

Article

Integrating Enterprise Supply Chains, Building Resilience, and Promoting Sustainable Development in Community-Based Tourism

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Abstract

Community-based tourism enterprises (CBTEs) play an important role in supporting local livelihoods, preserving cultural heritage, and promoting sustainable tourism development. This study examines the relationships among supply chain integration, resilience capabilities, and sustainable development using survey data from 256 community-based tourism enterprises in Vietnam. A two-stage empirical approach combining Seemingly Unrelated Regression (SUR) and Ordinary Least Squares (OLS) models was employed. The findings indicate that network design and information systems positively influence both proactive and reactive resilience capabilities, while collaboration strengthens proactive resilience but negatively affects reactive resilience. Strategy exerts the strongest positive effect on reactive resilience. Furthermore, both proactive and reactive resilience capabilities positively contribute to environmental, social, and economic sustainability outcomes. Reactive resilience demonstrates the strongest impact on environmental sustainability, whereas proactive resilience has the greatest effect on economic sustainability. An unexpected finding is the negative relationship between collaboration and reactive resilience, suggesting potential trade-offs between stakeholder dependence and organizational flexibility. This study extends Dynamic Capability Theory by distinguishing between proactive and reactive resilience capabilities and explaining how resilience facilitates the transformation of supply chain integration into sustainable development outcomes. The findings have practical implications for strengthening resilience and promoting sustainability in community-based tourism enterprises.

Keywords: supply chain; resilience; sustainable development; community-based tourism enterprise (CBTE); small and medium-sized enterprise



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1. Introduction

In rural regions of developing countries, community-based tourism enterprises (CBTEs) play an important role in poverty reduction, livelihood diversification, cultural preservation, and environmental protection. By creating income opportunities and facilitating the transition from traditional agricultural and handicraft activities to tourism services, CBTEs contribute to local socio-economic development while supporting the conservation of natural and cultural resources [1]. Consequently, CBTEs have attracted

increasing attention from both researchers and policymakers seeking sustainable development pathways for rural communities. In recent years, the global tourism industry has increasingly shifted toward Environmental, Social, and Governance (ESG)-oriented development, emphasizing sustainability, resilience, responsible governance, and inclusive community participation [2]. Tourists are becoming more environmentally and socially conscious, preferring destinations that preserve local culture, protect ecological systems, and provide authentic community-based experiences. As a result, community-based tourism has emerged as an important tourism model aligned with ESG principles, particularly in rural and indigenous regions of developing countries. Policymakers are therefore challenged to develop adaptive tourism systems capable of strengthening the resilience and long-term sustainability of CBTEs under increasing environmental, social, and economic uncertainties [3].

In Vietnam, community-based tourism has become a strategic approach for promoting local livelihoods, cultural preservation, and sustainable tourism development. In the rural development context, many CBTEs can also be considered a form of agri-startup, as agricultural entrepreneurs increasingly diversify their activities beyond traditional farming into community-based tourism, agritourism, local experience services, and cultural value creation. These enterprises contribute not only to agricultural transformation but also to rural economic revitalization by generating new income sources, enhancing local resource utilization, and strengthening community-based entrepreneurship. National policies increasingly emphasize green growth, digital transformation, stakeholder collaboration, and sustainable tourism governance. At the same time, growing pressures associated with environmental responsibility, social inclusion, and governance transparency have highlighted the importance of resilient and integrated tourism supply chains. Enterprises with weak supply chain connectivity may face operational inefficiencies, limited adaptive capacity, and difficulties in meeting evolving sustainability standards. Therefore, strengthening supply chain integration and resilience has become essential for tourism enterprises seeking long-term competitiveness and sustainable development [4]. For CBTEs, sustainable development encompasses three interrelated dimensions, including environmental, social, and economic sustainability. Unlike conventional mass tourism enterprises that typically rely on formalized, market-driven, and large-scale supply chains, CBTEs depend heavily on local households, community organizations, indigenous cultural assets, and trust-based stakeholder relationships. Consequently, supply chain integration in CBTEs involves not only operational coordination but also community participation, social legitimacy, cultural preservation, and environmental stewardship. These distinctive characteristics suggest that the mechanisms through which supply chain integration contributes to resilience and sustainable development may differ substantially between CBTEs and other tourism enterprises, making the relationships among supply chain integration, resilience, and sustainable development particularly important in community-based tourism contexts.

Despite growing scholarly attention to supply chain integration, resilience, and sustainable development, several important research gaps remain. Prior studies have primarily examined the relationships between supply chain integration and resilience or between resilience and sustainability separately, with limited empirical evidence regarding the mechanisms linking all three constructs. Moreover, existing studies have mainly focused on manufacturing firms, logistics systems, and conventional SMEs, while empirical evidence from community-based tourism enterprises remains limited. Furthermore, resilience is frequently conceptualized as a single organizational capability, providing limited understanding of whether proactive and reactive resilience contribute differently to environmental, social, and economic sustainability outcomes. The role of locally embedded entrepreneurs remains underexplored despite their stronger social networks, cultural legitimacy, and

trust-based relationships that may influence stakeholder collaboration, community participation, and sustainable resource management, particularly in rural and ethnic minority destinations [4,5].

To address these research gaps, this study employs a two-stage empirical framework combining Seemingly Unrelated Regression (SUR) and Ordinary Least Squares (OLS) models to examine the relationships among supply chain integration, resilience capabilities, and sustainable development in community-based tourism enterprises (CBTEs) in Vietnam. Vietnam provides a highly relevant context for this investigation because community-based tourism has expanded rapidly under sustainable tourism and ESG-oriented development strategies, especially in rural and ethnic minority regions where tourism competitiveness depends heavily on natural resources, cultural heritage, and community participation. Moreover, most CBTEs operate under resource constraints and face increasing environmental, social, and economic uncertainties, making resilience and supply chain integration critical determinants of long-term sustainability. Thus, this study seeks to examine whether and how different dimensions of supply chain integration influence sustainable development outcomes through proactive and reactive resilience capabilities in community-based tourism enterprises.

In this way, this study makes three contributions to the literature. First, it extends existing research on sustainable tourism and supply chain management by examining community-based tourism enterprises (CBTEs), an underexplored organizational context. CBTEs differ substantially from conventional tourism businesses, because they simultaneously pursue economic profit, environmental conservation, cultural preservation, and community well-being, with significant resource constraints in rural destinations. By focusing on this distinctive context, the study broadens the applicability of supply chain integration and resilience theories to community-based tourism. Second, this study explicitly distinguishes between proactive resilience capability and reactive resilience capability within CBTEs, thereby offering a more nuanced understanding of resilience in community-based tourism. As the findings suggest, these two dimensions of resilience play different roles in mediating the relationship between supply chain integration and sustainable development. Third, the study investigates the relationships among supply chain integration, resilience capabilities, and sustainable development using a two-stage SUR–OLS framework, providing empirical evidence on the mechanisms through which different dimensions of supply chain integration influence sustainability performance. Finally, the study offers context-specific managerial and policy implications for rural tourism development in Vietnam. The findings provide practical guidance for strengthening destination governance, developing resilience-oriented community partnerships, promoting green digital transformation, and supporting locally embedded tourism enterprises, thereby contributing to more inclusive and sustainable rural tourism development.

2. Literature Review

2.1. Factors Affecting the Supply Chain of Community-Based Tourism

Community-based tourism (CBT) has various definitions. France [6] characterizes CBT as a form of tourism controlled and operated by the local community, encompassing economic and social benefits. Phuong et al. [4] 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 [7].

The supply chain for CBT involves meeting tourist needs, from upstream services like infrastructure and food production, to basic services like transportation and accommoda-

tion [5]. This perspective on the supply chain acknowledges the interconnected relations of various actors, including tourists, tourism management, and micro-market entities. Won et al. [8] found a positive correlation between membership in supplier associations and supplier productivity, emphasizing strategic linkages in the supply chain.

Supply chain integration is a multidimensional construct. Consistent with previous studies [9,10], supply chain integration is operationalized through four dimensions: strategy, network design, information systems, and collaboration. These dimensions collectively reflect the extent to which CBTEs coordinate resources, information, stakeholders, and operational activities across the tourism supply chain. Therefore, strategy, network design, information systems, and collaboration are treated as dimensions of supply chain integration rather than as independent organizational capabilities. We will define each element in turn.

First, strategy is defined as the coordination of long-run strategic cooperation among decision-makers in a universal network, supporting process development and product production [11]. For CBTEs, an efficient strategy facilitates the development of new products and services, clarifies network systems with local travel organizations and booking platforms and ensures effective communication among employees, suppliers, and customers, including the local community, tour operators, and homestays. Fu et al. [12] emphasize that strategy enables CBTEs to communicate their future vision with suppliers regarding market development for agricultural products, art and culture, and handicrafts.

Second, the supply chain network is as a fundamental structure responsible for providing, manufacturing, and distributing products to customers [12]. Simchi-Levi et al. [13] emphasize how an efficient network design in the supply chain influences operational costs and customer responses. For CBTEs, network design enhances operational standards for accommodation, food and beverage, handicrafts, activities and entertainment, and inventory, ensuring prompt and accurate service delivery in areas like ground transport, ground operation, executions and attractions, and cultural, social and sport events. As network design evolves over time, it must adopt arrangements that align with and encourage behaviors optimizing an organization's sustainable performance, aligning with CBTEs' expectations.

In parallel, correct and clear information is crucial for attracting and retaining potential tourists, and instilling confidence in the tourism sector. The information system presents opportunities to reshape the supply chain, integrating it with sustainable development for balanced growth and superior performance over competitors [10]. An effective information system aids CBTEs in streamlining operations, reducing complexities, cutting time and business costs with cost-effective packages and entertainment, and exploring new markets [14,15].

Finally, collaboration in sustainable supply chains involves inter-organizational processes among members to create a seamless and synchronized supply chain, enhancing responsiveness and performance for customer satisfaction [16]. 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 [9,10]. Improving collaboration among stakeholders in CBTEs' supply chain enhances information sharing with customers and distributors, ensuring facilities like Wi-Fi, 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 [17]. Efficient collaboration with suppliers enhances the benefits of cooperation [18].

Although the literature recognizes the importance of supply chain integration, debate remains regarding which dimension most strongly influences organizational performance. Some studies identify strategic alignment as the primary driver of supply chain effectiveness through long-term planning and sustainability-oriented decision-making [11]. Others emphasize network design and stakeholder connectivity, particularly in service sectors where value creation depends on coordination among multiple actors [12]. More recent research highlights information systems and collaboration as key mechanisms for improving transparency, responsiveness, and adaptability in complex supply chains [9,10]. These differing perspectives suggest that the relative importance of supply chain integration dimensions may vary across contexts.

