

AN MCDM APPROACH TO EVALUATE DETERMINANTS OF SUSTAINABLE EXPORT CAPACITY OF VIETNAMESE TEXTILE AND GARMENT ENTERPRISES TO THE U.S MARKET

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ABSTRACT

Recently, exporting textiles and garments to the US market has become more difficult and complex for Vietnamese businesses. Stricter requirements regarding labor, raw material traceability, and sustainability standards mean that businesses can no longer rely on low prices or large-scale production as they did before. Therefore, to retain orders, businesses must comply with all regulations and flexibly adjust to various market changes. This study aims to find the factors that strongly affect the ability of Vietnamese textile and garment businesses to maintain long-term exports to the United States. The research method used is broad, combining qualitative analysis and multi-criteria decision-making methods to gather expert opinions on common business challenges and define the importance of factors. Results showed that strategic management capability was the most influential factor affecting the sustainable export capacity of Vietnamese textile and garment enterprises to the U.S. market. This was followed by the ability to secure sustainable raw material supply, human resource capacity, pressure from international customers and importers, and production and technological innovation capability. In contrast, global ESG trends and environmental pollution risks received the lowest priority weights, indicating that experts considered firms' internal managerial and operational capabilities to be more influential than broader external sustainability pressures. Based on these results, the research team provides management implications for businesses to focus on improving and orienting their exports to the US market.

Keywords: AHP, MCDM, sustainable export, textile and garment.

1. INTRODUCTION

Vietnam's textile and garment industry is one of the country's key economic sectors, generating significant export revenue. In 2024, export turnover reached approximately USD 44 billion, reflecting stable growth and recovery following global economic fluctuations [1].

Despite this growth, Vietnamese firms face increasing pressure related to sustainability and regulatory compliance, particularly in the U.S., the industry's largest export market, accounting for nearly 38% of total export value [2]. This market is characterized by stringent requirements on labor standards, environmental protection, and supply chain transparency. Under UFLPA, firms must demonstrate that their products are free from forced labor across the entire supply chain, with non-compliance leading to shipment delays or rejection.

In addition to regulatory requirements, firms are increasingly expected to meet

sustainability standards such as ESG reporting, product traceability, and environmental certification. As a result, export performance is no longer driven solely by cost or production scale but also depends on internal capabilities and external institutional pressures. However, the industry still faces structural limitations, including reliance on low value-added production, low localization of raw materials, and uneven adoption of sustainability practices.

Academically, existing studies mainly focus on sustainability challenges within trade agreements or policy frameworks but lack a systematic evaluation of sustainable export capacity in the context of the U.S. market. From a methodological perspective, MCDM approaches have been widely applied but often emphasize operational or cost-based criteria, while treating sustainability as a secondary factor.

This study identifies two key research gaps. First, there is limited development of MCDM frameworks that incorporate non-market institutional factors such as regulatory pressure and ESG requirements. Second, there remains a disconnect between strategic management theories and quantitative modeling approaches.

To address these gaps, this study applies the Analytic Hierarchy Process (AHP) by integrating the Resource Based View (RBV) and institutional theory into a unified framework. The study aims to evaluate and rank the factors affecting sustainable export capacity of Vietnamese textile and garment firms in the U.S., thereby contributing to both theoretical development and practical decision making.

2. THEORETICAL BACKGROUND

2.1. Theoretical framework

2.1.1. Triple Bottom Line (TBL) – John Elkington [3]

The Triple Bottom Line (TBL), proposed by Elkington [3], suggests that business performance should be evaluated based on three closely related aspects: Economic (Profit), Social (People), and Environmental (Planet). This approach shifts the focus from short-term financial goals to long-term sustainable development.

In the textile industry, a labor-intensive industry with a significant environmental impact, TBL is particularly relevant. Export markets such as the United States increasingly require businesses to comply with labor standards, environmental regulations, and sustainable reporting practices.

In this study, TBL is used as the basis for integrating sustainability into the analytical model. Specifically, the economic aspect is reflected through production efficiency and cost management; the social aspect relates to working conditions and human resource capabilities; and environmental aspects, including resource use, emissions, and compliance with environmental standards. This integration helps assess the role of sustainability factors in export capacity.

2.1.2. Gravity Model – Tinbergen [4]

The Gravity Model developed by Tinbergen [4], explains bilateral trade flows based on economic scale and trade costs. According to this model, countries with larger economies generally have higher trade volumes, while geographical distance and logistics costs act as barriers that reduce trade intensity.

In the context of Vietnam's textile exports to the United States, this model shows two parallel effects. On the one hand, the United States is a large market with high import demand. On the other hand, the long geographical distance increases transportation costs, delivery times, and logistics complexity.

Therefore, this study uses the Gravity Model to explain the inclusion of logistics-related factors such as transportation costs, delivery reliability, and infrastructure quality into the analytical model, as these are external conditions that directly affect the ability to sustain exports.

2.1.3. Porter's Diamond Model – Porter [5]

Porter's Diamond Model [5] explains national competitive advantage through four main factors: factors of production conditions, demand conditions, related and supporting industries, and the strategy, structure, and level of competition of the enterprise. These factors interact to form the competitiveness of an enterprise in a specific industry.

For the Vietnamese textile and garment industry, this model shows both advantages and limitations. The industry has the advantage of an abundant labor force and a strong export orientation, but it remains heavily dependent on imported raw materials and faces increasing competitive pressure from other countries.

In this study, the Diamond Model is used to guide the selection of factors related to competitiveness such as technological capacity, production efficiency, supply chain structure, and the level of competition in the industry. The model helps explain how conditions at the national and industry levels affect the export performance of enterprises.

2.1.4. Institutional Theory – North [6]

Institutional Theory, proposed by North [6], emphasizes that the behavior and performance of businesses are influenced by both formal (laws, policies, regulations) and informal (norms, practices, expectations) institutions. Businesses operating in international markets need to comply with both types of pressures to maintain legitimacy and competitiveness.

