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ARTICLE

Improving the Competitiveness of Coffee Exports: A Case Study in the Central Highlands Provinces, Vietnam

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ABSTRACT

The objective of this study is to identify the factors that affect the competitiveness of coffee exports in the Central Highlands provinces of Vietnam. Through reviewing previous studies, conducting field visits to enterprises, and consulting with experts, the author has proposed factors for the research model. A survey was conducted with representatives from 271 coffee exporting enterprises in the Central Highlands. The author used SPSS software to process the data and evaluate the factors in the proposed research model. The results indicate that five factors affect the improvement of coffee export competitiveness for enterprises in the Central Highlands provinces of Vietnam, listed in the following order: (1) Employee qualifications, (2) Readiness to apply technology, (3) Product diversity and quality, (4) Factors related to the production process, (5) Government support. Based on the level of influence of these factors, the author provides recommendations to help enterprises enhance their competitiveness in the coffee export market. This study also serves as a valuable reference for managers in the coffee export sector to develop policies that promote coffee export activities in the current fiercely competitive environment.

Keywords: Competitiveness; Coffee; Export; Central Highlands; Vietnam

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1. Introduction

Vietnam recorded a "great leap" in coffee exports in 2024, surpassing the 5 billion USD mark for the first time. With this result, the Vietnamese coffee industry continues to affirm its position as the second-largest coffee supplier in the world, after Brazil. According to data from the Ministry of Agriculture and Rural Development, Vietnam's coffee exports are estimated to reach 1.32 million tons in 2024, with a turnover of 5.48 billion USD, down 18.8% in volume but up 29.11% in value compared to the same period in 2023. The average export price of coffee in 2024 is estimated at 4,151 USD/ton, up 56.9% from the same period in 2023. Previously, coffee export turnover reached: 2.66 billion USD in 2020; 3 billion USD in 2021; 4.06 billion USD in 2022; and 4.18 billion USD in 2023. According to analysis by Rabobank (one of the leading commercial banks in the Netherlands with operations covering Europe, Asia, North America, and South America), from the beginning of the year to the end of September 2024, coffee prices on the world market were mainly led by Robusta, when countries producing this type of coffee, including Vietnam, faced difficulties due to drought and extreme weather due to the impact of the El Nino phenomenon. Mr. Carlos Mera, Director of Agricultural Commodity Market Research at Rabobank, stated that although Vietnam's coffee output in the 2023–2024 crop year was not particularly disappointing, being only about 5% lower than forecast, this occurred after coffee output in Brazil declined over the past few years, resulting in low inventories. In addition, delays in shipping due to shipping lines having to change routes due to concerns about the crisis in the Red Sea also contributed to the increase in coffee prices. Vietnam plays a strategic role in the global coffee export industry, particularly in the production and export of Robusta coffee. With stable growth in both production and quality, along with government support and proactive efforts from businesses, Vietnam's coffee industry has the potential to continue growing strongly and enhance its position in the international market. However, the industry also faces significant challenges, such as climate change and increasing demands for sustainable production. To overcome these challenges, businesses and authorities must continuously innovate and adapt [1].

Meanwhile, coffee importers in Europe in 2024 have been aggressively increasing their imports ahead of the EU Deforestation Regulation (EUDR) coming into effect. All of these factors have led to a sharp rise in coffee prices. Some experts predict that market tensions will ease in 2025; however, long-term coffee prices are expected to continue rising due to factors such as climate change. Additionally, the coffee industry is intensifying its collaboration with international organizations to build and certify sustainable coffee production areas, minimizing the negative impact on the environment. These efforts aim to meet the increasing market demand for clean coffee and sustainable coffee and to protect the interests of coffee farmers. One notable trend is the strong growth of processed coffee, especially instant coffee and roasted coffee. Domestic enterprises have been increasing their processing capacity to meet the growing demand from major markets. Coffee prices in 2024 have shown a rapid recovery trend, especially when the export price of Robusta coffee is higher than that of Arabica coffee, which is very special. The main reason for the increase in coffee prices is due to the forecast of coffee supply output of some major coffee exporting countries, such as Brazil and Vietnam, climate change, as well as weather abnormalities, are the main causes leading to crop failure. The recorded export price of coffee at the end of 2024 in Vietnam was approximately 122,000 VND/kg, representing a nearly 45% increase over the same period in 2023. A major barrier. Coffee exporting enterprises must comply with regulations to avoid to increasing coffee export prices is that the European Union places a heavy emphasis on the traceability of coffee from exporting countries. Coffee exporting enterprises must comply with regulations to avoid contributing to deforestation. This is a big challenge but also an opportunity to help the Vietnamese coffee industry develop sustainably [2].