2.2. The Relationship Between the Supply Chain and the Resilience of CBTEs

Resilience is a phenomenon that incorporates factors such as flexibility, responsiveness, and recovery [19,20]. Pettit et al. [21] describe resilience as a balanced state comprising vulnerability and capability, highlighting the supply chain's ability to prevent disruptions through flexibility and quick responses. Resilience has increasingly been recognized as a critical strategic capability that enables firms to survive and sustain competitiveness under conditions of uncertainty, disruption, and environmental turbulence [3]. Through the lens of Dynamic Capability Theory, resilience captures firms' capacities to sense environmental threats, seize opportunities during disruptions, and reconfigure resources for long-term adaptation [22].

The concept of resilience can be further broken down into two aspects: proactive resilience and reactive resilience. According to Duchek [23], resilience is not a single capability but a dynamic process consisting of anticipation, coping, and adaptation. The anticipation phase focuses on identifying potential threats, monitoring environmental changes, and preparing preventive actions before disruptions occur, whereas the coping and adaptation phases emphasize responding to disruptions, maintaining operational continuity, and learning from adverse events. Similarly, Hillmann and Guenther [3] argue that resilience encompasses both forward-looking capabilities that enable organizations to prepare for uncertainty and response-oriented capabilities that facilitate recovery and transformation after disruptions. In short, proactive resilience reflects the firm's ability to anticipate potential disruptions, identify risks, and prepare resources and strategies before crises occur. Meanwhile, reactive resilience capability refers to the firm's ability to respond effectively to disruptions, absorb shocks, recover operational performance, and adapt to changing environmental conditions after crises occur. This dimension includes operational continuity, recovery processes, organizational learning, and strategic adaptation following unexpected disruptions. Rather than merely returning to the pre-disruption state, reactive resilience also reflects the firm's ability to transform and reconfigure resources to sustain long-term competitiveness.

The distinction between proactive and reactive resilience is particularly relevant for CBTEs, as they operate in uncertain environments characterized by fluctuating tourist demand, environmental risks, and limited resources. Together, these complementary capabilities enable CBTEs to strengthen preparedness, absorb shocks, maintain operational continuity, and adapt to changing conditions [24]. In the context of ESG-oriented development and Industry 5.0, resilience has evolved beyond operational recovery toward a broader capability integrating sustainability, human-centered innovation, and adaptive governance.

Furthermore, recent studies emphasize that resilient organizations are increasingly expected to balance economic performance with environmental responsibility, social inclusion, and technological adaptability under uncertain conditions [25,26]. Industry 5.0 further strengthens the role of resilience by promoting human-centric, sustainable, and resilient

supply chain systems supported by digital technologies, stakeholder collaboration, and adaptive decision-making [27]. Despite the growing consensus that supply chain integration contributes to organizational resilience, empirical findings remain inconclusive regarding the mechanisms through which this relationship occurs. While several studies report that stronger collaboration, information sharing, and network connectivity enhance firms' abilities to anticipate and recover from disruptions [20,28], other studies suggest that excessive integration may increase dependence on external partners and reduce organizational flexibility under uncertain conditions. Therefore, the relationship between supply chain integration and resilience may be contingent upon organizational characteristics, industry context, and governance arrangements. From an ESG perspective, understanding this relationship has become increasingly important. Tourism enterprises are expected not only to withstand external disruptions but also to contribute to environmental sustainability, social inclusion, and responsible governance. This challenge is particularly relevant for CBTEs operating in rural and ethnic minority destinations where tourism development directly influences local livelihoods, cultural heritage preservation, and community well-being and suggest that supply chain integration dimensions may influence proactive and reactive resilience differently in CBTEs [1,17].

2.3. Supply Chain Integration, Resilience and Sustainable Development

The sustainable development of community-based tourism enterprises (CBTEs) involves adopting long-term strategies that generate economic, environmental, and social sustainability while maintaining competitiveness under changing conditions [29]. Previous studies emphasize that sustainable development requires firms to integrate strategic supply chain practices with adaptive capabilities to maintain performance and create long-term value [30]. In addition, resilience enhances firms' abilities to anticipate risks, maintain business continuity, recover from disruptions, and adapt to changing conditions, thereby supporting long-term competitiveness and sustainable performance [31,32]. Empirical studies further indicate that proactive actions, supply chain agility, and flexible supplier relationships contribute positively to firm performance and sustainable economic outcomes. From an environmental perspective, resilience enables CBTEs to adapt to environmental changes, maintain sustainable resource management practices, and support environmentally responsible operations through continuous adaptation and resource reconfiguration [14,33]. Yilmaz and Karadayi-Usta [34] emphasize that resilient tourism supply chains depend on effective stakeholder coordination, digitalization, and risk management to enhance long-term sustainability.

Unlike conventional firms, CBTEs operate within local communities and depend heavily on collaboration among households, local authorities, tourism operators, and indigenous groups. Therefore, resilience may play a critical role in transforming supply chain resources and stakeholder networks into social inclusion, livelihood improvement, and long-term community well-being. Although previous studies generally support a positive relationship between resilience and sustainable development, resilience has often been examined as an outcome of supply chain management or a determinant of firm performance rather than as a mediating mechanism. Consequently, the role of resilience as a strategic capability linking supply chain integration and sustainable development remains insufficiently understood, particularly among CBTEs in developing countries [23]. Previous studies have highlighted the important role of supply chain integration in enhancing organizational performance and adaptability under uncertain conditions. Effective supply chain integration enables firms to coordinate resources, strengthen stakeholder collaboration, improve information sharing, and respond more effectively to operational disruptions [20]. As a result, supply

chain integration has increasingly been recognized as a critical capability for improving organizational resilience and long-term competitiveness.

The relationship between supply chain integration and sustainable development has attracted growing attention. Sustainable supply chain practices have been associated with improved competitiveness, operational performance, and long-term value creation among small and medium-sized enterprises [35]. Similarly, proactive actions, supply chain agility, and adaptive response capabilities contribute to sustainable competitive advantage and long-term sustainability performance [29]. Recent evidence indicates that supply chain integration may not directly generate sustainability outcomes. Instead, integrated supply chains strengthen firms' abilities to coordinate stakeholders, access information, anticipate environmental changes, and mobilize resources, thereby enhancing resilience capabilities [16,28]. In turn, resilient organizations are more capable of maintaining environmental responsibility, supporting community well-being, and sustaining economic performance over time [29]. These findings suggest that resilience may serve as an important mechanism linking supply chain integration and sustainable development.

3. Conceptual Framework and Hypotheses Development

3.1. Conceptual Framework

Building on Dynamic Capability Theory (DCT), this study argues that supply chain integration and resilience represent two complementary organizational capabilities that support sustainable development in CBTEs. Dynamic capability is the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments [22]. DCT focuses on firms' abilities to renew, integrate, and transform organizational resources and capabilities in response to uncertainty, environmental turbulence, and market changes [22,36].

This theoretical perspective is relevant for CBTEs because they operate in resource-constrained environments characterized by fluctuating tourism demand, environmental uncertainty, limited financial resources, and strong dependence on local communities and multiple stakeholders. From the perspective of DCT, supply chain integration enhances firms' abilities to access information, coordinate stakeholders, mobilize resources, and strengthen collaborative relationships across the tourism supply chain. However, these organizational capabilities do not automatically translate into sustainable development outcomes. Instead, firms require adaptive mechanisms that enable them to sense opportunities, seize emerging market conditions, and reconfigure organizational resources under conditions of uncertainty and environmental change [36].

In this regard, resilience can be conceptualized as a dynamic capability that enables CBTEs to anticipate disruptions, respond effectively to unexpected events, and adapt to evolving environmental, social, and market conditions, consistent with recent studies emphasizing resilience as a dynamic capability that supports organizational adaptation, recovery, and long-term sustainability in tourism and supply chain systems [36,37]. Proactive resilience capability reflects the ability to identify risks and prepare preventive actions before disruptions occur, whereas reactive resilience capability reflects the ability to absorb shocks, recover operations, and adapt following disruptive events. Together, these resilience dimensions facilitate the transformation of supply chain integration capabilities into environmental, social, and economic sustainability outcomes. Building on DCT, the study develops a conceptual framework linking supply chain integration dimensions, resilience capabilities, and sustainability outcomes in community-based tourism enterprises. The hypotheses are organized into three thematic domains: supply chain integration, resilience, and sustainable development.

3.2. Hypotheses Development

3.2.1. Supply Chain Integration and Resilience

Supply chain integration enables firms to improve information sharing, stakeholder coordination, network connectivity, and collaborative decision-making. These capabilities enhance organizational preparedness, adaptability, and responsiveness under uncertain conditions. Previous studies have similarly reported that supply chain integration enhances organizational adaptability by improving visibility, coordination, and resource sharing across supply chain partners, thereby strengthening firms' resilience under conditions of uncertainty [16,24,28]. Consequently, stronger supply chain integration is expected to enhance both proactive and reactive resilience capabilities in CBTEs.

H1a–d. *Supply chain integration dimensions positively influence both proactive resilience capability and reactive resilience capability in CBTEs.*

3.2.2. Supply Chain Integration, Resilience and Sustainable Development

According to Dynamic Capability Theory, organizational resources create sustainable value only when firms possess dynamic capabilities that enable them to integrate, reconfigure, and deploy these resources under changing environmental conditions [22]. In CBTEs, supply chain integration provides important resources through information sharing, stakeholder coordination, and collaborative networks. However, these resources do not automatically generate sustainability outcomes. Resilience capability acts as an adaptive mechanism that enables CBTEs to anticipate risks, respond to disruptions, and transform supply chain resources into environmental, social, and economic sustainability outcomes. Specifically, proactive resilience enhances preparedness and preventive adaptation, whereas reactive resilience supports recovery and adjustment following unexpected disruptions. Recent studies similarly suggest that resilience functions as an intermediate capability linking supply chain integration with long-term sustainability and organizational adaptation [36,37].

H2a–b. *Resilience capabilities mediate the relationship between supply chain integration and sustainable development in CBTEs.*

To empirically test the proposed hypotheses, resilience capabilities are broken down into proactive resilience and reactive resilience capability. Meanwhile, three aspects of sustainability are examined: environmental, social, and economic sustainability.

