Strategy to Enhance the Adaptability of Vietnamese Agricultural Export Enterprises in Implementing Green Supply Chains according to International Standards

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ABSTRACT

In the context of ongoing global economic integration and expanding trade activities, the adaptability of enterprises plays a pivotal role in enhancing the efficiency of import - export operations. The agricultural export sector is considered a strategic pillar of Vietnam's economy. By employing a mixed-method approach combining qualitative and quantitative techniques, this study identifies strategic pathways to improve the adaptability of Vietnamese agricultural export enterprises in implementing internationally standardized green supply chains. These strategies include: sustainable development, market diversification, digital transformation, supply chain linkage, human resource training and development, industry competitiveness, policy frameworks, technological innovation, and logistics systems.

KEYWORDS: Agricultural exports, Green supply chain, Adaptability, Sustainable development

1. Introduction

In the context of deep international economic integration and increasing pressure for green transformation, Vietnamese agricultural export enterprises are facing an urgent need to restructure their supply chain models toward environmental sustainability. The Green Supply Chain (GSC) not only represents a trend toward sustainable development but is also becoming a mandatory standard imposed by major import markets, particularly developed countries such as the European Union, the United States, and Japan - where stringent environmental and quality control systems are in place (Zhu & Sarkis, 2004; Dubey et al., 2017). Implementing GSC offers tangible benefits to enterprises, including minimizing environmental impact, optimizing operational efficiency, and enhancing brand value in the eyes of international partners (Srivastava, 2007).

At the same time, major import markets are tightening regulations related to carbon emissions, renewable energy usage, and product traceability - factors that reflect their strong commitment to global sustainability goals. These requirements not only pose compliance challenges for exporters but also exert pressure to transform production and business models toward greener practices, especially in developing countries like Vietnam. In this context, integrating green supply chain principles into long-term development strategies is not merely a strategic choice but a prerequisite for maintaining competitiveness and accessing international markets in the future.

However, transitioning to GSC is not simply a matter of technical upgrades or process adjustments; it demands a high level of adaptability to international standards concerning environmental protection, labor practices, traceability, and corporate social responsibility (Chiou et al., 2011). Particularly in the agricultural sector - characterized by seasonality, fragmented production, and heavy reliance on smallholder farmers - the adaptability of enterprises becomes a critical determinant of successful GSC implementation (Yu et al., 2014). Despite Vietnam's advantages in agricultural resources and geographic location, many export enterprises struggle to meet international green supply chain standards. Common challenges include limited access to clean production technologies, a shortage of skilled personnel in environmental management, high investment costs, and fragmented government support policies. Moreover, enterprise awareness of the long-term benefits of GSC remains insufficient, resulting in delays in transformation and reduced competitiveness in global markets.

International studies have shown that enterprise adaptability is influenced by factors such as managerial capacity, organizational flexibility, learning ability, and leadership commitment (Wieland et al., 2013; Dubey et al., 2017). However, most of these studies are conducted in developed countries with stronger legal frameworks, infrastructure, and management capabilities. In contrast, Vietnamese agricultural export enterprises lack in-depth research that accurately reflects the sector's realities and specific challenges in adopting internationally standardized GSC practices. Existing studies on green supply chains in Vietnam primarily focus on technical aspects or macro-level policies, with limited analysis of enterprise-level adaptability in the agricultural export sector. The absence of a clear strategic framework makes it difficult for enterprises to define a suitable transformation roadmap aligned with industry characteristics and operational scale.

Therefore, developing quantitative analytical models to identify factors influencing adaptability is essential to support strategic decision-making and enhance enterprise capacity. This, in turn, will accelerate the green transformation of Vietnam's agricultural export sector amid global integration. This study aims to identify and quantify the key strategic factors influencing the adaptive capacity of Vietnamese agricultural export enterprises in implementing green supply chains in accordance with international standards. Specifically, the objectives of this study are to:

(1) identify strategic, operational, and institutional factors affecting enterprise adaptability in green supply chains;

(2) develop and empirically test the ADAPT model grounded in Dynamic Capability Theory, Institutional Theory, and Contingency Theory

(3) examine the relative impacts of sustainable development strategies, digital transformation, human resources, and other strategic factors on enterprise adaptability

(4) propose practical managerial and policy implications tailored to Vietnamese agricultural export small and medium-sized enterprises (SMEs).