2. Literature Review and Research Hypotheses

The issue of improving the competitiveness of coffee, in particular, and agricultural products in general has been studied in many different countries. The

studies have highlighted the characteristics of internal problems of coffee production enterprises as well as assessed the factors of countries importing coffee from their country. Boansi and Crentsil [3] analyzed the competitiveness of the factors determining coffee exports, as well as the issue of production prices and coffee output of Ethiopia. Some comments were that the productivity and quality of coffee are not high, leading to difficulties in competing with other countries, high transaction costs, as well as poor supply chain management, leading to more difficulties in competing in the market. In addition, the instability of exchange rates, as well as the lack of synchronous support from the government for this issue, are also obstacles to exports. Purwawangsa et al. [4] made comments to increase the competitiveness of Indonesian coffee, in which improving quality is given top priority and diversifying export products, adapting to certifications to ensure that products are eligible for export to demanding markets, and clarifying the origin of exported coffee are very important. Nguyen et al. [5] pointed out that to improve the competitiveness of Vietnamese coffee, it is necessary to focus on key factors in supply chain management. Nugroho and Lakner [6] argued that coffee exports are positively affected by exchange rates, gross domestic product and political globalization index, while the trade globalization index has a negative impact on coffee exports. Darmawan et al. [7] pointed out that the main reason for the decrease in coffee exports during harvest times in Indonesia is the decrease in demand from consuming countries. This study also raises the issue of the sustainable development of green agricultural products to recover from this decline. Vo et al. [8] pointed out that the factors that positively affect Vietnam's coffee exports are Gross Domestic Product (GDP) growth and population of the importing country; in addition, the factors that negatively affect exports are tariffs and exchange rate fluctuations. Faizin et al. [9] stated that the application of digital marketing in coffee exports is very necessary, as it will help coffee exporting enterprises expand their markets as well as increase sales. Additionally, when coffee enterprises utilise digital marketing, it will enable consumers and customers to easily access product information and identify brands. Deepika [10] pointed out that the competition in exporting agricultural products is partly influenced by the fact that enterprises must meet the certification requirements of importing countries, as well as ensure food safety standards. The government needs to pay more attention to free trade agreements and implement numerous price support measures for exports to increase competitiveness with other countries. Le et al. [11] affirmed that coffee is a key export item for Vietnam, both currently and in the future. Businesses need to adapt more quickly to international business activities, as well as digital transformation, and must also take advantage of the items in the free trade agreement between Vietnam and the EU. Nguyen et al. [5] noted that leveraging the coffee supply chain is necessary to enhance the competitiveness of Vietnamese enterprises in the export market, and that higher investments are required in this sector. Tesfaye [12] concluded that stabilizing coffee market prices will help improve export efficiency, assisting businesses to improve their competitiveness in the international market. In addition, the Government should also have a mechanism to regulate loan interest rates for coffee businesses at a more appropriate level. The domestic investment incentive policy system has partly supported agricultural export enterprises; however, additional government policies are needed to focus on planning agricultural growing areas, supporting farmers in science and technology, and implementing policies on borrowing capital [13]. Le Thu Hanh and Can Thi Thu Huong [14] have argued that favorable natural conditions as well as reasonable government policies on capital and planning will have the strongest impact on the application of high technology in agricultural production, in addition to the issue of enterprises' willingness to apply technology to this issue. Loan [15] also agrees with the need to promote the Vietnamese government's support policies for export activities, including capital policies, science and technology, and exchange rate stability. Based on the research results, the author proposes the following hypotheses on factors affecting the improvement of Vietnam's coffee export competitiveness:

Hypothesis 1 (H1). *Product diversity and quality (PROD) positively affect (+) the competitiveness of coffee exports (COMP)*

Product quality is defined as the set of product

characteristics and features that meet the needs and expectations of customers [16]. In the coffee export industry, quality not only includes physical characteristics such as cleanliness, bean size, and moisture content, but also involves characteristic flavor, uniformity, and international standards such as organic certification, fair trade. Good product quality helps businesses create a clear difference from competitors. High-quality coffee with a special flavor will attract loyal customers and enhance brand reputation [17]. Product diversification is a strategy to provide a variety of products to serve diverse customer segments [18]. In the coffee industry, product diversity can be expressed in many forms: pure coffee beans, roasted and ground coffee, instant coffee, speciality coffee (high-end), organic coffee, blended coffee, and various packaging forms.