In the case of exporting to the United States, institutional requirements are particularly stringent. Regulations related to labor standards, environmental protection, and supply chain transparency directly impact export performance. Compliance is no longer an option but a prerequisite for market access.

Therefore, this study incorporates factors such as compliance with legal regulations, trade policies, and transparency requirements into its analytical model. These factors represent external pressures that directly impact a business's ability to sustain exports.

2.1.5. Global Value Chain (GVC) Theory – Gereffi [7]

The Global Value Chain (GVC) theory, developed by Gereffi [7], explains how production processes are fragmented across countries, with different firms participating in specific stages of value creation. According to this theory, the position of a firm within the value chain determines the level of value it can capture, as well as its ability to control key activities such as design, sourcing, and market access.

In practice, firms operating in low-value segments such as CMT or simple assembly tend to capture limited value and face higher risks of substitution. In contrast, firms engaged in higher value-added activities, including design, supply chain coordination, or branding, are able to capture greater margins and maintain more stable competitive advantages. This highlights the importance of upgrading within the value chain.

In the context of this study, GVC theory provides a useful lens to explain differences in sustainable export capacity among Vietnamese textile and garment enterprises. Firms with higher levels of integration and upgrading within global value chains are better positioned to meet international standards, respond to market requirements, and sustain export performance over time.

2.2. Empirical research

In international business, competitiveness and sustainable export performance represent central research concerns. Prior studies demonstrate that firms determine their global competitiveness through the interaction between internal resources and external conditions at both the industry and macro levels. This interplay becomes particularly critical in the textile and garment industry, where firms face intense competitive pressure alongside stringent requirements related to sustainability, regulations, and product quality [8], [9].

Researchers typically classify the drivers of export competitiveness into three main groups: internal firm-level factors, micro-level external factors, and macro-level external factors. This classification aligns with key theoretical frameworks, including the Global Value Chain, the Resource-Based View, and Dynamic Capability Theory, which collectively explain how firms build and sustain competitive advantages in export markets [10].

2.2.1. Internal enterprise-level factors affecting competitiveness

Firm-level resources have long been central to explanations of export performance in labor-intensive industries, and the garment sector is no exception. Barney [8] argued that durable competitive advantage stems from resources competitors cannot easily replicate — a logic that applies with particular force to production technology and process efficiency in textile manufacturing. Firms that invest in modern equipment and cultivate innovation capacity tend to produce at lower cost, meet tighter quality thresholds, and satisfy the sustainability requirements that buyers in Europe and North America now treat as non-negotiable [9]. In Vietnam, this pattern is evident across the sector's better-performing exporters. Companies such as Vinatex, Phong Phu, and TNG have pursued automation alongside internationally recognized certifications, such as ISO 9001, WRAP, BSCI, and OEKO-TEX and the results show in their export stability and buyer retention [11].

Compliance and supply chain governance have moved from peripheral concerns to central ones. Gereffi and Fernandez-Stark [13] demonstrated that a firm's position and prospects within global value chains depend heavily on its ability to meet the governance standards set by lead buyers — standards that now extend well beyond product quality to cover labor practices, environmental performance, and supply chain traceability. For Vietnamese manufacturers, this creates a particular pressure point: the sector currently sources 80–85% of its production inputs from abroad, leaving it exposed whenever global supply conditions tighten [12]. Strengthening domestic supplier networks is therefore both a competitiveness strategy and a risk management imperative.

Underpinning these operational capabilities is financial strength. Firms with limited capital cannot sustain the investment cycles that technology upgrading requires, nor can they absorb the costs of compliance without eroding margins [9]. Strategic management quality and workforce development shape how effectively firms deploy whatever resources they do have - a factor that becomes more consequential as digital transformation raises the skill demands across the production floor and the management suite alike [12].

Across the literature, four factors recur as the principal determinants of competitiveness for garment exporters: technological and production capability, supply chain compliance, financial capacity, and organizational governance. Their relative importance is not fixed, it shifts with market segment, buyer requirements, and a firm's current position in the value chain [12], [13].

2.2.2. Micro-level external factors affecting competitiveness

External pressures shape firm behaviour just as much as internal resources do, though this dimension receives less systematic attention in the Vietnamese context. Fontana et al. [14]

show that suppliers in developing-economy textile chains make strategic decisions, including whether to invest in compliance based largely on where their customers are located and what those customers demand. For Vietnamese exporters targeting the U.S. market, this dynamic is particularly acute: American buyers have progressively tightened requirements around quality consistency, on-time delivery, and supply chain transparency, pushing suppliers toward process upgrades they might not otherwise prioritize [13], [14].

Integration into global value chains offers genuine opportunities for access to foreign buyers, technology transfer, and exposure to international management practices [10]. The problem, as Grumiller et al. [15] document in detail, is that most Vietnamese garment firms have remained stuck in cut-make-trim assembly, the segment with the thinnest margins and the least learning potential. The ILO and VITAS [12] confirm that this pattern persists. Gereffi et al. [10] argue that without deliberate upgrading moving toward full-package production, own-design, or own-brand manufacturing, GVC participation can actually entrench low-value positioning rather than overcome it. This is a structural vulnerability that Vietnam's textile sector has yet to resolve.

Competition from China, India, and Bangladesh adds a further layer of pressure. Le and Vo [16], applying the Generalized Double Diamond Model, found Vietnam less competitive than China across all four dimensions of industrial competitiveness with the gap widest in related and supporting industries. More recent data reinforce the point: in 2024, Vietnam held roughly 19 percent of U.S. apparel imports by value but remained concentrated in mid-to-low market segments, while Chinese and Indian suppliers captured a disproportionate share of premium orders [12]. Price competition from lower-cost entrants such as Bangladesh and Cambodia intensifies this pressure further, making cost-based positioning increasingly difficult to sustain.