3.2.3. Supply Chain Integration and Sustainable Development

Supply chain integration also contributes to economic, social, and environmental sustainability. Through effective integration, CBTEs can better balance economic performance, environmental responsibility, and social well-being, which are essential dimensions of sustainable development. Existing works indicate that supply chain integration improves firms' environmental performance, stakeholder relationships, and long-term competitiveness by enhancing coordination, reducing operational inefficiencies, and supporting sustainable value creation [35,38]. Consequently, beyond its indirect influence through resilience capabilities, supply chain integration is also expected to exert direct positive effects on sustainable development. DCT suggests that firms capable of integrating resources, coordinating stakeholders, and continuously reconfiguring supply chain activities are better positioned to create long-term environmental, social, and economic value.

H3a–d. *Supply chain integration dimensions influence sustainable development in CBTEs.*

The proposed framework is presented in Figure 1. Proposed conceptual framework illustrating the direct effects of supply chain integration on resilience capabilities (H1a–d) and sustainable development (H3a–d), together with the mediating role of resilience capabilities in the relationship between supply chain integration and sustainable development (H2a–b).

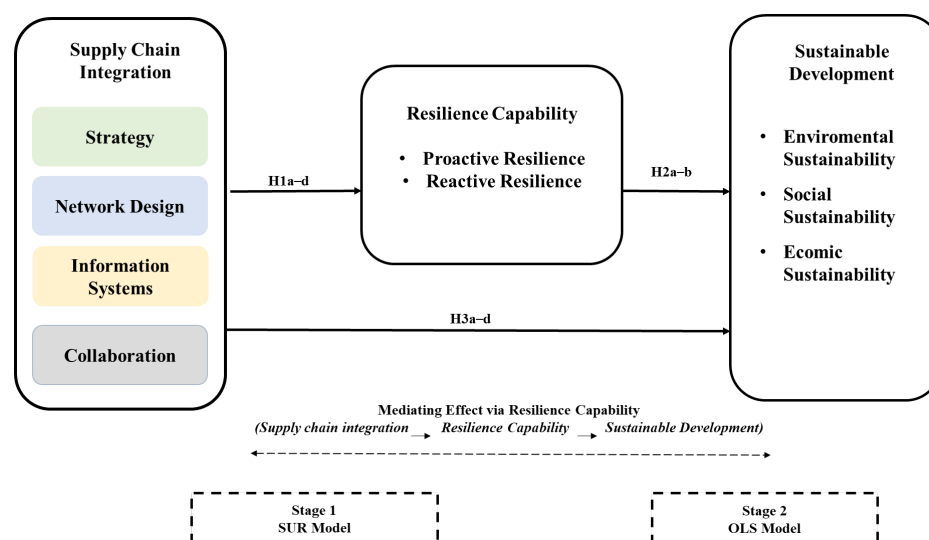


Figure 1. Conceptual framework.

4. Methods

4.1. Sampling and Data Collection

Following the COVID-19 pandemic, Vietnam's tourism sector experienced a strong recovery, with community-based tourism emerging as a key development orientation associated with sustainable development, cultural preservation, and the improvement of local livelihoods. In 2024, the Ministry of Culture, Sports and Tourism of Vietnam issued by the Community-Based Tourism Development Project under Decision No. 3222/QĐ-BVHTTDL to promote community tourism in a more professional, sustainable, and internationally integrated manner. Current policies and development strategies also emphasize enhancing adaptability and strengthening resilience against economic, environmental, and public health shocks in the context of global change. Community-based tourism models in Vietnam have gradually shifted from spontaneous development toward value-chain integration, digital technology adoption, and improved visitor experiences.

To optimize data collection from CBTEs and encourage their participation, the study employed a multistage approach. Initially, the study focused on three key regions including the Northern mountainous region (Ha Giang and Lang Son), the Central Highlands region (Dak Lak), and the Mekong Delta region (Dong Thap and An Giang), as these regions are among the most developed community-based tourism destinations and play an important role in promoting local livelihoods, cultural preservation, and sustainable tourism development. In addition, these regions were selected because they represent three major community-based tourism clusters in Vietnam and exhibit substantial diversity in terms of geographical conditions, ethnic composition, tourism products, and levels of tourism development. Consequently, the selected regions provide an appropriate setting for examining supply chain integration, resilience capability, and sustainable development across different community-based tourism contexts.

Subsequently, the study simple randomly sampled registered CBTEs from comprehensive lists provided by local authorities in each area, resulting in the selection of 256 CBTEs. These selected enterprises had been operating for at least five years and employed at least

5 individuals. These criteria were applied to ensure that the selected CBTEs had sufficient organizational maturity, operational experience, and managerial capacity to engage in supply chain integration activities and develop resilience capabilities. Local authorities facilitated interviews at the district-level People's Committee offices, where CBTEs were categorized into local entrepreneur-owned enterprises and external entrepreneur-owned enterprises. Face-to-face interviews were conducted to gather information on the impact of supply chain integration on CBTE resilience. The final sample comprised 256 interviews, addressing questions related to resilience, supply chain integration and the sustainable development of CBTEs. To ensure that the sample size was adequate for the proposed regression analyses, a post hoc statistical power analysis was conducted using GPower 3.1 [39]. Assuming a medium effect size ($f^2 = 0.15$), a significance level (α) of 0.05, a statistical power of 0.80, and 13 predictors, the required minimum sample size was 131 observations [40]. Since the final sample comprised 256 CBTEs, the sample size exceeded the recommended threshold, indicating adequate statistical power to detect the hypothesized relationships. While the data were collected from selected regions, these locations represent major community-based tourism destinations in Vietnam and provide substantial variation in tourism development conditions, cultural characteristics, and stakeholder structures. Although local authorities assisted in identifying registered CBTEs and facilitating interviews, respondents were randomly selected from the sampling frame and participation was voluntary. Therefore, the risk of selection bias was reduced, although it cannot be completely eliminated.

Data were collected using a structured questionnaire administered through face-to-face interviews with owners or managers of CBTEs. The questionnaire was developed based on established scales from previous studies on supply chain integration, resilience, and sustainable development and was adapted to the context of community-based tourism enterprises in Vietnam. Prior to the main survey, the questionnaire was reviewed by tourism experts and pilot-tested with a small group of CBTE managers to ensure clarity, relevance, and content validity. Face-to-face interviews were selected to improve response quality, facilitate clarification of survey items, and reduce the risk of missing data, particularly in rural and ethnic minority areas where respondents may have different levels of familiarity with survey instruments.

4.2. Empirical Model and Analytical Procedures

4.2.1. Empirical Model

To examine the effects of supply chain integration on sustainable development through resilience capabilities in community-based tourism enterprises, this study employs a two-stage analytical framework combining SUR and OLS models. Although Structural Equation Modeling (SEM) is widely used to simultaneously estimate latent-variable measurement and structural models, it was not adopted because the first-stage analysis models proactive and reactive resilience as two correlated dependent variables, making SUR more appropriate for accounting for cross-equation error correlations. In the second stage, OLS regression is applied to estimate the effects of supply chain integration and resilience capabilities on three continuous sustainability dimensions. Consequently, the SUR–OLS framework is more consistent with the objectives and empirical structure of the present study than SEM [41].

In the first stage, the study investigates the impacts of supply chain integration on proactive resilience capability and reactive resilience capability. Although these two dimensions jointly represent organizational resilience, they capture conceptually distinct adaptive capabilities. Proactive resilience reflects firms' abilities to anticipate risks and prepare preventive actions before disruptions occur, whereas reactive resilience reflects firms' abilities to respond, recover, and adapt following disruptions. Because these resilience dimensions

may respond differently to supply chain integration, they are modeled as separate dependent variables. The SUR model is employed to estimate the two equations simultaneously while accounting for potential cross-equation error correlations. The general form of the regression model is expressed as follows:

$$Y = \alpha_i + \beta_i X_i + \varepsilon_i \quad (1)$$

where (Y) represents the dependent variable, (X) denotes a vector of explanatory variables, α_i is the intercept term, β_i represents the estimated coefficients, and ε_i is the stochastic disturbance term. Accordingly, the first-stage SUR model is specified as follows:

$$RE_1 = \alpha_1 + \beta_1 SCI_s + \beta_2 \text{Controls} + \varepsilon_1 \quad (2)$$

$$RE_2 = \alpha_2 + \beta_3 SCI_s + \beta_4 \text{Controls} + \varepsilon_2 \quad (3)$$

The SUR approach is employed because the error terms across the resilience equations may be contemporaneously correlated. If the disturbances are correlated, separate OLS regressions become inefficient. Therefore, the Breusch–Pagan test of independence is employed to test the null hypothesis of no cross-equation correlation. A statistically significant chi-square statistic supports the appropriateness of the SUR estimation. The two resilience equations were estimated jointly using the SUR procedure. This approach accounts for potential contemporaneous correlations between the disturbance terms of proactive and reactive resilience equations and improves estimation efficiency relative to separate OLS regressions.

In the second stage, the study evaluates the impacts of supply chain integration and resilience capabilities on the three dimensions of sustainable development, including social, environmental, and economic sustainability. Three separate OLS models were estimated where each aspect of sustainable development is the dependent variable. Consistent with the triple-bottom-line perspective, these dimensions represent distinct but related outcomes and may be influenced differently by supply chain integration and resilience capabilities. Estimating separate models allows the study to identify heterogeneous effects across sustainability dimensions and avoids masking dimension-specific relationships that could be obscured in an aggregated sustainability index. Since the dependent variables are continuous composite indices, OLS regression is appropriate. Although the original questionnaire items were measured using five-point Likert scales, the empirical analysis was conducted using composite construct scores obtained by averaging multiple validated items for each construct. Following the assessment of internal consistency using Cronbach's alpha and construct validity through exploratory factor analysis (EFA), these composite scores were treated as approximately continuous variables. Previous methodological studies have demonstrated that OLS provides reliable and robust estimates for composite Likert-scale measures, particularly when multiple items are aggregated and the sample size is moderate to large [42,43]. The OLS equations are specified as follows:

$$SD_i = \alpha_3 + \beta_5 RE_1 + \beta_6 RE_2 + \beta_7 SCIs + \beta_8 \text{Controls} + \varepsilon_3 \quad (4)$$

where SD_i represents the three dimensions of sustainable development (environmental, social, and economic sustainability); RE_1 denotes proactive resilience capability; and RE_2 denotes reactive resilience capability. SCIs refers to supply chain integration dimensions (strategy, network design, information systems, and collaboration). Controls include enterprise demographic and operational characteristics, namely age, gender, education, working years, revenue, entrepreneur origin, and CBTE type. These control variables were selected based on Dynamic Capability Theory and prior empirical studies to account for firm- and

entrepreneur-specific characteristics that may influence resilience capabilities and sustainable development. Age and working years capture managerial experience and adaptive capacity; education reflects firms' ability to acquire and apply knowledge; gender accounts for potential differences in entrepreneurial behavior and leadership; revenue proxies enterprise resource availability; entrepreneur origin reflects local embeddedness and social capital; and CBTE type controls for differences in operational characteristics across tourism business models [23,29,38]. The inclusion of both supply chain integration dimensions and resilience capabilities in Equation (4) enables the assessment of the mediating role of resilience in the relationship between supply chain integration and sustainable development. Robust standard errors were not employed in the OLS estimations because the homoskedasticity assumption was formally assessed prior to model estimation. Specifically, the Breusch–Pagan/Cook–Weisberg test for heteroskedasticity was conducted for each of the three OLS models. The results showed no statistically significant evidence of heteroskedasticity in the environmental sustainability model ($\chi^2 = 1.09$, $p = 0.296$), the social sustainability model ($\chi^2 = 1.45$, $p = 0.228$), or the economic sustainability model ($\chi^2 = 0.01$, $p = 0.937$). Therefore, the null hypothesis of constant error variance could not be rejected, indicating that the homoskedasticity assumption was not violated. Accordingly, conventional standard errors were retained for statistical inference in the OLS estimations.