Based on the above objectives, this study proposes nine research hypotheses (H1–H9) corresponding to the strategic dimensions of the ADAPT model. These hypotheses examine how sustainable development and market diversification affect enterprise adaptability. They also consider the roles of digital transformation, supply chain integration, and human resource development. In addition, industry competition, policy and institutional support, technological innovation, and logistics systems are analyzed. All of these factors are studied in the context of green supply chain implementation.

2. Literature Review and Research Model

2.1. Literature Review

At the core of strategy lies the choice to perform activities differently from competitors (Porter, 1996). In his seminal work, Michael Porter emphasized that business strategy is distinct from operational efficiency. Strategy involves positioning the enterprise in the market through long-term decisions regarding scale, business model, product offerings, customer segments, and competitive advantages. A sound business strategy, according to Porter, must enable the enterprise to create clear differentiation rather than merely pursuing process optimization for higher efficiency. Enterprises that focus solely on performance enhancement and profit maximization without a clear strategic direction risk falling into destructive and unsustainable competition. Adaptability is defined as the property of a system that enables it to adjust its characteristics or behavior to expand its capacity to respond to current or future climate variability (Bo Lim, 2004). Practically, it refers to the ability to design and implement effective response strategies to emerging risks and pressures, thereby mitigating the severity of adverse consequences. The adaptation process requires learning from past experiences and applying that knowledge flexibly to unforeseen future scenarios. Implementing adaptive strategies demands substantial resources, including financial capital, human resources, social capital, and natural assets. According to Dubey et al. (2017), enterprise adaptability is influenced by managerial capacity, organizational flexibility, learning capability, and leadership commitment. In the agricultural export sector, adaptability must be prioritized, especially in responding to risks arising from climate change, international market fluctuations, and green supply chain requirements. Enterprises must proactively assess their readiness to adapt, identify influencing factors, and formulate appropriate strategies to maintain operational efficiency and competitive advantage. Enhancing adaptability is the central objective of this study, aiming to ensure that Vietnamese agricultural export enterprises not only keep pace with other exporting nations but also establish a long-term and sustainable strategic direction for the country's agricultural sector.

The study by Nguyen Vi Le & Pham Thi Huyen examined green supply chain management (GSCM) in Vietnam's agricultural export sector using a mixed-methods approach, combining survey data and expert interviews. The results showed that policy orientation was the strongest influencing factor on GSCM adoption, followed by management awareness, available resources, and stakeholder understanding. Empirical evidence confirms that GSCM enhances both environmental and economic efficiency, while supporting compliance with international standards, particularly through the application of Agriculture 4.0 and circular economy practices. However, financial constraints, weak technical infrastructure, and management capacity gaps continue to hinder widespread implementation, indicating the need for stronger institutional support and long-term policy interventions (Nguyen & Pham, 2025). This research provided the foundation for the authors' study.

In the context of increasing globalization and severe climate change, the Green Supply Chain (GSC) and green logistics have become an inevitable trend in modern management. According to Jacoby (2010), efficiency and ecology must be regulated at the global level, and the green supply chain must become part of the political agenda of nations. The term Supply Chain Management (SCM) refers to the task of integrating organizational units along the supply chain and coordinating the flow of materials, information, and finances to meet the needs of the end customer, with the goal of enhancing the competitiveness of the entire supply chain (Hartmut Stadtler, 2015). Traditional supply chains, which focus on cost and performance optimization, now need to be integrated with environmental factors to ensure sustainable development. A supply chain is understood as a network of organizations linked together through the flow of materials, information, and finances- from raw material suppliers to end customers (Stadtler, 2015). Green Supply Chain Management (GSCM) is the combination of traditional supply chain management with environmental awareness, aiming to minimize negative impacts on the ecosystem. Wang and Gupta (2011) affirm that a supply chain only truly becomes green when it is integrated across all aspects of the value chain. GSCM emphasizes green productivity and environmental impact reduction at every link in the value chain through: Reducing energy consumption; Minimizing the use of natural resources; Limiting pollution issues; Enhancing recycling to maximize material and supply

utilization. Emerging challenges and opportunities in green logistics in 2025 highlight how businesses are leveraging Artificial Intelligence (AI), blockchain, and the Internet of Things (IoT) to improve operational efficiency while reducing emissions (Lee Shee Weng, 2025).