2.2.3. External macroeconomic factors affecting competitiveness

Previous studies highlight the influence of institutional environments, economic conditions, and global trends on export competitiveness [6], [10]. Trade policies and regulatory frameworks in key importing markets, particularly the United States, shape market access and cost structures, while stricter compliance requirements create challenges for Vietnamese textile exporters [13], [15].

Environmental and climate-related risks are also critical, as the textile industry is resource-intensive and increasingly subject to regulatory and emission pressures, which may affect production stability if firms fail to adapt [14], [17].

Furthermore, ESG adoption is associated with enhanced credibility and sustained market access, whereas global economic volatility increases uncertainty, affecting export demand and firm performance [18], [19].

Overall, export competitiveness is shaped by the interaction between internal capabilities and external conditions across micro and macro levels [8], [9]. Building on this, the present study proposes an integrated framework combining firm-level capabilities with institutional pressures and global value chain dynamics to explain sustainable export competitiveness in Vietnam's textile industry.

3. RESEARCH METHODOLOGY

3.1. Research Process

As mentioned throughout, this study aims to investigate the factors affecting the sustainable export capabilities of Vietnamese businesses to the US market using the MCDM methodology. Based on this, the research process is structured into the main steps, as illustrated

in Figure 1.

Step 1: Analyze the current state of sustainable export performance of Vietnamese firms in the United States market in order to establish sustainability objectives and core requirements for export activities.

Step 2: Develop the set of influencing factors.

Step 2.1: The research team conducts a literature review using bibliometric analysis, systematic review, in-depth analysis, and comparative evaluation of studies related to the research topic. Concurrently, these findings are aligned with the theoretical framework to formulate the preliminary set of factors.

Step 2.2: The initial version of the factor set is refined and classified into many suitable groups.

Step 2.3: The authors conduct in-depth interviews with experts and business managers to collect insights, which are then used to adjust and supplement the factors, thereby finalizing the set of factors influencing sustainable export capability in the textile and garment sector to the U.S. market by building a hierarchical tree of factors.

Step 3: Apply the AHP to calculate the relative weights of the identified factors.

Step 3.1: The research team designs a questionnaire based on pairwise comparisons of criteria using Saaty's scale [21].

Pairwise comparisons are conducted based on questionnaires. A scale from 1 to 9 is applied to represent equal importance to extreme importance presented in *Table 1*.

Table 1. Saaty's Scale of Importance Intensity (1–9)

Important Intensity	Definition
1	Equal importance
3	Moderate importance of one over another
5	Essential importance
7	Demonstrated importance
9	Extreme importance
2,4,6,8	Intermediate values

Step 3.2: The questionnaire is distributed to experts who participated in the interviews in Step 2. After collection, incomplete or inconsistent responses are excluded. For each pair of criteria, evaluations from multiple experts are aggregated to determine a representative value.

Step 3.3: Construct pairwise comparison matrices.

The pairwise comparison matrix is as follows:

$$A = \begin{bmatrix} a_{11} & \cdots & a_{1j} & \cdots & a_{1n} & \vdots & \vdots & a_{i1} & \cdots & a_{ij} & \cdots & a_{in} & \vdots & \vdots & a_{n1} & \cdots & a_{nj} & \cdots & a_{nn} \end{bmatrix}$$

Where, a_{ij} is the level of evaluation between the i th and the j th criteria.

$a_{ij} > 0$, $a_{ij} = 1/a_{ji}$, $a_{ii} = 1$,

Step 3.4: Determine the weights of the criteria.

The weight matrix is presented as follows:

$$W = \begin{bmatrix} w_1 & \dots & w_j & \dots & w_n \\ w_1/w_1 & \dots & w_1/w_j & \dots & w_1/w_n \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ w_i/w_1 & \dots & w_i/w_j & \dots & w_i/w_n \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ w_n/w_1 & \dots & w_n/w_j & \dots & w_n/w_n \end{bmatrix}$$

Multiply W with w

$$Ww = \begin{bmatrix} w_1 & \dots & w_j & \dots & w_n \\ w_1/w_1 & \dots & w_1/w_j & \dots & w_1/w_n \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ w_i/w_1 & \dots & w_i/w_j & \dots & w_i/w_n \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ w_n/w_1 & \dots & w_n/w_j & \dots & w_n/w_n \end{bmatrix} \begin{bmatrix} w_1 \\ w_j \\ w_n \end{bmatrix} = n \begin{bmatrix} w_1 \\ w_j \\ w_n \end{bmatrix}$$

Or $(W - nI)w = 0$

The comparative weights can be obtained by multiplying the eigenvector w by A_{max} such that $Aw = \lambda_{max} w$, where λ_{max} is the highest value of the matrix A , which means find the eigenvector w with respective A_{max} for $(A - \lambda_{max} I)w = 0$.

Step 4: Examine the consistency of the pairwise comparison matrices using the Consistency Ratio (CR). If the CR meets the acceptable threshold, less than 0.1, the analysis proceeds; otherwise, the pairwise comparisons are revised.

Step 5: Synthesize the calculated weights and evaluate the criteria to rank the factors according to their level of influence on sustainable export capability.

Step 6: Discuss the result.