4.2.2. Analytical Procedures

This study employed several analytical procedures to validate the measurement scales and estimate the empirical models. First, Cronbach's alpha coefficients were calculated to evaluate the internal consistency and reliability of the constructs, including supply chain integration, resilience, and sustainable development. Second, Exploratory Factor Analysis (EFA) was conducted to examine the construct validity and dimensional structure of the variables. The Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity were used to assess sampling adequacy and the suitability of factor analysis. Third, the first-stage relationships between supply chain integration and resilience capabilities were estimated using the SUR model. This method was selected because proactive and reactive resilience are theoretically related dimensions and may exhibit correlated disturbances across equations. Finally, OLS models were applied to estimate the impacts of supply chain integration and resilience capabilities on social, environmental, and economic sustainability outcomes. Following the multidimensional perspective of sustainable development, environmental, social, and economic sustainability were modeled separately rather than combined into a single aggregate construct. This approach was adopted because different organizational capabilities may generate heterogeneous effects across sustainability dimensions. Estimating separate models enables the identification of potential differences and trade-offs in how supply chain integration and resilience capabilities influence environmental protection, social well-being, and economic performance.

The indirect effects of supply chain integration on sustainable development through resilience capabilities were subsequently estimated using the product-of-coefficients approach. To assess the statistical significance of the mediation effects, a non-parametric bootstrap procedure with 5000 resamples was performed. Bias-corrected (BC) 95% confidence intervals were estimated for all indirect effects. Following Preacher and Hayes [44], an indirect effect was considered statistically significant when the corresponding 95% BC confidence interval did not include zero. The bootstrap approach provides more reliable statistical inference because it does not assume that the sampling distribution of indirect effects follows a normal distribution. All statistical analyses were conducted using Stata statistical software (version 16.0, StataCorp LLC, College Station, TX, USA).

4.3. Measures

The study variables were developed based on the conceptual framework linking supply chain integration, resilience capability, and sustainable development in community-based tourism enterprises. These variables were classified into two groups. The first group consisted of control variables to capture demographic and enterprise-specific characteristics that may influence resilience and sustainable development outcomes among community-based tourism enterprises. Age was measured using the respondent's actual age in years. Education was measured by the total number of completed schooling years. Gender was coded as a binary variable (1 = male and 2 = female), enterprise type (1 = ecotourism, 2 = indigenous tourism, 3 = cultural tourism, 4 = village tourism, 5 = agricultural tourism, and 6 = arts and crafts tourism). Geographical location was coded as follows 1 = Mekong Delta region, 2 = Central Highlands region, and 3 = Northern mountainous region. Working years were measured by the number of years since the enterprise was established. Monthly revenue was measured as an ordinal variable (1 = less than 100 million VND, 2 = from 100 to 500 million VND, 3 = from 500 to 1000 million VND, and 4 = more than 1000 million VND). Entrepreneur origin reflects whether the entrepreneur possesses local social and cultural embeddedness within the tourism destination and was coded as 1 = local entrepreneur and 2 = external entrepreneur. These control variables were incorporated into the empirical models to improve estimation robustness and reduce potential omitted variable bias in Table 1a. The second group comprised the principal research constructs derived from the conceptual framework, namely supply chain integration, resilience capability, and sustainable development. Supply chain integration was operationalized through four dimensions (strategy, network design, information systems, and collaboration), resilience capability through two dimensions (proactive resilience capability and reactive resilience capability), and sustainable development through three dimensions (environmental, social, and economic sustainability). Descriptive statistics for these constructs are reported in Table 1b.

The measurement scales were adapted from established studies in the supply chain management, resilience, and sustainability literature. Supply chain integration dimensions were adapted from [12,15]. Resilience capability scales were adapted from [3,23,45]. Sustainable development dimensions were adapted from [29,46]. All items were initially developed in English and subsequently translated into Vietnamese using a back-translation procedure. Because these instruments were originally developed in different institutional contexts, the wording of several items was carefully adapted to reflect the operational characteristics of Vietnamese community-based tourism enterprises while preserving the conceptual meaning of the original constructs. The English questionnaire was translated into Vietnamese using a back-translation procedure. Subsequently, three academic experts in tourism management and supply chain research together with experienced CBTE managers reviewed the questionnaire to evaluate content relevance, clarity, and contextual appropriateness. Based on their feedback, several wording adjustments were made before the pilot survey.

Prior to the main survey, the questionnaire was pilot-tested with 30 CBTE managers and tourism experts who were not included in the final survey sample to ensure clarity, contextual relevance, and content validity. Minor wording adjustments were made based on feedback received during the pilot stage. All items were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Supply chain integration was represented by four dimensions: strategy, network design, information systems, and collaboration. Resilience capability was measured through two dimensions (proactive resilience capability and reactive resilience capability) and sustainable development was assessed through three dimensions (environmental, social and economic sustainability) (Table 1b). Following the pilot study, the measurement scales were validated through

Exploratory Factor Analysis (EFA). The KMO statistic exceeded the recommended threshold of 0.70 and Bartlett's Test of Sphericity was statistically significant ($p < 0.001$), confirming the suitability of the data for factor analysis. All retained items loaded satisfactorily on their intended constructs, while Cronbach's alpha coefficients ranged from 0.739 to 0.940, indicating satisfactory internal consistency and construct reliability.

Table 1. (a) Respondent and enterprise characteristics. (b) Construct descriptive statistics.

(a)			
Variables	Definition	Mean	SD
Age	Respondent's actual age (years)	33.667	7.164
Education	Actual schooling years	15.420	1.488
Gender-female	Respondent's gender	1.624	0.485
CBEs types	Primary tourism business type	2.008	1.420
Working years	Number of years from the time the business was established	15.337	5.902
Revenue	Monthly revenue category	1.447	0.894
Entrepreneur origin	Locally embedded entrepreneurs tend to possess stronger social ties and cultural legitimacy within community-based tourism destinations	1.110	0.313
(b)			
Variables	Definition	Mean	SD
Resilience			
Proactive resilience capability	Refers to a firm's proactive resilience capability	3.353	1.002
Reactive resilience capability	Refers to a firm's reactive resilience capability	3.639	1.070
Sustainable Development			
Environmental sustainability	Refers to long-term operational strategies supporting environmental sustainability	3.616	1.000
Social sustainability	Refers to long-term operational strategies supporting social sustainability	3.537	1.067
Economic sustainability	Refers to long-term operational strategies supporting economic sustainability	3.475	1.038
Supply chain			
Strategy	Refers to a firm's strategic orientation in developing products and services, improving stakeholder communication, utilizing local resources, and sharing long-term development visions with partners and suppliers	3.612	1.036
Network design	Refers to a firm's ability to organize and coordinate operational activities, ensure timely service delivery, and provide financial and non-financial support within the supply chain network	3.610	1.009
Information systems	Refers to a firm's use of information systems to reduce operational complexity, lower business costs and time, and identify new market opportunities	3.765	0.955
Collaboration	Refers to a firm's cooperation and information sharing with customers, suppliers, and stakeholders to improve forecasting, operational coordination, and mutual benefits within the supply chain	3.631	1.007

Table 2 indicates satisfactory reliability for all measurement dimensions. Cronbach's alpha values exceeded the recommended threshold of 0.70, ranging from 0.739 to 0.940. Information systems reported the highest reliability (0.940), while all resilience and sustainable development dimensions also demonstrated acceptable internal consistency. These results confirm the adequacy of the measurement scales for further analysis.

Table 2. Measurement Items.

Construct	Dimension	Items	Cronbach's α	Example Items	Source
Supply Chain Integration	Strategy	4	0.903	The CBTE has strategic coordination and long-term planning within the supply chain.	[11,12]
	Network design	4	0.913	The CBTE effectively organizes and coordinates network and distribution activities with supply chain partners.	[12,13]
	Information systems	4	0.940	The CBTE integrates information and operational data across supply chain activities.	[10,14,15]
	Collaboration	5	0.842	The CBTE actively collaborates and shares information with supply chain stakeholders.	[9,10,16]
Resilience	Proactive resilience capability	3	0.886	The CBTE proactively identifies and prepares for potential supply chain disruptions.	[3,23,24]
	Reactive resilience capability	3	0.805	The CBTE rapidly responds and adapts to unexpected supply chain disruptions.	[23,24]
Sustainable Development	Environmental sustainability	4	0.747	The CBTE reduces environmental impacts through sustainable operational practices.	[14,29,33]
	Social sustainability	4	0.804	The CBTE contributes positively to local communities and stakeholder well-being.	[1,17,29]
	Economic sustainability	4	0.739	The CBTE maintains long-term economic growth and financial performance.	[29,30]

Because all variables were collected through a single survey instrument, common method bias (CMB) may be a concern. Following Harman's single-factor test, all measurement items were entered into an unrotated exploratory factor analysis. The first factor explained 38.921% of the total variance, which was below the recommended threshold of 50%. Therefore, common method bias was unlikely to pose a serious threat to the validity of the findings. Nevertheless, as the study relied on self-reported data, the possibility of residual common method bias cannot be entirely excluded. This limitation is inherent in studies relying on self-reported perceptual data collected from single respondents, despite the procedural and statistical remedies adopted to mitigate common method bias.