According to UNCTAD (2023), over 80% of current Free Trade Agreements (FTAs) incorporate provisions related to environmental protection, including green standards for imported products. These standards typically encompass low-carbon certification, eco-labeling, cleaner production requirements, and environmentally friendly logistics processes. Compliance with green standards is not only a legal obligation but also a strategic competitive advantage that enables firms to access demanding markets. In the agricultural sector, green standards are particularly critical due to the environmental sensitivity and health implications of agricultural products. The European Union applies a set of rigorous standards such as GlobalG.A.P., Organic Certification, and Carbon Footprint to assess the sustainability of agricultural goods. Japan requires JAS (Japanese Agricultural Standards) certification for organic products and conducts strict inspections on pesticide residues and cultivation practices. The United States enforces USDA Organic and other stringent quality control standards for imported agricultural products. ISO 14001 is a widely recognized international standard for Environmental Management Systems (EMS), and in addition to ISO, each country may impose its own green standards depending on the type of exported product. According to Lee Shee Weng (2025), meeting green standards not only enhances brand reputation but is also a prerequisite for maintaining market share in an era where consumers increasingly prioritize environmentally friendly products. As reported by the Government News Portal (2025), green logistics and sustainable supply chains are becoming the "passport" for Vietnamese enterprises to integrate more deeply into global markets. This shift carries not only economic significance but also affirms the position of Vietnamese products in modern consumption trends. With standards such as GlobalG.A.P., ASC, COI, and ISO 14001, enterprises can more easily overcome technical barriers, meet strict requirements for quarantine and chemical residue testing, and demonstrate deforestation-free sourcing in accordance with the EU Deforestation Regulation (EUDR). Agricultural exporters must invest in clean production technologies, green logistics processes, and transparent traceability systems to meet international market demands.

The sustainable development strategy is considered a key instrument for agricultural export enterprises to enhance their adaptive capacity within green supply chains. According to Ali Diabat (2017), firms that integrate environmental factors into their development strategies - such as using eco-friendly materials and processes - demonstrate stronger adaptability in green supply chain contexts. Furthermore, Joseph Sarkis (2010) emphasizes that companies implementing environmental impact reduction policies or adopting ISO 14001 or equivalent environmental standards are more likely to improve their adaptive capacity. This is aligned with Hart (1995), who argues that sustainable strategies are reflected in firms that regularly report or assess their environmental impacts.

H1 (GREEN): Sustainable development strategies provide a foundation for enhancing firms' adaptive capacity.

According to Zahra & George (2002), market diversification enables firms to reduce dependency and expand their capacity to seize opportunities. Strategic flexibility across different markets is a strong indicator of high adaptive capacity. Market diversification encompasses activities such as expanding into international markets and tailoring products to meet specific market demands (Michael A. Hitt, 1997). This diversification enhances adaptability when firms develop multi-local distribution systems, conduct market research, and segment-based evaluations (Shaker A. Zahra, 2002). These practices allow firms to better manage their supply chains and respond effectively to external changes (Lezoche, 2020).

H2 (DIVERS): Market diversification is a strategic approach that enhances firms' adaptive capacity.

Sustainable development strategies that aim to enhance adaptive capacity are increasingly inseparable from digital transformation (Vial, 2019). A firm's digital transformation activities can be assessed through various dimensions, such as the use of Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) systems in business operations, the adoption of analytical tools, and the digitization of workflows (Zhu, 2006). The integration of advanced technologies into operational processes is a key indicator of digital maturity (Vial, 2019). Digital transformation enables firms to respond more flexibly to market changes, optimize resource allocation, and improve transparency across the supply chain. These capabilities are essential for navigating the complexities of green supply chains, where responsiveness to environmental standards and traceability requirements is critical.

H3 (DIGITAL): Digital transformation is a strategic approach that enhances firms' adaptive capacity.