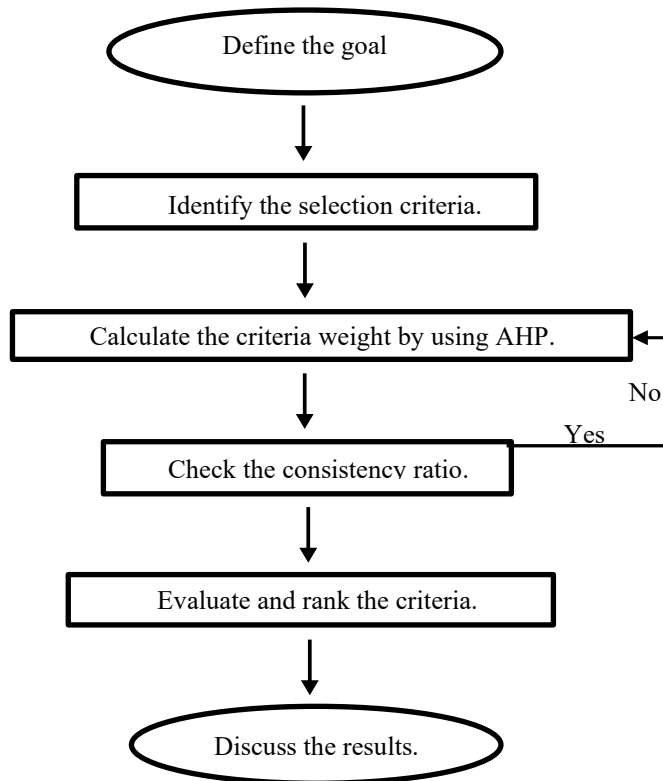


Figure 2. Research process

Source: Research team's proposal

3.2. In-depth interview

3.2.1. Expert selection

This study applies to the AHP, an MCDM based on expert evaluations to identify and rank the importance of factors. Unlike traditional quantitative methods that require large sample sizes, AHP emphasizes the professional quality, practical experience, and consistency of participants' assessments.

In this study, a total of four experts were selected ($n = 4$), including two managers working in textile companies and two university lecturers with expertise in economics, international trade, or supply chain management. Although the sample size is relatively small, it is considered suitable for the AHP method for several reasons.

Firstly, many previous studies have shown that AHP can produce reliable results even with a limited number of experts, provided that the experts have strong expertise and domain knowledge [20], [21]. The focus of the AHP is not on the number of participants but on the consistency of the pairwise comparative assessments, tested through the Consistency Ratio (CR), as proposed by Saaty [21], who introduced the AHP method.

Secondly, this study combines two groups of experts with different backgrounds to ensure comprehensiveness in the assessment. Specifically, the management team provides a practical, business-oriented perspective, particularly regarding production, export, and international regulatory compliance. Meanwhile, university lecturers contribute an academic, systematic perspective based on theoretical foundations and prior research. This combination helps balance practical experience and academic thinking in the decision-making process.

3.2.2. Criteria for Expert Selection

The selection of experts in this study was carried out using purposive sampling [22], ensuring that participants not only had practical experience but also possessed the assessment capabilities appropriate to the requirements of the AHP methodology. Specifically, experts were selected based on three main criteria groups: (i) professional experience, (ii) relevance to export activities, and (iii) multi-criteria cognitive and assessment capabilities.

(i) Professional experience

All selected experts were required to have a minimum of five years of experience in relevant fields to ensure their ability to accurately understand and evaluate the influencing factors. For the managerial group, this included experience in the textile and garment industry, particularly in roles related to production, export operations, or supply chain management, as well as direct involvement in decision-making processes or the implementation of export activities in international markets. For the academic group, the requirements focused on expertise in areas such as international economics, supply chain management, or sustainable development, together with teaching or research experience related to international trade or the textile and garment sector. These conditions ensured that the assessments were grounded in both practical knowledge and academic insight.

(ii) Relevance to export activities

Given that the study focuses on export competitiveness in the United States market, experts were required to demonstrate a solid understanding of this specific context. This included familiarity with technical standards, regulatory frameworks, and compliance requirements in the U.S. market, as well as awareness of critical issues such as supply chain traceability, social responsibility, and environmental standards. In addition, participants were expected to have either direct experience in export activities, in the case of managers, or indirect exposure through teaching and research, in the case of academic experts. This criterion ensured that the evaluated factors accurately reflected the real-world pressures and

requirements of the target market.

(iii) Multi-criteria assessment capability

As AHP requires systematic pairwise comparisons across multiple criteria, experts need to demonstrate the ability to think analytically and provide consistent qualitative judgments. This included the capacity to understand and apply the pairwise comparison scale, evaluate the relative importance of different factors in a logical and structured manner, and actively engage in the evaluation process by providing reliable and well-considered responses. Such capabilities are essential for ensuring the internal consistency of the input data, thereby enhancing the reliability of the AHP results.

(iv) Diversity and complementarity among experts

In addition to individual qualifications, the study also emphasized diversity in the composition of the expert panel in order to strengthen the robustness of the findings. Specifically, the inclusion of both managerial and academic participants enabled the integration of practical and theoretical perspectives, where managers contributed insights grounded in operational feasibility and business efficiency, while academics provided a more systematic and long-term analytical viewpoint. This combination created a complementary effect, reducing the risk of bias associated with a single perspective and enhancing the overall comprehensiveness of the evaluation process.

3.2.3. Limitations of expert assessment

Although the AHP method, based on expert assessment, offers many advantages in addressing complex multi-criteria problems, the use of a limited number of experts still presents some limitations that need to be discussed.

First, the small sample size may affect the generalizability of research results. Therefore, the results should be understood as indicative rather than representative of the entire Vietnamese textile and garment industry.

Second, differences in background between the two groups of experts may lead to bias in assessment. Managers tend to emphasize practical and feasible factors in business operations, while lecturers may prioritize theoretical or long-term factors such as sustainable development and institutions. However, this difference also contributes to enriching the research results by reflecting multiple perspectives.

Third, expert opinions can be influenced by subjective perceptions and personal experience. To minimize this bias, the study applied the CR test to ensure consistency in pairwise comparisons. The results showed that all matrices met the acceptable threshold ($CR < 0.1$), demonstrating that the assessments have intrinsic reliability.

Finally, the data was collected at a specific point in time and therefore does not fully reflect the changes in the international trade environment, especially in the context of rapidly changing import regulations and sustainability requirements in the US market.

4. RESEARCH RESULT

The research team wanted to examine whether the multi-criteria decision-making (MCDM) method, specifically the AHP method, is suitable for assessing the factors influencing the sustainable production capacity of Vietnamese textile and garment businesses exporting to the US market. As a result, the team interviewed experts to develop and test the study. Initial results showed that this model exactly reflects market requirements and is suitable for the actual operating conditions of Vietnamese textile and garment businesses.