Hypothesis 2(H2). *Factors in the agricultural production process (PROC) positively affect (+) the competitiveness of coffee exports (COMP)*

Coffee is a crop that is sensitive to climate and soil conditions. Temperature, rainfall, humidity, and soil properties affect the yield and quality of coffee beans [19]. Choosing coffee varieties with high yield, good quality, and disease resistance contributes to improving production efficiency. Good varieties also help reduce investment costs and increase yield stability. Organizing farming in groups, cooperatives, or enterprises helps to apply synchronous science and technology, save costs and improve efficiency [20]. Processing, drying, and preservation processes significantly affect the final quality of coffee. Modern technology helps to preserve the characteristic flavor, increase product value and extend storage time.

Hypothesis 3 (H3). *Financial capacity (FINA) positively affects (+) the competitiveness of coffee exports (COMP)*

Financial capacity is understood as the ability of an enterprise to mobilize and effectively use capital sources to meet production and business needs and financial obligations [21]. Good financial capacity allows enterprises to invest in modern processing technology, improve production processes to improve coffee quality, reduce costs, and increase productivity [22]. This is a key factor that helps enterprises create highly competitive products in the international market. Strong financial resources help enterprises expand coffee growing areas, diversify products (coffee beans, roasted coffee, instant coffee, and speciality coffee) to meet diverse market needs. Diversifying and expanding production scale helps enterprises increase their ability to capture the market and quickly adapt to fluctuations. Strong financial capacity helps businesses to maintain reserve resources, allowing them to cope with market risks such as fluctuations in coffee prices, changes in tax policies, or liquidity difficulties [23]. Financial stability helps maintain continuous production and business activities and increases trust from partners and customers.

Hypothesis 4 (H4). *Government support (GOVE) positively affects (+) the competitiveness of coffee exports (COMP)*

Government support plays an important role in promoting the development of the coffee industry and enhancing the competitiveness of exporting enterprises in the international market. The government can create a favorable environment through policies supporting finance, technology, training, trade and infrastructure development. These interventions help reduce production costs, improve product quality, and expand markets, thereby contributing to enhancingthe competitiveness of the coffee export industry. Financial and tax support helps reduce production and export costs, increase profits and price competitiveness [24]. Training and technology transfer help enterprises improve coffee quality, meeting strict standards in the international market [25].

Hypothesis 5 (H5). *Readiness to apply technology (TECH) positively affects (+) the competitiveness of coffee exports (COMP)*

Technology Readiness is defined as the willingness, ability and attitude of an organization or enterprise to adopt and apply new technologies to improve production processes, improve product quality and increase operational efficiency [26]. In the coffee industry, this readiness reflects the extent to which enterprises proactively apply modern technologies to the entire value chain, from production and processing to management and export. Technology is considered a key factor promoting development and enhancing competitiveness in

the coffee industry, especially in the context of globalization and increasing demands from the international market [27]. Information technology and digitalization help to make product information transparent, meet customer requirements and international certifications.

Hypothesis 6 (H6). *Employee qualifications (EMPL) positively affects (+) the competitiveness of coffee exports (COMP)*

Human resources play a central role in production and business activities, especially in the coffee export industry—a field that requires advanced processing techniques, quality management, and the ability to adapt to the international market. Employee qualifications include the knowledge, skills, experience, and work attitude that employees possess [28]. In the context of coffee exports, this qualification encompasses not only cultivation and processing techniques but also management, marketing, and an understanding of the international market. Qualified human resources will readily accept new and innovative technologies in the production process and quickly adapt to fluctuations in the global market [29]. This helps businesses improve their innovation capacity and maintain their long-term competitive position. Qualified staff are also capable of conducting market research, building effective marketing and branding strategies, and contributing to the expansion of export markets and the enhancement of coffee product value in the international market.