5. Results

5.1. Reliability and Validity of Measures

The survey results indicate that women accounted for the majority of respondents among the surveyed CBTEs, and an average age of 33.667 years. The CBTEs had been operating for an average of 15.337 years, indicating relatively mature community-based tourism businesses. Ecotourism and indigenous tourism were the dominant tourism activities among the sampled enterprises (2.008). The average educational attainment of respondents reached 15.420 years of schooling, suggesting a relatively well-educated managerial group. Regarding business performance, most CBTEs were concentrated in the lower and middle revenue categories (1.447), reflecting the small- and medium-scale nature of community-based tourism enterprises in rural Vietnam. These characteristics indicate that the sampled CBTEs possess substantial operational experience while continuing to face resource constraints commonly observed among rural tourism enterprises in developing economies.

The exploratory factor analysis (EFA) results further support the construct validity of the measurement scales. All factor loadings exceeded the recommended threshold of 0.70, ranging from 0.736 to 0.944, indicating that the observed variables loaded strongly on their respective constructs. The Kaiser–Meyer–Olkin (KMO) value of 0.756 exceeded the minimum acceptable level of 0.50, confirming the adequacy of the sample for factor analysis. In addition, Bartlett’s Test of Sphericity was statistically significant (Sig. = 0.000), indicating sufficient correlations among the variables to justify factor extraction. Together with the Cronbach’s alpha results, these findings confirm the reliability and construct validity of the measurement scales, providing a robust foundation for subsequent econometric analyses using the SUR and OLS models (Table 3).

Table 3. Exploratory Factor Analysis of the Study Constructs.

Variables	Loading
Supply Chain Integration	
Strategy	0.817
Network design	0.812
Information systems	0.758
Collaboration	0.736
Resilience Capability	
Proactive resilience capability	0.846
Reactive resilience capability	0.846
Sustainable Development	
Environmental sustainability	0.944
Social sustainability	0.875
Economic sustainability	0.926

5.2. Impact of the Supply Chain on the Resilience of CBTEs

Table 4 reports the estimation results of the two SUR models, namely Model 1 (Proactive Resilience) and Model 2 (Reactive Resilience). The two models exhibit substantial explanatory power, with R-squared values of 0.826 and 0.853, respectively. The SUR estimation was performed jointly because proactive and reactive resilience capabilities may be influenced by common unobserved factors. The Breusch–Pagan test rejected the null hypothesis of independent residuals ($p = 0.004$), indicating contemporaneous correlation between the two equations. The estimated residual correlation coefficient was 0.294, suggesting a statistically significant but moderate correlation between the error terms and supporting the use of the SUR model. Joint estimation therefore improves efficiency relative

to separate OLS estimations and accounts for cross-equation error correlations. Several organizational and supply chain integration dimensions, including strategy, network design, information systems, collaboration, and selected control variables, show statistically significant effects, thereby supporting the empirical validity of the research framework.

Table 4. Impact of supply chain on resilience of CBTEs.

Variables	Model 1			Model 2		
	Proactive Resilience			Reactive Resilience		
	Coefficient	SE	p-Value	Coefficient	SE	p-Value
Age	−0.004	0.002	0.032	−0.004	0.004	0.375
Gender	−0.093	0.047	0.047	−0.004	0.063	0.947
Education	0.009	0.004	0.047	−0.021	0.019	0.273
Working years	−0.007	0.004	0.087	0.001	0.004	0.862
Revenue	0.003	0.001	0.038	−0.076	0.034	0.023
Entrepreneur origin	0.111	0.041	0.007	−0.025	0.097	0.797
CBTE type	−0.023	0.008	0.002	−0.000	0.021	0.990
Strategy	0.024	0.061	0.695	0.511	0.131	0.000
Network design	0.135	0.064	0.036	0.088	0.044	0.046
Information systems	0.102	0.039	0.009	0.139	0.058	0.016
Collaboration	0.189	0.048	0.000	−0.138	0.051	0.007
SUR Diagnostics						
Statistic				Value		
Observations				256		
Residual correlation (ρ)				0.294		
Breusch–Pagan test of independence				p = 0.004		
Residual Correlation Matrix						
				Model 2		Model 1
Model 1				1.000		0.294
Model 2				0.294		1.000

The SUR results show that the highest positive effect is observed between strategy and reactive resilience capability (0.511). This finding highlights the critical role of strategic planning and long-term orientation in enabling CBTEs to adapt and recover from unexpected shocks. Another notable relationship is the positive effect of collaboration and social capital on proactive resilience capability (0.189), indicating that trust-based relationships and stakeholder cooperation strengthen preparedness and adaptive capacity before disruptions occur. Information systems also exert significant positive effects on both proactive resilience (0.102) and reactive resilience (0.139), underscoring the importance of digital information exchange in supporting organizational resilience.

However, the low relationship among the supply chain integration dimensions is the effect of strategy on proactive resilience, which is statistically insignificant (0.024). In addition, several demographic characteristics including age, gender, education, entrepreneur origin, business type, and working years do not significantly influence reactive resilience capability. A particularly noteworthy result is that collaboration and social capital, despite its positive contribution to proactive resilience, exhibit a significant negative association with reactive resilience (−0.138). CBTEs in Vietnam operate in remote mountainous and

economically disadvantaged areas where tourism activities rely heavily on coordination among households, community groups, local authorities, and supporting organizations. While the collaboration enhances preparedness and information sharing before disruptions occur, extensive dependence on multiple stakeholders may slow decision-making and resource mobilization during crises, thereby reducing the ability to respond rapidly to unexpected shocks. Nevertheless, this finding should be interpreted with caution because it may reflect the specific institutional, geographical, and governance characteristics of Vietnamese CBTEs rather than a universal relationship. In addition, the observed negative association may also be influenced by context-specific measurement or sample characteristics. Therefore, further research using longitudinal data, qualitative interviews, and comparative cross-country studies is needed to determine whether this relationship represents a context-dependent phenomenon or a more generalizable theoretical mechanism.

5.3. Impact of Supply Chain Factors, Resilience Factors on the Sustainable Development of CBTEs

The estimation results of the three OLS models in Table 5 demonstrate the robustness and reliability of the empirical framework and provide statistical support for examining the relationships among supply chain integration, resilience capabilities, and sustainable development in CBTEs. The findings indicate that resilience factors and institutional-related variables influence sustainability performance, although the magnitude and direction of effects vary across the three models. In particular, both proactive and reactive resilience capabilities exhibit positive and statistically significant effects in all models.

Table 5. Impact of supply chain, resilience on sustainable development of CBTEs.

Variables	Model 1 Environment Sustainability			Model 2 Social Sustainability			Model 3 Economic Sustainability		
	Coefficient	SE	p-Value	Coefficient	SE	p-Value	Coefficient	SE	p-Value
Age	0.012	0.004	0.007	0.005	0.002	0.025	0.004	0.004	0.390
Gender	0.042	0.020	0.041	0.019	0.007	0.008	0.197	0.070	0.005
Education	−0.010	0.021	0.622	−0.050	0.021	0.016	−0.012	0.007	0.070
Working year	−0.012	0.004	0.003	−0.002	0.001	0.046	−0.004	0.003	0.216
Revenue	0.090	0.036	0.012	−0.035	0.016	0.023	0.021	0.011	0.060
Entrepreneur origin	−0.384	0.098	0.000	−0.340	0.104	0.001	−0.245	0.104	0.018
CBTEs types	0.017	0.023	0.468	−0.009	0.005	0.096	0.003	0.002	0.084
Proactive resilience capability	0.261	0.067	0.000	0.276	0.071	0.000	0.314	0.080	0.000
Reactive resilience capability	0.473	0.121	0.000	0.181	0.061	0.003	0.061	0.027	0.025
Strategy	−0.148	0.071	0.037	0.135	0.068	0.046	0.166	0.072	0.021
Network design	0.328	0.084	0.000	0.261	0.067	0.000	0.088	0.034	0.009
Information systems	−0.045	0.022	0.043	0.152	0.062	0.014	0.139	0.063	0.027
Collaboration	0.151	0.056	0.007	0.019	0.009	0.033	0.249	0.064	0.000
_cons	0.080	0.029	0.006	0.835	0.417	0.045	0.229	0.096	0.017
N	256			256			256		
R ²	0.838			0.834			0.819		
Adjusted R ²	0.829			0.825			0.810		
F-statistic	95.57			93.26			84.02		
Prob > F	0.000			0.000			0.000		
Root MSE	0.447			0.446			0.453		

The results demonstrate that both proactive and reactive resilience capability positively influence environmental, social, and economic sustainability. Specifically, proactive resilience exerts positive effects on environmental sustainability (0.261), social sustainability (0.276), and economic sustainability (0.314). Similarly, reactive resilience positively affects environmental sustainability (0.473), social sustainability (0.181), and economic sustainability (0.061). These findings confirm that enhanced resilience capabilities contribute significantly to the sustainable development of CBTEs across environmental, social, and economic dimensions. Among the supply chain integration factors, network design consistently exhibits positive and statistically significant effects across all three sustainability dimensions. Information systems and collaboration also contribute significantly to sustainability performance, although their effects differ across environmental, social, and economic outcomes (Table 5).

The strongest positive relationship is observed between reactive resilience capability and environmental sustainability (0.473), indicating that enterprises with stronger adaptive and recovery capabilities are more likely to achieve environmental sustainability objectives. Another notable relationship is the positive effect of network design on environmental sustainability (0.328), followed by its effects on social sustainability (0.261) and economic sustainability (0.088). Furthermore, proactive resilience capability demonstrates a particularly strong influence on economic sustainability (0.314), highlighting the importance of preparedness and long-term planning for maintaining sustainable economic performance. In addition, collaboration and social capital also emerge as important determinants, especially for economic sustainability (0.249), suggesting that stakeholder trust, cooperation, and community engagement enhance long-term business viability. In addition, entrepreneur origin shows relatively large coefficients across all three models, indicating that locally embedded entrepreneurs may possess advantages that contribute to sustainability performance.