Step 1: Analyze the current situation and identify evaluation criteria

Based on a review of previous studies, an assessment of Vietnam's textile and garment exports to the U.S. market, and insights from expert interviews in areas such as export operations, supply chain management, and international trade, the study identifies the current challenges and requirements related to sustainable export performance.

The findings indicate that firms face increasing pressure from market requirements, including environmental standards, labor compliance, and supply chain transparency. At the same time, internal limitations such as dependence on imported materials and limited technological capability affect their ability to meet these requirements.

These conditions highlight the need to identify key evaluation criteria for sustainable export capacity, which serves as the basis for the subsequent development of influencing factors in the next step.

Step 2: Develop the influencing factors

Step 2.1: Preliminary factor identification

This study identifies the initial set of factors influencing sustainable export capacity through a literature review. The research team used bibliographic analysis and systematic review to gather factors commonly mentioned in previous studies on exports and sustainability in the textile and garment industry. In addition, VOSviewer software was employed to conduct bibliometric analysis and visualize keyword co-occurrence and research trends, thereby supporting the identification and clustering of relevant factors.

The study analyses and compares research findings to select factors relevant to the context of Vietnam's textile and garment exports to the US market. Key factors include production efficiency, technological capacity, supply chain management, and compliance with environmental and labor standards, etc. Simultaneously, these factors are compared against the theoretical framework of the study to ensure academic relevance.

As a result, the study developed an initial set of factors, serving as the basis for classification and adjustment in subsequent steps.

Step 2.2: Factor classification

The initial set of factors was systematically adjusted and categorized into three main groups to ensure a clear analytical structure. This classification reflects the multi-level nature of sustainable export capabilities and provides a basis for subsequent analytical steps.

The first group consists of internal factors, including those within the enterprise that directly affect operational efficiency. These factors typically relate to production capacity, technological capabilities, cost efficiency, and the quality of human resources. These are the factors that determine the enterprise's ability to improve productivity and maintain stable export operations.

The second group consists of external factors at the micro level, reflecting the enterprise's direct business environment. These factors include supply chain relationships, customer requirements, and the level of competition in the industry. These factors represent the interaction between the enterprise and its partners in the value chain and have a significant impact on export results.

The third group consists of macro-level external factors, encompassing broader environmental conditions that impact export activities. These factors include trade policies, legal regulations, and global market conditions. These create opportunities and challenges that businesses need to adapt to in order to maintain export capacity.

This classification helps to systematize the factors logically and provides a basis for

applying the AHP methodology in the next step.

Step 2.3: Expert validation and factor finalization

The study conducted in-depth interviews with experts and managers in the textile and garment industry to gather feedback on the factors identified in the previous steps. Participants assessed the relevance and importance of each factor based on their practical experience in exporting to the US market.

Based on the collected feedback, the initial set of factors was adjusted, supplemented, and refined to ensure accurate reflection of real-world conditions and high applicability. This process eliminated unsuitable factors while adding missing ones.

As a result, the final set of 13 factors was identified and categorized into three groups as follows:

Internal factors of the enterprise

1. Financial capacity
2. Production and technological innovation capacity
3. Strategic management capacity
4. Human resource capacity
5. Ability to comply with quality standards and supply chain management
6. Ability to participate in the global value chain of the enterprise

Micro-level external factors

7. Pressure from international customers and importers
8. Ability to secure sustainable raw material supply from suppliers
9. Competitors in the industry

Macro-level external factors

10. International trade policies and regulations
11. Global ESG trends
12. Economic fluctuations
13. Environmental pollution risks

The decision-making problem is structured as a hierarchical tree of factors. In this model, the overall objective of sustainable export capacity is placed at the first level. Three main groups of factors are arranged at the second level, and 13 specific factors are arranged at the third level. This structure forms the basis for applying the AHP method in the subsequent analysis step (see Figure 2).

Step 3: Apply the AHP to calculate the relative weights of the identified factors.

Step 3.1: The research team designs a questionnaire based on pairwise comparisons of criteria using Saaty's scale.

Step 3.2: The questionnaire is distributed to experts who participated in the interviews in Step 2. After collection, incomplete or inconsistent responses are excluded. For each pair of criteria, evaluations from multiple experts are aggregated to determine a representative value.

Step 3.3: Construct pairwise comparison matrices. (see Table 2)

Step 3.4: Determine the weights of the criteria. (see Table 3)

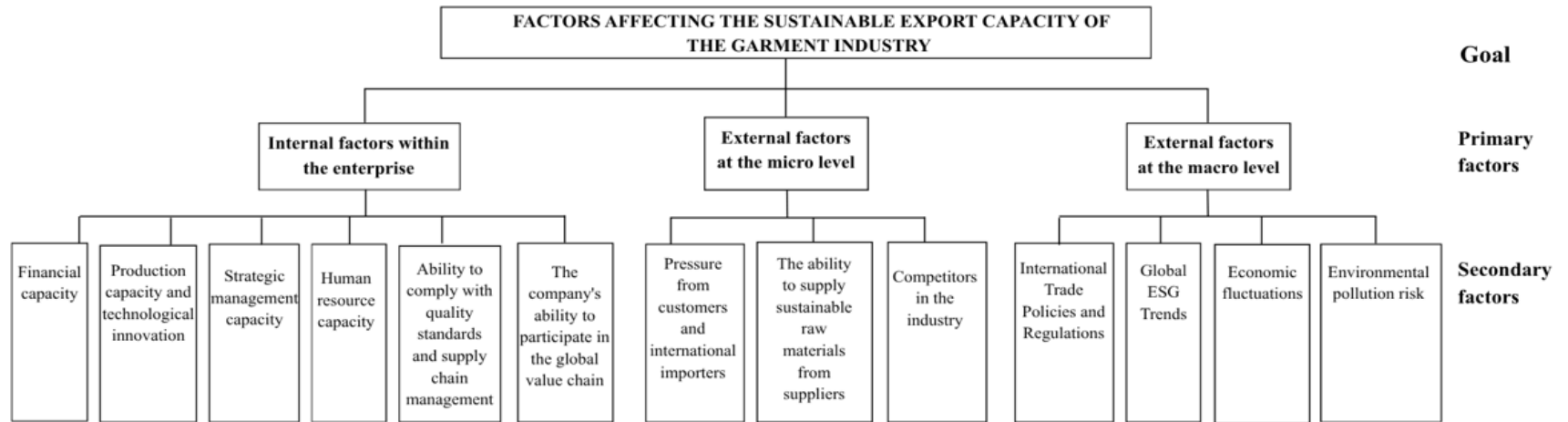


Figure 2. Analytical framework for sustainable export capacity of the garment industry