Lorsch (1967) emphasized that there is no universally optimal management model for all circumstances; rather, effectiveness depends on the alignment between organizational structure and environmental conditions. In the agricultural sector, product characteristics such as perishability, short harvest cycles, and high technical requirements demand flexible logistics systems and supply chain operations. Christopher (1998) argued that integrated supply chains enable firms to respond rapidly to market fluctuations. Supply chain integration refers to the coordination of all components within the chain to ensure operational efficiency, risk control, and responsiveness to market volatility (Meindl, 2016). This includes adaptive information systems and data sharing among supply chain partners (Nguyen & Pham, 2025), which are essential for real-time decision-making and operational agility.

H4 (CHAIN): Supply chain integration and logistics systems serve as foundational mechanisms for enhancing operational capacity, thereby supporting firms' adaptive capability.

Training and human resource development are not only essential strategies for enhancing the adaptive capacity of agricultural export enterprises but also serve as a cornerstone for sustainable development (Nguyen & Pham, 2025). Human resource initiatives may include regular skill training programs,

attention to employees' mental well-being (Patrick M. Wright, 2001), and the readiness of personnel to adapt to evolving roles and responsibilities (Behnam Fahimnia, 2017). These practices contribute to organizational agility and resilience, enabling firms to respond effectively to market fluctuations and operational challenges.

H5 (HR): Training and human resource development are strategic approaches that enhance firms' adaptive capacity.

Porter (1980) posits that industry competition serves as a driving force for innovation, enabling firms to maintain their market position. Dess and Beard (1984) further argue that the more dynamic and complex the industry environment becomes, the more flexible and responsive organizations must be. In the agricultural export sector, competitive pressure stemming from international standards and increasingly stringent quality requirements compels firms to continuously improve and innovate. This competitive landscape fosters adaptability, pushing enterprises to upgrade their processes, technologies, and strategic approaches to remain viable and competitive.

H6 (COMP): Industry competition is a strategic factor that enhances firms' adaptive capacity.

Powell (1983) emphasizes that organizational behavior is strongly influenced by external institutional forces such as policies, regulations, and societal expectations. Sarkis (2010) further highlights that leveraging supportive policies from governments and international organizations enables firms to be more agile in adjusting their operational models. In the agricultural export sector, policy instruments - including trade agreements, legal reforms, and market orientation strategies - play a pivotal role in shaping firms' strategic responses to environmental volatility. These institutional supports not only reduce uncertainty but also enhance firms' capacity to adapt and thrive in dynamic global markets.

H7 (POLICY): Leveraging supportive policies, legal frameworks, and market orientation strengthens firms' strategic responses and enhances their adaptive capacity.

According to David J. Teece (1997), within the framework of Dynamic Capability Theory, technological innovation is not merely a technical input but a transformative mechanism that converts operational capabilities into strategic responsiveness. Technology enables firms to identify market opportunities, restructure internal processes, and adjust products to meet shifting market demands. Empirical research in Vietnam shows that enterprises adopting new technologies tend to operate with greater flexibility - particularly in the agricultural export sector, which is highly sensitive to seasonality, logistics, and import standards (Pham, 2022). Technological innovation may stem from market research, investment in advanced technologies, or automation of production processes (Mario Lezoche, 2020), all of which contribute to enhanced adaptability.

H8 (INNOV): Technological innovation indirectly enhances firms' adaptive capacity through product improvement, operational model transformation, and market interaction.

Van Hoek (1999) expands the traditional view of logistics by positioning it as a strategic core that enables firms to respond swiftly to global trade fluctuations. In the agricultural export sector, logistics encompasses more than transportation it includes integrated systems such as warehouse management, traceability, and information connectivity. An effective logistics system helps firms mitigate inventory risks, ensure product quality, and meet international delivery standards demanded by markets like the EU, Japan, and the United States. These capabilities are especially critical in agriculture, where seasonality, perishability, and compliance with import regulations require agile and responsive operations.

H9 (SYS): A modern logistics system is a strategic enabler that not only improves operational efficiency but also supports timely responses to market fluctuations, thereby enhancing firms' adaptive capacity.