A notable finding is that information systems negatively affect environmental sustainability (-0.045), despite showing positive effects on social and economic sustainability. Likewise, strategy exhibits a negative association with environmental sustainability (-0.148) but positive relationships with social (0.135) and economic sustainability (0.166). Additional robustness analyses were conducted by estimating quadratic specifications for strategy and information systems to examine potential nonlinear relationships with environmental sustainability. The squared terms of strategy (0.102) and information systems (0.135) were statistically insignificant, indicating no evidence of curvilinear relationships. The linear specification adopted in the main analysis was considered appropriate. These contrasting results suggest that certain dimensions of supply chain integration contribute differently across the three pillars of sustainability, reinforcing the multidimensional nature of sustainable development. Previous studies generally report that strategic planning and digital information systems improve environmental performance by enhancing resource utilization, operational efficiency, environmental monitoring, and information transparency [16,38]. However, the present findings indicate that these capabilities do not necessarily generate immediate environmental benefits in community-based tourism enterprises (CBTEs). From the perspective of Dynamic Capability Theory, organizational capabilities create sustainable value only when firms are able to effectively sense opportunities, seize them through coordinated actions, and continuously reconfigure resources in response to changing environmental conditions [22,23].

In resource-constrained CBTEs, strategic planning and digital information systems are often introduced primarily to strengthen destination promotion, visitor attraction, operational coordination, and market expansion rather than environmental management. Consequently, these investments may initially increase infrastructure development, transportation activities, energy consumption, and operational complexity, creating temporary

environmental trade-offs before longer-term sustainability benefits emerge. This interpretation is consistent with recent studies suggesting that digital transformation and strategic capability development may produce heterogeneous sustainability outcomes depending on organizational maturity, institutional conditions, implementation capacity, and resource availability [36,38]. The qualitative interviews further support this interpretation. Several CBTE managers explained that their first priority when adopting digital technologies was to increase tourist arrivals and improve business visibility rather than reduce environmental impacts. As one tourism entrepreneur in Ha Giang noted, “Our investment in online booking platforms and digital promotion has brought more visitors, but it has also increased waste generation and pressure on local infrastructure because environmental management has not kept pace.” Similarly, a community leader in An Giang stated that “Strategic planning mainly focuses on attracting tourists and creating jobs. Environmental protection usually comes later, once the business becomes financially stable.” These qualitative insights suggest that the observed negative relationships may reflect transitional implementation costs rather than the long-term ineffectiveness of strategic planning or information systems.

Nevertheless, these findings may also reflect the institutional, operational, and geographical characteristics of Vietnamese CBTEs or, to some extent, the specific characteristics of the study sample and the perceptual nature of the survey measures. These findings suggest that public support for digital transformation and strategic planning in CBTEs should be accompanied by dedicated environmental governance measures. Rather than promoting digitalization solely as a tool for business expansion, policymakers should incorporate environmental management requirements, green certification schemes, financial incentives for green technologies, and sustainability performance indicators into tourism development programs. Capacity-building initiatives and technical assistance should also be provided to help CBTEs integrate environmental objectives into their digital transformation strategies. Such policy interventions would enable CBTEs in Vietnam to capture the economic and social benefits of digital transformation while minimizing short-term environmental trade-offs and promoting more balanced sustainable development.

From a managerial perspective, the findings highlight important practical trade-offs between short-term business expansion and long-term environmental sustainability. While investments in strategic planning and digital information systems can strengthen market competitiveness, improve visitor management, and enhance social and economic sustainability, they may also increase infrastructure demand, energy consumption, transportation activities, and environmental pressures during the early stages of implementation. Managers should therefore avoid treating digital transformation solely as a growth strategy. Instead, investments in online marketing, visitor management systems, and destination promotion should be implemented alongside carrying-capacity assessments, resource-efficient operations, community-based waste management, environmental monitoring, and green infrastructure development. Integrating environmental objectives into strategic planning from the outset would enable CBTE managers to balance economic growth with environmental protection, thereby reducing the temporary trade-offs identified in this study and improving the long-term sustainability of community-based tourism destinations.

In addition, Table 6 shows the results of indirect effects calculated as the product of coefficients obtained from the first-stage SUR estimations and the second-stage OLS estimations [47].

Table 6 indicates that proactive resilience consistently mediates the relationship between supply chain integration and the three dimensions of sustainable development, as all corresponding confidence intervals exclude zero, confirming statistically significant mediation effects. Through proactive resilience, collaboration exhibits the strongest indirect

effects across the three sustainability dimensions, with indirect effects of 0.049 on environmental sustainability, 0.052 on social sustainability, and 0.059 on economic sustainability. Information systems and network design also demonstrate positive indirect effects through proactive resilience, ranging from 0.027 to 0.042.

Table 6. Effects of Supply Chain Integration on Sustainable Development through Resilience Capability.

Indirect Path	Environmental Sustainability			Social Sustainability			Economic Sustainability		
	Effect	Boot SE	95% BC CI	Effect	Boot SE	95% BC CI	Effect	Boot SE	95% BC CI
Network Design → Proactive Resilience → Sustainability	0.035	0.039	[0.021, 0.168]	0.037	0.035	[0.023, 0.164]	0.042	0.044	[0.029, 0.194]
Information Systems → Proactive Resilience → Sustainability	0.027	0.022	[0.008, 0.096]	0.028	0.026	[0.008, 0.105]	0.032	0.026	[0.004, 0.101]
Collaboration → Proactive Resilience → Sustainability	0.049	0.026	[0.031, 0.137]	0.052	0.028	[0.031, 0.145]	0.059	0.031	[0.038, 0.158]
Strategy → Reactive Resilience → Sustainability	0.242	0.068	[0.137, 0.413]	0.092	0.041	[0.030, 0.185]	0.031	0.034	[−0.030, 0.106]
Network Design → Reactive Resilience → Sustainability	0.042	0.040	[0.010, 0.110]	0.016	0.024	[−0.012, 0.076]	0.005	0.021	[−0.017, 0.053]
Information Systems → Reactive Resilience → Sustainability	0.066	0.032	[0.016, 0.137]	0.025	0.019	[0.006, 0.068]	0.008	0.012	[−0.007, 0.041]
Collaboration → Reactive Resilience → Sustainability	−0.065	0.019	[−0.104, −0.031]	−0.025	0.008	[−0.041, −0.010]	−0.008	0.005	[−0.019, 0.001]

Among the indirect effects through reactive resilience, strategy → reactive resilience → environmental sustainability exhibited the largest positive indirect effect (0.242), suggesting that reactive resilience represents an important transmission mechanism linking strategic integration with environmental sustainability. In contrast, network design → reactive resilience → economic sustainability produced only a negligible and statistically insignificant indirect effect (0.005), indicating a limited mediating role. Notably, collaboration exhibited negative indirect effects through reactive resilience across all three sustainability dimensions (−0.065 for environmental sustainability, −0.025 for social sustainability, and −0.008 for economic sustainability). However, statistically significant negative mediation effects were confirmed only for environmental and social sustainability, whereas the effect on economic sustainability was not statistically significant. These findings suggest that although collaboration strengthens proactive resilience, excessive reliance on external coordination during disruption responses may reduce flexibility and slow immediate decision-making processes, thereby creating potential trade-offs in reactive resilience mechanisms. The effects of both proactive and reactive resilience capabilities on sustainability outcomes, together with the indirect effects reported in Table 6, confirm that resilience serves as a mediating mechanism linking supply chain integration with sustainable development in CBTEs. Because several supply chain integration dimensions remain statistically significant after resilience variables are included in the OLS models, the findings suggest partial rather than full mediation. Importantly, proactive resilience provides a more consistent pathway connecting supply chain integration and sustainability outcomes, whereas reactive resilience demonstrates more differentiated effects depending on specific integration dimensions and sustainability objectives.

Overall, the empirical findings support the proposed hypotheses. The SUR results confirm that supply chain integration dimensions significantly influence resilience capabilities (H1a–d), while the bootstrap indirect effects provide evidence for the mediating role of resilience (H2a–b). Furthermore, the OLS results demonstrate significant direct effects of supply chain integration on sustainability outcomes, supporting H3a–d (Figure 2).

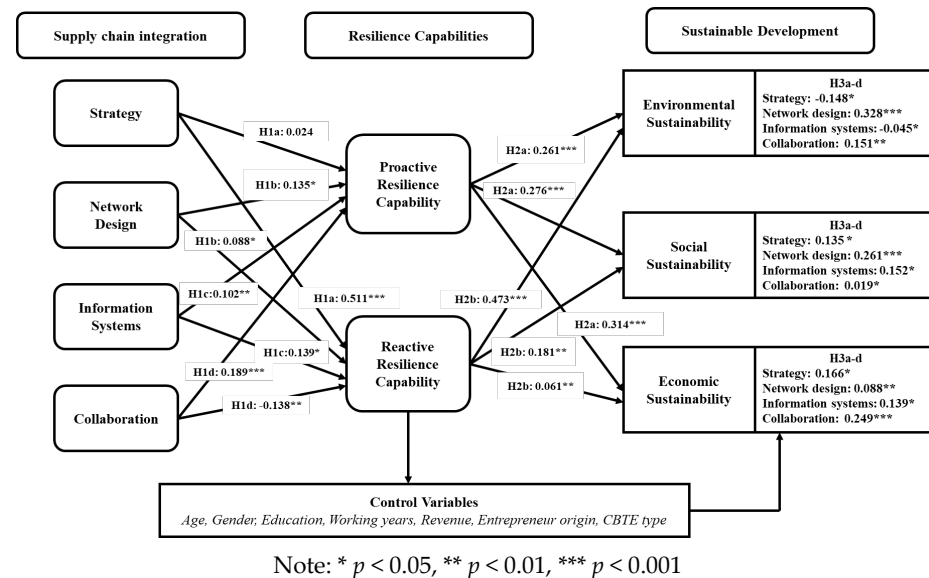


Figure 2. Empirically validated conceptual framework.

6. Discussion

The findings provide the strong empirical evidence that supply chain integration enhances both proactive and reactive resilience capability among CBTEs in rural Vietnam. The SUR results indicate that network design and information systems positively influence both dimensions of resilience, while collaboration exerts the strongest positive effect on proactive resilience. The empirical findings largely support the proposed conceptual framework. Most hypothesized relationships between supply chain integration, resilience capabilities, and sustainability outcomes were confirmed, although several unexpected negative relationships were identified, suggesting that the effects of supply chain integration may vary across sustainability dimensions and resilience mechanisms.