Source: Research team's proposal

Table 2. Pairwise comparison matrix of criteria using AHP

	Financial capacity	Production and technological innovation capacity	Strategic management capacity	Human resource capacity	Ability to comply with quality standards and supply chain management	Ability to participate in the global value chain of the enterprise	Pressure from international customers and importers	Ability to secure sustainable raw material supply from suppliers	Competitors in the industry	International trade policies and regulations	Global ESG trends	Economic fluctuations	Environmental pollution risks
Financial capacity	1.00	1.00	0.50	2.00	2.00	0.33	0.50	1.00	0.50	1.00	1.00	2.00	2.00
Production and technological innovation capacity	1.00	1.00	1.00	1.00	2.00	2.00	0.50	0.50	1.00	2.00	2.00	1.00	2.00
Strategic management capacity	2.00	1.00	1.00	2.00	2.00	1.00	3.00	3.00	2.00	0.50	2.00	3.00	2.00
Human resource capacity	0.50	1.00	0.50	1.00	3.00	3.00	0.50	1.00	1.00	2.00	2.00	2.00	2.00
Ability to comply with quality standards and supply chain management	0.50	0.50	0.50	0.33	1.00	1.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00
Ability to participate in the global value chain of the enterprise	3.00	0.50	1.00	0.33	1.00	1.00	0.50	0.33	0.50	1.00	1.00	0.50	0.50

Pressure from international customers and importers	2.00	2.00	0.33	2.00	1.00	2.00	1.00	0.33	0.50	1.00	2.00	2.00	2.00
Ability to secure sustainable raw material supply from suppliers	1.00	2.00	0.33	1.00	0.50	3.00	3.00	1.00	2.00	1.00	2.00	2.00	2.00
Competitors in the industry	2.00	1.00	0.50	1.00	0.50	2.00	2.00	0.50	1.00	0.33	0.50	0.50	0.50
International trade policies and regulations	1.00	0.50	2.00	0.50	1.00	1.00	1.00	1.00	3.00	1.00	1.00	1.00	1.00
Global ESG trends	1.00	0.50	0.50	0.50	1.00	1.00	0.50	0.50	2.00	1.00	1.00	0.50	1.00
Economic fluctuations	0.50	1.00	0.33	0.5	1.00	2.00	0.50	0.50	2.00	1.00	2.00	1.00	2.00
Environmental pollution risks	0.50	0.50	0.50	0.50	1.00	2.00	0.5	0.50	2.00	1.00	1.00	0.50	1.00
SUM	16.000	12.500	9.000	12.667	17.000	21.333	14.500	12.167	19.500	13.833	18.500	17.000	19.000

Source: Authors' calculation

The weights are calculated as the row averages of the normalized matrix.

Table 3. Calculation of criteria weights using AHP

No.	Factors	Weights
1	Financial capacity	0.075
2	Production and technological innovation capacity	0.084
3	Strategic management capacity	0.125
4	Human resource capacity	0.093
5	Ability to comply with quality standards and supply chain management	0.064
6	Ability to participate in the global value chain of the enterprise	0.057
7	Pressure from international customers and importers	0.089
8	Ability to secure sustainable raw material supply from suppliers	0.100
9	Competitors in the industry	0.062
10	International trade policies and regulations	0.078
11	Global ESG trends	0.053
12	Economic fluctuations	0.066
13	Environmental pollution risks	0.054

Source: Authors' calculation

Step 4: Check the consistency ratio

The maximum eigenvalue is calculated as:

$$\lambda_{\max} = (1,102/0,075 + 1,212/0,084 + 1,874/0,125 + 1,349/0,093 + 0,958/0,064 + 0,845/0,057 + 1,302/0,089 + 1,496/0,1 + 0,938/0,062 + 1,159/0,078 + 0,783/0,053 + 0,964/0,053 + 0,964/0,066 + 0,802/0,054)/13 = 14,783$$

The Consistency Ratio (CR) is calculated as:

$$CR = \frac{CI}{RI} = \frac{(\lambda_{\max} - 13)/12}{1.56} = 0.095$$

Where $\lambda_{\max}$ is the maximum eigenvalue of the comparison matrix, (n) is the number of criteria, and (RI) is the Random Index.

Since (CR = 0.095 < 0.1), the level of inconsistency is acceptable, indicating that the expert judgments are consistent and reliable.

Step 5: Evaluating and ranking the criteria

The final ranking of the 13 factors, based on their calculated priority weights, is illustrated in Table 4. The results of this step are presented in the following table

Table 4. Ranking of criteria affecting sustainable export capacity based on AHP

Factors	Priority weight	Rank
Strategic management capacity	0.125	1
Ability to secure sustainable raw material supply from suppliers	0.100	2
Human resource capacity	0.093	3
Pressure from international customers and importers	0.089	4
Production and technological innovation capacity	0.084	5
International trade policies and regulations	0.078	6
Financial capacity	0.075	7
Economic fluctuations	0.066	8
Ability to comply with quality standards and supply chain management	0.064	9
Competitors in the industry	0.062	10
Ability to participate in the global value chain of the enterprise	0.057	11
Environmental pollution risks	0.054	12
Global ESG trends	0.053	13

Source: Authors' calculation

Step 6: Discussion of results

The AHP results indicate that the sustainable export capacity of Vietnamese textile and garment enterprises to the U.S. market is driven primarily by firms' internal capabilities rather than by isolated external factors. The highest weight assigned to strategic management capability (0.125) implies that long-term competitiveness increasingly depends on managerial effectiveness, resource allocation, and the ability to adapt to changing international market conditions.