2.2. Research Model

Synthesizing insights from three foundational theories - Dynamic Capability Theory (Teece et al., 1997), Institutional Theory (DiMaggio & Powell, 1983), and Contingency Theory (Lawrence & Lorsch, 1967) - suggests that adaptive capacity does not emerge from a single factor. Instead, it is the result of coordinated interactions among internal strategies, operational structures, and responsiveness to external environments. In the context of Vietnamese agricultural export enterprises, which face increasing technical requirements, logistics risks, and market volatility, the research model must reflect a comprehensive structure of adaptive capacity. These firms are under pressure to meet international green standards while navigating seasonal constraints and global trade dynamics.

Based on the system of hypotheses from H1 to H9, this study proposes the ADAPT Model - a conceptual framework that captures the relationship between: Internal strategic initiatives (e.g., human resource development, technological innovation), Operational systems (e.g., logistics infrastructure, digital transformation), Institutional and market environments (e.g., policy support, industry competition). The ADAPT model aims to explain how these dimensions collectively enhance the adaptive capacity of Vietnamese agricultural exporters in their pursuit of sustainable and competitive integration into international markets.

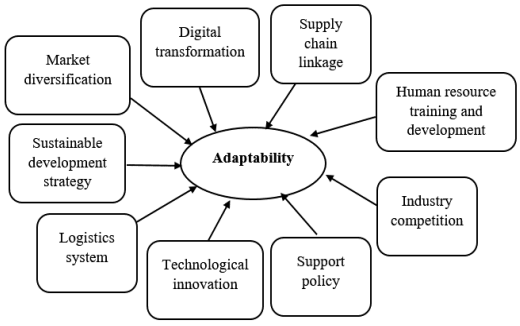

Figure 1: Proposed Research Model

3. Research Methodology

The research was conducted through two phases: qualitative and quantitative, involving two distinct respondent groups. The qualitative phase targeted managers and researchers from the Department of Import-Export, provincial Departments of Industry and Trade, and experts from institutes

and universities. The quantitative phase focused on direct and indirect agricultural export enterprises. Data were processed using SPSS 20, beginning with data cleaning and reliability testing via Cronbach's Alpha, with a threshold of > 0.6. Scale validity was assessed using Exploratory Factor Analysis (EFA) with Principal Component Analysis (PCA) and Varimax rotation. Variables with factor loadings < 0.5 (Gerbing & Anderson, 1988) and item-total correlations < 0.3 (Nunnally & Burnstein, 1994) were excluded. Remaining items were retained for the official quantitative survey. The validated scale was used to design a 5-point Likert questionnaire. Sample size was determined based on minimum requirements and the number of measurement items (Hair et al., 2006). For EFA, the minimum sample size is 50, preferably 100, with an observation-to-variable ratio of 5:1, ideally 10:1 (Nguyễn Đình Thọ, 2011, p. 398). Scales were re-evaluated using Cronbach's Alpha > 0.6, Bartlett's Test of Sphericity ($p < 0.05$), and Kaiser-Meyer-Olkin (KMO) measure (> 0.5). EFA was rerun with Varimax rotation to confirm factor structure. Finally, the validated constructs were tested using Multiple Linear Regression at a 5% significance level, assessing the impact of strategic, operational, and institutional factors on firms' adaptive capacity.

4. Findings

4.1. Data

This study focuses on Vietnamese enterprises operating in the export sectors of agricultural products, seafood, and fruits - representative industries with a high proportion of domestic firms. From May 22 to July 28, 2025, the author conducted an online survey via Google Forms, which was distributed directly to businesses and shared on specialized social media platforms. The sample size of 297 was determined based on established guidelines for multiple regression analysis. Following Tabachnick and Fidell (2013), the minimum required sample size is $N \geq 50 + 8m$, where m is the number of independent variables. With $m = 9$, the minimum required sample size is 122 observations. A total of 356 responses were collected, of which 297 valid questionnaires were retained after screening for analysis. This sample size meets the requirements for factor analysis and structural equation modeling, as it exceeds the minimum threshold of 170 observations (based on the rule of 5 observations per variable, with a total of 34 observed variables), as recommended by Hair et al. (2014). Regarding sample characteristics: Export sectors represented include coffee, rice, cashew nuts, and pepper (35%), fruits (30%), seafood (20%), vegetables (10%), and other products such as honey, flowers, and medicinal herbs (5%). Firm size distribution: small enterprises (60%), medium-sized enterprises (30%), and large enterprises (10%). Respondent roles: business owners (25%), middle managers (50%), and technical staff (25%). Geographic distribution: Mekong Delta (50%), Southeast region (30%), North Central and Central Highlands (15%), and other regions (5%).