Strategy exhibits the strongest positive effect on reactive resilience capability (0.511), whereas network design and information systems positively influence both proactive and reactive resilience. These findings suggest that strategic orientation, stakeholder connectivity, and information-sharing mechanisms constitute the primary supply chain integration dimensions through which CBTEs strengthen their resilience in uncertain environments. CBTEs are typically small-scale enterprises operating in remote or mountainous areas where tourism activities depend heavily on local communities, natural resources, and external visitor flows in the context of rural Vietnam. As a result, these enterprises are particularly vulnerable to disruptions such as natural disasters, extreme weather events, pandemics, transportation interruptions, and fluctuations in tourism demand. The strong effect of strategy on reactive resilience suggests that CBTEs with clear contingency plans, diversified tourism products, and adaptive management practices are better able to recover from shocks and maintain operations during periods of uncertainty.

The positive effects of network design on both resilience dimensions suggest that CBTEs benefit significantly from stronger connections with suppliers, local authorities, tourism associations, and community stakeholders. This result is consistent with previous studies emphasizing that collaborative networks facilitate knowledge sharing, resource

mobilization, and collective responses to disruptions, thereby strengthening organizational resilience [28]. Similarly, the significant role of information systems confirms that digital technologies and information-sharing mechanisms improve the ability of tourism enterprises to anticipate risks, monitor market changes, and respond effectively to emerging challenges. These findings align with recent Industry 5.0 discussions highlighting the role of digitalization in improving resilience while maintaining human-centered and sustainable development objectives [48]. This finding is particularly relevant for CBTEs in destinations such as Sa Pa, Ha Giang, Dak Lak, or the Mekong Delta, where tourism services are often fragmented among homestays, local guides, transport providers, handicraft producers, and community organizations. Strong stakeholder networks enable these actors to coordinate tourism activities, share market information, jointly promote destinations, and mobilize resources during crises. Likewise, the growing use of social media platforms, online booking systems, and digital communication tools allows rural tourism enterprises to maintain customer relationships, access broader markets, and quickly adjust their operations when visitor demand changes unexpectedly.

Among the control variables, age and gender exhibit negative effects on proactive resilience capability. Age is negatively associated with proactive resilience (-0.004), suggesting that younger entrepreneurs may be more willing to adopt digital technologies, innovative management practices, and preventive risk-management measures before disruptions occur. Similarly, gender shows a negative coefficient (-0.093), indicating that female entrepreneurs reported slightly lower levels of proactive resilience than their male counterparts. This finding may reflect the fact that women working in CBTEs in rural and ethnic minority areas often face greater constraints in accessing financial resources, training opportunities, and business networks. However, neither age nor gender exerts a significant effect on reactive resilience capability, suggesting that these demographic characteristics are less relevant once disruptions have occurred and enterprises focus on recovery and adaptation.

In addition, the OLS results further demonstrate that both proactive and reactive resilience may contribute positively to environmental, social, and economic sustainability. Notably, reactive resilience capability exerts the strongest influence on environmental sustainability (0.473), while proactive resilience capability demonstrates relatively balanced effects across environmental (0.261), social (0.276), and economic sustainability (0.314). This finding suggests that the ability to respond, recover, and adapt to unexpected disruptions is particularly important for environmental sustainability outcomes, whereas preparedness and anticipation capabilities contribute more evenly across the three ESG dimensions.

The relationship between reactive resilience and environmental sustainability can be explained by the fact that many CBTEs in rural Vietnam rely directly on natural assets such as forests, mountains, rivers, rice terraces, caves, and biodiversity landscapes. When environmental disturbances occur, including floods, landslides, droughts, or pollution incidents, these enterprises with stronger adaptive capabilities can implement corrective measures more rapidly, restore tourism activities, and reduce long-term environmental degradation. Therefore, resilience is not only a business capability but also a mechanism for protecting the ecological resources upon which community-based tourism depends. These findings suggest that resilience should not be viewed merely as a crisis-management capability but rather as a strategic mechanism that enables enterprises to achieve long-term ESG objectives. This conclusion is consistent with recent resilience literature arguing that resilient organizations are better positioned to manage environmental challenges, maintain stakeholder relationships, and sustain economic performance simultaneously [3,23].

A result concerning the role of entrepreneur origin shows that locally embedded entrepreneurs demonstrate significantly stronger sustainability outcomes than external

entrepreneurs. This result may reflect the stronger social legitimacy, cultural attachment, and community trust enjoyed by local entrepreneurs. In community-based tourism destinations, local entrepreneurs are often more motivated to preserve indigenous culture, protect environmental resources, and ensure equitable benefit-sharing among local residents. Such findings are particularly relevant for ethnic minority communities in rural Vietnam, where tourism development is closely linked to livelihood improvement, cultural preservation, and social inclusion. Local entrepreneurs often possess a deeper understanding of community norms, customary practices, and environmental values than outside investors. Consequently, they are more likely to encourage community participation, preserve traditional architecture and handicrafts, maintain cultural authenticity, and distribute tourism benefits more equitably among local households. These characteristics strengthen both social sustainability and long-term destination competitiveness.

Another notable finding is that network design remains positively significant across all sustainability dimensions, while collaboration exhibits its strongest effect on economic sustainability (0.249). These results indicate that collaborative relationships not only strengthen resilience but also directly contribute to sustainable economic performance and community welfare. For rural CBTEs, collaboration often takes the form of trust-based relationships among households, village leaders, cooperatives, local authorities, and tourism associations. Such relationships facilitate collective action, reduce transaction costs, improve service coordination, and create opportunities for joint marketing and product development. As a result, social capital becomes an important driver of local income generation and economic sustainability.

A finding concerns several negative relationships identified in the empirical models. Collaboration exhibits a significant negative association with reactive resilience capability. While collaboration strengthens proactive resilience by facilitating information sharing, trust building, and collective preparedness, excessive dependence on collaborative networks may reduce organizational flexibility during post-disruption responses. This finding is consistent with the concept of network lock-in and collaboration rigidity, which suggests that firms embedded in dense and highly interdependent networks may experience slower decision-making and reduced adaptive capacity when rapid responses are required [49]. In the context of CBTEs, strong reliance on community consensus and stakeholder coordination may delay operational adjustments during crises, thereby weakening reactive resilience.

In addition, strategy demonstrates a negative relationship with environmental sustainability despite its positive effects on social and economic sustainability. Strategic development in Vietnamese CBTEs often prioritizes increasing tourist arrivals, expanding tourism services, and improving local incomes, whereas environmental sustainability is evaluated based on reducing environmental pressures and resource consumption. Consequently, growth-oriented strategies may improve economic and social outcomes more than they generate immediate environmental benefits. Information systems also show a small but significant negative effect on environmental sustainability. Although digital technologies improve communication, market access, and operational efficiency, they may simultaneously increase electricity consumption, digital infrastructure requirements, and technology related resource use.

For small-scale CBTEs operating in rural areas, the environmental costs associated with digitalization may temporarily outweigh environmental benefits, particularly when renewable energy and green technology adoption remain limited. These findings highlight the multidimensional nature of sustainability and suggest that supply chain integration dimensions may generate differentiated effects across environmental, social, and economic dimensions. While the strategy and information systems dimensions primarily capture

business development, market expansion, operational efficiency, and stakeholder connectivity, environmental sustainability is measured through enterprises' abilities to reduce environmental impacts and resource consumption. Consequently, strategic initiatives and digital investments that successfully improve social and economic outcomes may not immediately generate environmental benefits. Similarly, investments in information systems may improve coordination and market access but require additional energy consumption and digital infrastructure. Therefore, the negative coefficients observed for strategy and information systems suggest the existence of short-term trade-offs between economic growth, digital transformation, and environmental sustainability in CBTEs, particularly in resource-constrained rural destinations.

In general, the findings extend the resilience and sustainable tourism literature in three important ways. First, the findings demonstrate that CBTEs represent a distinctive organizational context in which supply chain integration simultaneously supports business performance, community development, and environmental conservation under significant resource constraints. Second, the study shows that proactive and reactive resilience should not be treated as interchangeable capabilities. Instead, they influence environmental, social, and economic sustainability through different mechanisms, highlighting the multidimensional nature of organizational resilience in community-based tourism. Finally, the findings contribute context-specific evidence from rural Vietnam, where community participation, local governance, and destination-level collaboration play a central role in achieving sustainable tourism development.

6.1. Theoretical Contributions

This study contributes to Dynamic Capability Theory by providing empirical evidence that supply chain integration functions as an organizational capability that enhances both proactive and reactive resilience capabilities. While previous studies have primarily examined resilience in manufacturing and logistics contexts, this research provides empirical evidence from CBTEs operating in rural areas of a developing country. This contribution is useful because CBTEs differ substantially from manufacturing firms. Their operations depend heavily on community participation, cultural resources, and environmental assets, making resilience a socially embedded and place-based capability rather than merely an operational capability. Consequently, the findings broaden the applicability of Dynamic Capability Theory to tourism enterprises operating in resource-constrained rural environments.

Moreover, the study adds empirical support to resilience theory by conceptualizing resilience as a multidimensional construct consisting of proactive resilience capability and reactive resilience capability. This distinction advances resilience theory by showing the necessity of examining different resilience mechanisms rather than relying on an aggregated resilience construct. Furthermore, the study adds to the emerging ESG and sustainable tourism literature by empirically demonstrating that resilience functions as a mediating mechanism linking supply chain integration to environmental, social, and economic sustainability outcomes. This research provides evidence of their sequential relationship within a unified framework in the context of CBTEs. In addition, by focusing on CBTEs in rural Vietnam, the study shows how resilience contributes to sustainability in tourism systems characterized by limited resources, fragmented supply chains, and strong dependence on local communities. Accordingly, this contextual evidence enriches the sustainability literature, which has largely focused on larger tourism enterprises or developed-country settings [38,50].

Another important contribution concerns community-based tourism and entrepreneurship research. The findings also extend entrepreneurship research by highlighting the role

of locally embedded entrepreneurs as important actors in sustainable community-based tourism development. This perspective re-mains largely underexplored in existing resilience and supply chain studies. The findings further suggest that entrepreneurship in CBTEs should be understood not only through economic or managerial lenses but also through social and cultural dimensions, particularly in ethnic minority communities where local identity and community relationships strongly influence tourism development outcomes.

These findings also extend the understanding of sustainable entrepreneurship in rural contexts by demonstrating how supply chain integration and resilience capabilities support the transformation of community-based enterprises. Beyond the tourism literature, the findings also contribute to the broader discussion on agri-startups, multifunctional agriculture, and rural entrepreneurship. In many developing economies, agricultural entrepreneurship is increasingly evolving beyond traditional production activities toward diversified rural business models that integrate tourism services, cultural experiences, local food systems, and community-based value creation. From this perspective, CBTEs can be viewed as an emerging entrepreneurial pathway closely connected with agri-startup development, where agricultural resources, local knowledge, tourism innovation, and community participation are combined to promote sustainable rural transformation. Moreover, the findings highlight that supply chain integration and resilience capabilities represent important dynamic capabilities that enable these rural enterprises to adapt, diversify, and create sustainable value.

