, supplier management are pivotal stages for any rural CBTEs striving to introduce innovation to the agricultural sector. The process commences with identifying the needs and challenges within the agricultural domain, such as enhancing crop yield, minimizing environmental impact, or optimizing supply chain efficiency. CBTEs develops informal electronic channels to support the exchange and sharing of technical-scientific information about products and processes. Existing competing products are assessed according to a sustainable process. Customer locations are visited by designers before initiation of design. Users are involved in the design process. This is primarily attributed to the limited direct or online communication channels that hinder widespread customer interaction. Consequently, improvements in this aspect are imperative. To address the weaknesses of rural CBTEs, several best practices have been recommended. These include developing a comprehensive event checklist, establishing essential infrastructure, and formalizing response procedures in collaboration with industry practitioners, as highlighted during a recent brainstorming session (Oumaima et al, 2022).

Besides, CBTEs also has metrics to understand the correct way to conduct the learning process, considering the specific social and cultural realities of the organization (Soroush et al, 2019). CBTEs frequently allocate resources for innovation and research and development (R&D) endeavors, which may encompass experimenting with new agricultural technologies, breeding novel crop varieties, or devising sustainable farming methodologies. Subsequently, upon validating the product, CBTEs frequently

concentrate on expanding production, which may involve forming partnerships with farmers, investing in manufacturing infrastructure, or securing supply chains for essential inputs. Notably, for rural CBTEs in Vietnam, establishing a robust brand and marketing strategy is indispensable for customer attraction, which may entail emphasizing the product's sustainability, efficiency, and innovation. Practical approaches encompass online marketing, participation in agricultural trade shows, and leveraging networks within the farming community. In general, integrating production across the value chain has yielded advantages for cooperatives and farmers, reducing intermediary stages, decreasing production costs, and amplifying product value (Ho et al, 2022).

However, quality issues is the lowest level in rural CBTEs. Targets related to quality issues are defined but still missed more often than not. Customer satisfaction has improved, but is still low. Rural CBTEs face significant challenges related to low quality, which hinders their competitiveness and long-term sustainability. These issues often stem from a lack of standardized service practices, limited training in hospitality and customer care, and inconsistent product offerings. In many cases, local providers do not have access to the necessary skills or resources to meet tourist expectations, leading to poor guest experiences, negative reviews, and reduced repeat visits. Furthermore, inadequate infrastructure, weak feedback systems, and misleading marketing exacerbate the problem.

5. Conclusion

This study utilizes the ordinal logistic regression model to examine the factors impacting on the sustainable supply chain of CBTEs in rural Vietnam after pandemics like Covid-19. Additionally, it investigates the level of maturity of the sustainable supply chain for these CBTEs. The analysis extends scholarly discussions on the interplay of supply chain factors with sustainable development of CBTEs in rural Vietnam. The findings emphasize the need for innovative strategies (1.832), customer and supplier

management (1.381), sustainable governance (0.942), in CBTEs ventures during economic upheavals. Key recommendations emerge from the study:

Firstly, innovative strategies tailored for CBTEs should be developed in coordination between the State and CBTEs, integrating them into local tourism planning, regional economic development, and rural construction.

Secondly, support for capacity-building in community tourism development is essential. This includes vocational training, production of souvenirs, and training programs for welcoming tourists, emphasizing traditional occupations. Specialized training for ethnic minority communities and the creation of a team of experts in community tourism development should be priorities.

Thirdly, the government should implement coordinated measures to enhance infrastructure and technical capabilities, emphasizing improvements in information systems for customers and suppliers in the sustainable supply chain for rural CBTEs.

Fourthly, the State should promote socialization in tourism human resource training, focusing on vocational and soft skills for those directly serving tourism, particularly tour guides. Training programs for communities involved in tourism should also be organized to enhance local destinations and tourism images.

Lastly, the State should foster the development of a comprehensive community tourism product, aiming to be a key component in Vietnam's tourism product system. This involves organizing survey programs, promoting routes and community tourism sites, consulting on product design, restoring folk arts and traditional cuisine, and supporting the construction of products and services for rural, eco, and cultural tourism at community destinations

This study shows the assessment of the sustainable supply chain of CBTEs was confined to 3 rural areas in Vietnam. It is suggested that future studies mitigate this limitation by incorporating diverse geographical areas. Besides,

due to time constraints, interviews primarily involved leaders or employees within CBTEs. Expanding research to include the perspectives of tourists, both domestic and international, is a

valuable avenue for future exploration. This broader approach would provide a more comprehensive understanding of the sustainable supply chain of CBTEs in Vietnam.

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