4.2. Reliability Measurement

To assess the internal consistency of the research constructs, Exploratory Factor Analysis (EFA) and Cronbach's Alpha reliability analysis were conducted. The results of Cronbach's Alpha testing are summarized in Table 1. All constructs in the research model achieved acceptable Cronbach's Alpha values (greater than the required threshold of 0.6). The item-total correlations of all observed variables met the requirement of > 0.3 (Hair et al., 2006), indicating that no items were eliminated and the scale was suitable for subsequent EFA. Following the reliability assessment, all observed variables related to the factors influencing firms' adaptive capacity met the criteria for EFA. The EFA results showed a KMO coefficient of 0.805, and Bartlett's Test of Sphericity was significant (sig < 0.05). A total of 9 factors were extracted, with a cumulative variance explained of 59.888%. All observed variables had factor loadings greater than 0.5, so no items were removed. Furthermore, the variables within each original construct did not merge with items from other constructs during factor extraction. Therefore, no renaming of factors was necessary, and the original factor structure was retained for subsequent analysis.

Table 1: Summary of Cronbach's Alpha Reliability Coefficients for Independent Variables

Measurement Scale	**Cronbanh's Alpha**
Sustainable Development Strategy	0.875
Market Diversification	0.870
Digital Transformation	0.835
Supply Chain Integration	0.874
Industry Competition	0.785
Policy and Institutional Support	0.835
Technological Innovation	0.741
Logistics Systems	0.876
Human Resource Development	0.742

Source: Author's own analysis

All scales demonstrate acceptable internal consistency, with Cronbach's Alpha values exceeding the recommended threshold of 0.6, confirming their reliability for further factor analysis.

4.3. Exploratory Factor Analysis (EFA)

The results of the Exploratory Factor Analysis (EFA), conducted using Principal Component Analysis with Varimax rotation and Kaiser normalization, indicate that the observed variables are clearly grouped into nine principal factors. The total variance explained by these nine factors is 59.888%, suggesting a relatively good level of generalizability for the model. All items within each factor group have factor loadings ≥ 0.5, ranging from 0.544 to 0.830, which meets the reliability standards for sample sizes between 100 and 350 (Hair et al., 2010). This demonstrates that the observed variables are highly correlated with their respective representative factors, ensuring

both convergent and discriminant validity within the research model. Therefore, the measurement scales used in this study are appropriate and exhibit high reliability, allowing for subsequent analytical steps such as model testing and regression analysis.

Table 2: Measurement Model Summary

Construct	Items	Loading Range	AVE
CHAIN	7	0.683–0.805	0.62
DIVERS	7	0.705–0.816	0.65
SYSTEM	6	0.649–0.825	0.60
GREEN	6	0.759–0.830	0.66
POLICY	5	0.666–0.828	0.58
DIGITAL	5	0.763–0.788	0.64
COMP	6	0.561–0.735	0.55
INNOV	5	0.544–0.787	0.52
HR	3	0.764–0.830	0.68

Source: Author's own analysis

4.4. Linear Regression Analysis

The results of the linear regression analysis indicate a high level of model fit in assessing the adaptability of agricultural export enterprises. Specifically, the R coefficient reaches 0.816, reflecting a strong correlation between influencing factors and adaptability levels. The adjusted R^2 is 0.656, meaning that the model explains 65.6% of the variance in the dependent variable ADAPT, which represents the adaptability of enterprises in the context of digital transformation and market volatility. This suggests that factors such as management systems (SYS), diversification (DRIVERS), human resources (HR), sustainable development (GREEN), digital transformation (DIGITAL), competitive capacity (COMP), supply chain integration (CHAIN), policy support (POLICY), and innovation (INNOV) significantly influence enterprise adaptability. The Durbin-Watson statistic is 2.183, which falls within the acceptable range, indicating no autocorrelation in the residuals. With a Sig. F Change value of $0.000 < 0.05$, the model is statistically significant, confirming that the independent variables reliably explain the dependent variable. Therefore, it can be concluded that the constructed regression model is appropriate for measuring the impact of various factors on the adaptability of agricultural export enterprises in the current business environment.