From a methodological perspective, this study contributes by integrating SUR and OLS approaches within a two-stage analytical framework. The SUR model captures the interdependence between proactive and reactive resilience capabilities, while the OLS models evaluate their subsequent effects on environmental, social, and economic sustainability. This analytical approach provides a more comprehensive understanding of the mechanisms connecting supply chain integration, resilience, and sustainable development.

6.2. Practical Contributions

The findings generate several practical implications for policymakers, tourism managers, and development organizations seeking to promote sustainable community-based tourism.

Table 7 shows the main managerial and policy implications derived from the empirical findings. These recommendations highlight the importance of integrating supply chain development, resilience-building strategies, and sustainability objectives to support the long-term development of community-based tourism enterprises. Strengthening supply chain integration should be considered a strategic priority. Investments in digital information systems, stakeholder collaboration platforms, and network-building initiatives can significantly improve resilience capabilities among CBTEs. For rural destinations in Vietnam such as Ha Giang, Lao Cai, Son La, and the Central Highlands, where many CBTEs continue to face limited market access, weak digital infrastructure, and fragmented tourism supply chains, this may include supporting community tourism cooperatives, establishing destination management organizations, improving internet connectivity, and providing digital skills training for local tourism operators. Such interventions can help small tourism enterprises overcome geographical isolation, improve access to tourism markets and enhance participation in domestic and international tourism markets.

In addition, the effects of resilience on all sustainability dimensions suggest that resilience building programs should be incorporated into tourism development policies. Local authorities and tourism agencies should provide training programs focused on risk management, adaptive planning, digital transformation, and collaborative governance to enhance both proactive and reactive resilience capabilities. Given the increasing impacts of climate change in Vietnam, resilience-building initiatives should also include disaster

preparedness, environmental risk assessment, and climate adaptation strategies tailored to local tourism destinations.

Table 7. Practical Implications for Sustainable Community-Based Tourism Development.

Findings	Practical Recommendation	Implementation Steps	Implementation Actors
Strategy, network design, and information systems enhance resilience capabilities.	Strengthen destination-level stakeholder networks and community partnerships	- Establish destination management committees, develop digital information-sharing platforms - Organize regular coordination meetings, and formalize cooperation agreements among tourism stakeholders.	Local governments, CBTE managers, tourism associations
Proactive resilience improves all sustainability dimensions	Invest in risk assessment and preparedness programs	- Conduct periodic risk assessments, develop early-warning systems - Provide resilience training, and organize emergency simulation exercises.	Local authorities, tourism departments, CBTE managers
Reactive resilience positively influences sustainability outcomes.	Develop crisis response and business continuity plans	- Prepare standard operating procedures (SOPs), establish emergency communication protocols - Create contingency funds, and regularly update business continuity plans.	CBTE managers, local authorities
Network design demonstrates consistent positive effects on resilience and sustainability.	Strong stakeholder networks facilitate resource sharing, market access, and coordinated responses to challenges.	- Build regional tourism clusters, facilitate resource-sharing mechanisms - Develop joint marketing initiatives, and improve transport and logistics coordination among CBTEs.	Tourism agencies, local governments, community organizations
Collaboration improves proactive resilience but negatively affects reactive resilience.	Avoid excessive dependence on external partners	- Diversify partnership portfolios, clarify decision-making responsibilities - Establish local emergency response teams, and strengthen internal operational capabilities.	CBTE managers, community leaders
Information systems improve resilience but may negatively affect environmental sustainability.	Promote green digitalization and energy-efficient technologies	- Adopt energy-efficient ICT infrastructure - Introduce digital visitor management systems, monitor resource consumption - Integrate environmental indicators into digital platforms.	Tourism enterprises, ICT providers, environmental agencies
Strategy negatively affects environmental sustainability while supporting other sustainability dimensions.	Growth-oriented strategies may generate short-term environmental trade-offs	- Integrate environmental objectives into strategic planning, conduct carrying-capacity assessments, - Adopt green investment criteria, and monitor environmental performance alongside financial performance.	CBTE managers, tourism authorities
Entrepreneur origin significantly influences sustainability outcomes.	Support locally embedded entrepreneurs through finance, training, and market access programs	- Provide preferential financing, entrepreneurship training, mentoring programs, local branding initiatives, and facilitate access to tourism markets.	Government agencies, financial institutions, tourism organizations

Additionally, the importance of network design highlights the need for stronger partnerships among tourism enterprises, local governments, community organizations, and supporting institutions. In practice, stronger partnerships can support the development of integrated tourism products that combine accommodation, local cuisine, cultural performances, handicrafts, agricultural experiences, and ecotourism activities, thereby increasing local value creation and reducing economic leakage from rural destinations.

In parallel, the findings regarding entrepreneur origin indicate the importance of supporting locally embedded entrepreneurs, particularly those belonging to ethnic minority

communities. Policies aimed at improving access to finance, training, digital technologies, and market opportunities for local entrepreneurs can generate broader social benefits while strengthening cultural preservation and community participation. Special attention should be given to empowering women entrepreneurs, youth entrepreneurs, and ethnic minority households, as these groups often play a central role in community-based tourism while facing greater barriers to accessing resources and market opportunities.

7. Research Conclusions and Implications

This study examines how supply chain integration influences resilience capabilities and sustainable development in community-based tourism enterprises (CBTEs) in Vietnam. Using a two-stage empirical framework combining Seemingly Unrelated Regression (SUR) and Ordinary Least Squares (OLS) models, the findings demonstrate that supply chain integration significantly contributes to both proactive and reactive resilience capabilities, which subsequently enhance environmental, social, and economic sustainability outcomes. Among the supply chain integration dimensions, network design and information systems exert consistently positive effects on resilience, while strategy shows the strongest positive influence on reactive resilience. Collaboration emerges as the most important driver of proactive resilience and contributes substantially to economic sustainability, highlighting the differentiated roles of supply chain integration dimensions in supporting sustainable development.

The findings also suggest that resilience serves as an important mechanism linking supply chain integration and sustainable development. Enterprises that strengthen stakeholder collaboration, information sharing, and network connectivity are better positioned to balance environmental protection, social inclusion, and economic growth. An unexpected finding is the negative relationship between collaboration and reactive resilience, suggesting that excessive dependence on collaborative networks may reduce organizational flexibility during periods of disruption.

Overall, the study highlights the importance of integrating supply chain and resilience-building strategies to support sustainable tourism development in resource constrained rural communities. From an ESG perspective, strengthening supply chain integration and resilience capabilities helps CBTEs to contribute to environmental protection, social inclusion, and economic prosperity. Such efforts are particularly important for improving livelihoods among ethnic minority populations and vulnerable groups while supporting the achievement of SDG 1 (No Poverty), SDG 8 (Decent Work and Economic Growth), SDG 10 (Reduced Inequalities), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land). In rural Vietnam, where community-based tourism is increasingly viewed as a pathway for sustainable rural development, the integration of supply chain, resilience, and ESG objectives can help ensure that tourism growth generates long-term benefits for local communities while preserving the cultural and environmental resources that constitute the foundation of tourism competitiveness.

7.1. Theoretical Implications

This study contributes to the literature on sustainable tourism, supply chain management, resilience, and Dynamic Capability Theory in several ways. First, the study contributes to Dynamic Capability Theory by providing empirical evidence that supply chain integration and resilience represent complementary organizational capabilities that jointly support sustainable development. Second, the study contributes to resilience research by distinguishing between proactive resilience capability and reactive resilience capability, indicating that these dimensions may influence sustainability outcomes differently. Third, resilience functions as an important mechanism through which supply

chain integration contributes to environmental, social, and economic sustainability. Finally, by focusing on CBTEs in rural Vietnam, the study extends the empirical application of resilience and supply chain theories beyond manufacturing and logistics contexts and provides contextual evidence from a developing country setting characterized by limited resources, strong community dependence, and increasing ESG expectations.

7.2. Managerial and Policy Implications

The findings provide important implications for policymakers and tourism practitioners by emphasizing the need to integrate supply chain development, resilience-building strategies, and ESG principles into community-based tourism development. Strengthening digital infrastructure, information systems, stakeholder collaboration, and inter-regional connectivity can improve CBTEs' access to markets, resources, and knowledge, particularly in remote and ethnic minority destinations. In addition, resilience-oriented initiatives, including strategic planning, crisis preparedness, adaptive management, and digital capability development, should be promoted to enhance both proactive and reactive resilience capabilities. Supporting locally embedded entrepreneurs through improved access to finance, technology, training, and market opportunities is also essential for strengthening local livelihoods, preserving cultural heritage, and promoting sustainable and inclusive tourism development.

Overall, this study contributes to the sustainable tourism literature by extending supply chain integration and resilience theories to the underexplored context of Vietnamese community-based tourism enterprises. By distinguishing between proactive and reactive resilience capabilities, the study demonstrates that different resilience mechanisms generate different sustainability outcomes. The findings further provide context-specific managerial and policy implications for strengthening resilient and sustainable rural tourism development in Vietnam, where CBTEs represent an important form of rural entrepreneurial transformation in which agri-startup development, community-based tourism, and sustainable supply chain management interact to promote inclusive and resilient rural development.

7.3. Limitations and Directions for Future Research

Despite its contributions, this study has several limitations that provide opportunities for future research. The empirical analysis was conducted using data collected from CBTEs located in three major tourism regions of Vietnam. Although these regions represent important community-based tourism destinations, the findings may not fully capture the diversity of tourism enterprises operating in other geographical contexts. Moreover, although efforts were made to include diverse CBTEs across the selected regions, the sampling procedure was facilitated by local authorities, which may have introduced selection bias. The research adopts a cross-sectional design, which limits the ability to observe how resilience capabilities and sustainability performance evolve over time. Longitudinal studies would provide deeper insights into the dynamic relationships among supply chain integration, resilience, ESG practices, and sustainable development outcomes. In addition, although procedural and statistical remedies were applied to minimize common method bias, the possibility of residual common method bias cannot be entirely excluded because the study relies on self-reported perceptual data collected from single respondents. Accordingly, future studies should expand the sample to additional regions and conduct cross-country comparisons to improve the generalizability of the findings. In addition, future research could combine survey data with objective performance indicators or multiple data sources to further reduce this potential bias.

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