This finding is consistent with the Dynamic Capabilities perspective proposed by Teece et al. [9], which suggests that firms achieve sustainable competitive advantage through their ability to sense environmental changes, seize opportunities, and continuously reconfigure organizational resources. The present findings further indicate that strategic management capability represents the practical manifestation of these dynamic capabilities in the context of Vietnamese textile enterprises.

However, the present findings differ to some extent from Tran Thuy Linh and Do Duc Binh [24], who emphasized regulatory factors as the strongest driver of sustainable export performance. In this study, trade policy and regulatory conditions received only a moderate weight (0.078). This divergence may be explained by differences in market context and research methodology. While some export markets are more strongly shaped by institutional frameworks, the U.S. market tends to impose more direct pressure through requirements related to quality, delivery reliability, traceability, and supply chain responsibility. In addition, AHP captures the relative priorities perceived by experts, whereas regression or SEM approaches generally examine causal relationships among variables [25].

The ability to secure sustainable raw material supply ranked second (0.100), which is consistent with previous reports by the International Labor Organization and VITAS [12], which indicate that Vietnam's textile industry remains highly dependent on imported raw materials and continues to face low domestic value addition. This result indicates that sourcing

capability is no longer merely an operational cost issue, but a strategic determinant associated with rules of origin, production continuity, and long-term order retention.

Human resource capacity (0.093) was ranked above technological innovation (0.084), suggesting that enterprises continue to regard people as central to operational effectiveness. This finding adds a practical perspective to studies emphasizing digitalization and automation. Although technology is increasingly important, under current conditions in many Vietnamese textile firms, skilled labor, middle-level managers, and personnel capable of meeting international standards remain necessary for technological investments to generate full value.

A notable result is that ESG trends (0.053) and environmental risks (0.054) were ranked lowest. This partially contrasts with previous studies emphasizing the growing importance of ESG adoption and sustainability compliance in international textile supply chains [14], [17]. The difference may reflect a gap between long-term academic expectations and short-term business priorities. Many enterprises may still focus primarily on cost control, order stability, and business continuity, while ESG is approached mainly as a compliance obligation rather than a source of strategic advantage. Nevertheless, this gap is likely to narrow as international buyers continue to tighten environmental and social standards.

The moderate position of trade policy factors also suggests that preferential agreements and external institutional frameworks do not automatically create competitiveness. This observation is related to previous studies emphasizing the role of FTAs in expanding market opportunities. In practice, policies mainly create access opportunities, whereas the ability to benefit from them depends on managerial capability, sourcing readiness, and compliance with rules of origin at the firm level.

Overall, the findings suggest that sustainable export capacity is shaped by the interaction between internal capabilities and external pressures. Strategic management, human resources, and sourcing autonomy constitute the core competitive foundation; international customer requirements act as a stimulus for upgrading; while trade policy and macroeconomic conditions form a broader operating environment. Compared with earlier studies that often-emphasized single dimensions in isolation, this study indicates that export success in the U.S. market increasingly depends on the simultaneous ability to manage effectively, adapt quickly, and comply with rising international standards.

5. CONCLUSION AND PROPOSED IMPLICATIONS

5.1. Research findings

This study employs the Analytic Hierarchy Process (AHP) to identify and rank the factors influencing the sustainable export capacity of Vietnamese textile and garment enterprises to the US market. The results indicate that strategic management capability is the most significant factor, followed by ability to secure sustainable raw material supply from suppliers, human resource capabilities, pressure from international customers and importers, and production and technological innovation capabilities. These findings suggest that internal management capabilities and resource readiness play a more decisive role than external environmental factors in enhancing sustainable export capacity.

Conversely, factors related to Environmental pollution risks and Global ESG trends hold relatively lower priority rankings. Although these factors are becoming increasingly important in international trade, experts assess their impact as lower compared to management and operational capabilities within the current context of Vietnamese textile and garment enterprises.

Overall, the AHP analysis establishes a priority framework for these influencing factors, enabling enterprises to analyze their resources more effectively and formulate strategic directions based on the relative importance of each factor.

5.2. Contributions of the study

This study makes several important contributions to the literature on sustainable export capacity in the textile and garment industry, particularly by strengthening the theoretical and methodological foundations of existing MCDM/AHP research.

First, theoretical contribution through integrated framework development. Unlike prior studies that typically rely on a single theoretical perspective, this research develops a multi-dimensional analytical framework by systematically integrating four core theories, including the Triple Bottom Line (TBL), the Gravity Model, Porter's Diamond Model, and Institutional Theory. This integration enables a more comprehensive conceptualization of sustainable export capacity, capturing not only firm-level capabilities but also external institutional pressures and global market dynamics. As a result, the study proposes a structured set of criteria that reflects the interaction between internal resources and non-market constraints, an aspect largely overlooked in previous studies.

Second, extending the conceptualization of competitiveness toward sustainability and compliance. This study introduces a significant shift in evaluating export competitiveness by positioning sustainability and regulatory compliance, particularly ESG requirements and regulations such as the UFLPA, as core determinants rather than peripheral considerations. In doing so, the research advances existing literature by reframing sustainable export capacity as a dynamic capability shaped by both market and institutional forces.

Third, methodological contribution to MCDM/AHP literature. While the AHP has been widely applied in supply chain and supplier selection problems, this study extends its application by incorporating non-market institutional variables into the hierarchical decision structure. Specifically, abstract constructs such as stakeholder pressure, regulatory compliance, and institutional legitimacy are operationalized and quantified within the AHP framework. This represents a novel methodological contribution, as previous MCDM/AHP studies have largely focused on measurable operational or cost-based criteria.