Table 3: Model Fit and Explanatory Power

R	R-squared	Adjusted R-squared	Standard Error of Estimate	Durbin-Watson
0.816	0.667	0.656	0.32072	2.183

Source: Author's own analysis

The results of the linear regression analysis reveal that all constituent factors - Innovation (INNOV), Policy Support (POLICY), Supply Chain Integration (CHAIN), Digital Transformation (DIGITAL), Sustainable Development (GREEN), Management Systems (SYS), Competitive Capacity (COMP), Market Diversification (DRIVERS), and Human Resources (HR) - significantly influence the adaptability of agricultural export enterprises. Specifically, the significance values (Sig.) of the t-tests for all independent variables are less than or equal to 0.05, indicating statistical significance at the 95% confidence level. This confirms that the variables included in the model have a linear relationship with the dependent variable ADAPT, and can reliably explain variations in enterprise adaptability amid digital transformation, market volatility, and international integration demands. The standardized regression coefficients (Beta) show that GREEN (0.314), HR (0.287), DIGITAL (0.282), and DRIVERS (0.281) exert stronger impacts compared to the remaining factors. Additionally, all Variance Inflation Factor (VIF) values are below 5, indicating no multicollinearity and ensuring model stability and reliability. Therefore, it can be concluded that the constructed regression model is appropriate and practically valuable for measuring the influence of various factors on the adaptability of agricultural export enterprises in the current context.

Table 4: Estimated Regression Coefficients for the Impact Levels of Influencing Factors

	Unstandardized Coefficients		Standardized Coefficients	T	Multicollinearity Statistics	
	B	Standard Error	Beta		Tolerane	VIF
(Const)	-2.906	.308		-9.419		
GREEN	.214	.024	.314	8.972	.946	1.057
DRIVERS	.208	.026	.281	8.112	.968	1.033
DIGITAL	.219	.027	.282	8.104	.963	1.039
CHAIN	.205	.030	.252	6.924	.877	1.140
HR	.200	.024	.287	8.393	.994	1.006
COMP	.163	.045	.131	3.647	.898	1.113
POLICY	.198	.031	.240	6.469	.844	1.185
INNOV	.160	.041	.158	3.860	.697	1.434
SYS	.216	.035	.254	6.187	.690	1.449

Source: Author's own analysis

After conducting Exploratory Factor Analysis (EFA) to identify the correlation between factors and groups of variables, the author calculated the mean scores for each group of independent and dependent variables to be used in the linear regression analysis. The results of the regression analysis between the dependent variable ADAPT and the independent variables (GREEN, DIGITAL, INNOV, CHAIN, POLICY, DIVERS, COMP, HR, SYS) show that the adjusted R^2 is 0.656, indicating that the model explains 65.6% of the variance around the mean value of the dependent variable ADAPT. To assess the model's goodness-of-fit, the author used data from the ANOVA table. The result shows Sig. < 0.01, suggesting that the regression model is statistically significant and well-fitted to the

data. All coefficients in the regression estimation table meet the 1% significance level, implying that the estimated coefficients are meaningful and consistent with real-world observations. Based on these findings, the standardized regression model is specified as follows:

ADAPT = -2.906 + 0.214*GREEN + 0.208*DRIVERS + 0.219*DIGITAL + 0.205*CHAIN + 0.200*HR + 0.163*COMP + 0.198*POLICY + 0.160*INNOV + 0.216*SYS

4.5.. Discuss the research results.

The research results show that the constructed linear regression model has a high fit in assessing the adaptability of agricultural export businesses. The R-factor = 0.816 reflects a strong correlation between the independent variables and the dependent variable ADAPT, while the adjusted R^2 = 0.656 indicates that the model explains 65.6% of the variation in adaptability. This confirms that the factors included in the model have practical value in measuring the responsiveness of businesses to the context of digital transformation and market fluctuations.

Independent variables such as GREEN (β = 0.314), HR (β = 0.287), DIGITAL (β = 0.282), and DRIVERS (β = 0.281) have the highest standardized regression coefficients, indicating that these factors strongly influence adaptability. This result is clearly similar to the study by Trang & Vi (2025), titled "Strengthening the green supply chain in Vietnam's agricultural export activities" published in the Journal of State Management. In that study, the authors surveyed 215 agricultural export enterprises in the Southern region and concluded that optimizing the green supply chain, improving management capacity and applying green technology are core factors that help enterprises improve export efficiency and adaptability to market fluctuations.

The similarity between the two studies is clearly shown in three groups of factors: (1) The CHAIN variable in the regression model of this study has a significant influence (β = 0.252), reflecting the role of chain linkage in improving adaptability, corresponding to the orientation of strengthening the green supply chain in the study by Nguyen Vi Le and Dang Thu Trang. (2) The GREEN variable has the strongest impact (β = 0.314), consistent with the green consumption trend and international requirements for sustainable agricultural products mentioned by the author. (3) The HR and DIGITAL factors also show similarities in the importance of a workforce knowledgeable in green supply chain management (GSCM) and the ability to apply technology in operations.

However, the current study expands the scope of analysis by integrating additional factors such as support policies (POLICY), management systems (SYS), and innovation (INNOV), thereby building a more comprehensive theoretical framework. While Le & Trang's study focuses on the green supply chain management aspect, this study takes a multi-dimensional approach, encompassing internal factors, the institutional environment, and innovation capacity, helping to more fully reflect the factors affecting the adaptability of Vietnamese agricultural export businesses in the context of change.

5. Conclusion and Managerial Implications

Although the regression model has identified several factors that positively influence adaptive capacity, in practice, many Vietnamese agricultural export enterprises - particularly small and medium-sized enterprises (SMEs) - continue to face significant limitations in effectively implementing adaptive strategies. Common challenges include fragmented and small - scale production, low levels of technological advancement, limited financial management capabilities, shortages of high-quality human resources, and restricted access to international markets. In the context of increasingly stringent requirements for product quality, technical standards, and sustainability from export markets, these weaknesses make enterprises more vulnerable to global disruptions. To address these challenges, managers should prioritize strategic investments in digital transformation, human resource development, and supply chain integration. Moreover, leveraging institutional support and aligning with international green standards can enhance resilience and competitiveness. Strengthening adaptive capacity is not only a response to external pressures but also a pathway toward sustainable growth and long -term market positioning.

To improve adaptive capacity, small and medium-sized enterprises (SMEs) need to develop strategies that are practical, flexible, and aligned with their existing resources. Instead of adopting complex management models, businesses should focus on incremental improvements across production processes, management practices, and market access. Leveraging simple technological tools, training personnel based on actual operational needs, implementing effective cost control measures, and proactively utilizing government support policies will enable SMEs to enhance their adaptive capacity in a sustainable manner.

Adaptive strategies should be implemented in phases, with a clear roadmap aligned to long-term development goals. Maintaining flexibility in management, strengthening partnerships with both domestic and international stakeholders, and continuously innovating business thinking are decisive factors that enable small and medium-sized enterprises (SMEs) to advance within the global agricultural export value chain. At the same time, support from the government, industry associations, and development organizations plays a crucial role in creating favorable conditions for SMEs to gradually enhance their adaptive capacity, thereby achieving stable and sustainable growth in an increasingly competitive international environment.

Although the study has identified key factors influencing the adaptive capacity of agricultural export enterprises, several limitations remain. These include the limited scope of the survey, which does not fully represent the entire industry; the predominance of quantitative methods; and the use of a linear analytical model. To enhance reliability and practical applicability, future research should expand the survey coverage to include key agricultural regions, integrate qualitative methods to explore internal organizational dynamics, and apply advanced analytical models such as Structural Equation Modeling (SEM) or nonlinear regression.

Additionally, comparative studies across enterprise groups - based on scale, product category, or level of international integration - will help formulate more tailored adaptive strategies for specific business segments.

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