Fourth, empirical contribution from a developing economy context. Using the case of Vietnam, the study provides empirical evidence on how firms in a developing economy simultaneously respond to internal constraints and external institutional pressures in the context of sustainable exports. The findings demonstrate that these factors interact rather than operate independently, thereby offering insights not only for Vietnam but also for other emerging markets facing similar regulatory environments.

Overall, the proposed framework contributes to bridging the gap between strategic management theories and quantitative decision-making models, while offering a replicable approach for future research on sustainable export performance in industries subject to increasing global compliance requirements.

5.3. Managerial implications

The AHP results indicate that compliance-related factors, particularly labor standards, environmental regulations, and sustainability requirements, are among the most influential determinants of sustainable export performance for Vietnamese textile enterprises in the U.S. market. Based on this prioritization, a key managerial implication is that compliance should be embedded as a core strategic component rather than being treated as a short-term administrative requirement.

This result can be further explained by the increasing regulatory pressure in the United States, particularly under the UFLPA, which imposes strict requirements on supply chain transparency and traceability. In line with this prioritisation, the capability to comply with quality standards and supply chain management becomes the most critical determinant, as firms are required not only to ensure product quality but also to demonstrate full control over sourcing,

production processes, and labor conditions across the entire supply chain. This reflects a fundamental shift in compliance from a product-based requirement to a comprehensive supply chain governance issue. In practice, Vietnamese textile enterprises face significant challenges due to their high dependence on imported raw materials and the uneven level of supply chain transparency across the industry, which limits their ability to provide sufficient documentation and traceability evidence. As a result, shipments may be subject to additional inspections, delays, or even rejection at U.S. ports when compliance requirements are not fully met. Therefore, compliance capability is no longer a supporting function but a prerequisite for market access, directly reinforcing its dominant role identified in the AHP results.

Accordingly, firms should prioritize strengthening internal compliance systems and enhancing supply chain transparency, as these factors carry higher relative importance in the AHP results compared to cost-oriented competitive dimensions. Investments in these areas are expected to directly improve firms' ability to meet U.S. market requirements, thereby increasing partner trust and reducing export-related operational and regulatory risks.

Furthermore, the findings suggest a shift in competitive orientation, as cost leadership alone is no longer the dominant driver of sustainable export capacity. This implies that Vietnamese textile exporters should progressively reorient their strategies toward sustainability and responsible production practices. Such a transition not only aligns with the weighted importance of non-price factors identified in the AHP model but also contributes to the development of more stable and long-term relationships with international buyers, supporting sustained export growth.

5.4. Limitations of the study

Although the study achieved its research objectives, several important limitations should be explicitly acknowledged and critically examined, particularly in relation to methodological weaknesses and the robustness of the findings.

Firstly, the study is based on a relatively small sample size, consisting of only four participants, including two managers and two experts in the textile and garment industry. While these participants provide valuable practical insights, such a limited sample raises concerns about representativeness and the extent to which the findings reflect the diversity of firms within the industry, especially large-scale or vertically integrated enterprises. More critically, in the context of the AHP, a small number of experts increases the sensitivity of the results to individual judgments. This implies that a single expert's evaluation may disproportionately influence the pairwise comparison matrix and the resulting weights. Consequently, the stability of the weighting system may be compromised, which in turn reduces the robustness and generalizability of the findings.

Secondly, the study relies heavily on subjective expert judgment, which is an inherent limitation of the AHP method. The pairwise comparison process is grounded in individual perceptions and experiences, making it inherently vulnerable to cognitive bias. Although the CR meets the acceptable threshold, it is important to emphasize that CR ensures internal logical consistency rather than objective accuracy. In other words, judgments may be consistent but still systematically biased. As a result, the derived weights may reflect subjective preferences rather than the actual importance of the factors, thereby affecting not only the accuracy of the weighting process but also the validity of the final ranking of factors.

Thirdly, the study lacks quantitative validation using large-scale empirical data. The results are primarily derived from qualitative analysis and expert evaluation of 13 factors, without being tested through statistical techniques such as regression analysis, structural equation modeling (SEM), or other econometric methods. The absence of such validation limits the ability to verify causal relationships between variables and weakens the empirical rigor of the study. Consequently, the findings should be interpreted as exploratory rather than

confirmatory, and the explanatory power of the model remains limited.

Fourthly, the study was conducted using a static approach, meaning that data was collected and analyzed only within a single time frame. Therefore, sustainable export capacity is a dynamic concept, constantly changing overtime under the influence of numerous economic, political, and social factors. Specifically, factors such as US trade policy, ESG standards and requirements, and sustainable consumption trends in the international market can evolve rapidly and continuously over time. However, the AHP methodology used in the study only reflects the assessment and determination of experts at the time of the survey, based on their current experience and perspectives. Consequently, the research results do not reflect the changes over time of the influencing factors, nor do they capture the long-term development trends of sustainable export capacity. This limits the ability to forecast the future and reduces flexibility in applying research findings to strategy development in the context of constantly fluctuating international markets.

Furthermore, the study focuses exclusively on domestic textile and garment enterprises and does not include foreign direct investment (FDI) firms. This restricts the comprehensiveness of the analysis, as FDI enterprises often play a significant role in export performance and typically possess advantages in capital, technology, managerial expertise, and integration into global value chains. The exclusion of this group may therefore lead to an incomplete assessment of sustainable export capacity and limit the potential for comparative analysis across different business models.

Given these limitations, future research should adopt a more rigorous and comprehensive approach. Expanding the sample size and increasing the diversity of expert participants would enhance representativeness and reduce bias. More importantly, integrating quantitative datasets and applying complementary analytical methods, such as regression analysis or structural modeling, would allow for empirical validation and strengthen the robustness of the findings. In addition, including FDI enterprises and conducting comparative analyses between domestic and foreign-invested firms would provide a more holistic understanding of sustainable export capacity. These improvements would significantly enhance the reliability, objectivity, and generalizability of future research outcomes.

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