3. Methodology

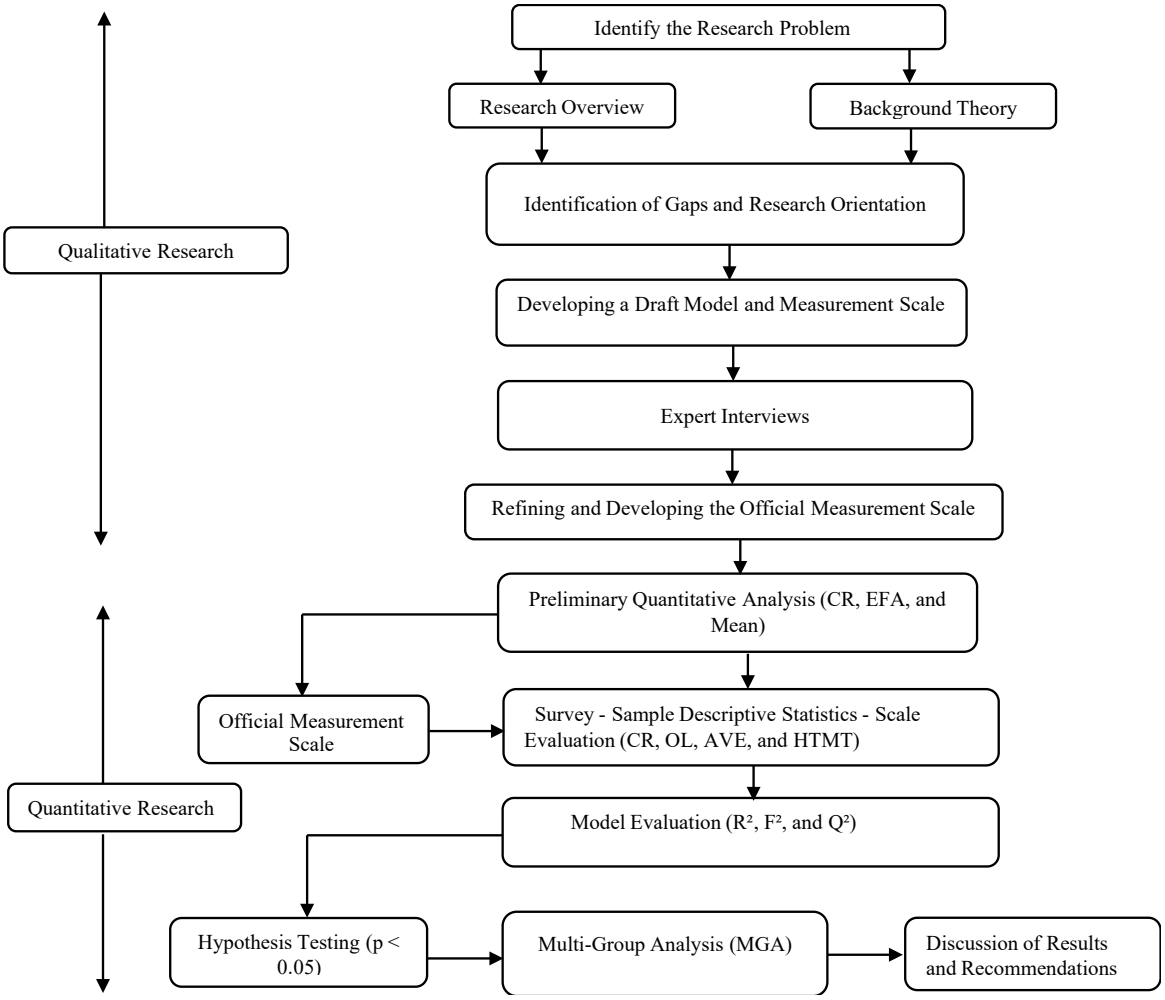

Figure 1. Research implementation process.

Source: Author's proposal.

The author employs a mixed-methods research approach, combining qualitative and quantitative research methods (**Figure 1**). The study conducted in-depth interviews with university lecturers and managers working directly at enterprises and coffee associations to gather their experiences related to improving the competitiveness of Vietnamese coffee exports. These in-depth interviews all have a pre-prepared structure of questions and discussions, and any issues arising during the interview process are recorded for consideration during the official research. First of all, through the process of synthesizing documents and previous research topics related to coffee exports, agricultural products as well as coffee export competitiveness, the group of authors identified factors affecting the improvement of coffee export competitiveness at enterprises in the Central Highlands region, Vietnam, thereby proposing a research model on factors influencing this issue, and at the same time building a research scale for research variables in the model. The results of qualitative research, obtained through interviews and group discussions with experts, helped determine the official research model for this study. At the same time, experts also supported the author in adjusting the draft scale for research variables to make them easy to understand, complete and appropriate, thereby forming an official research scale to move to the analysis step in quantitative research (**Appendix A**).

Quantitative research is conducted to evaluate the scale and test the theoretical model of the relationship between factors in the model. This method is used to measure and test the factors that affect the improvement of coffee export competitiveness at enterprises in the Central Highlands, Vietnam. Quantitative research allows quantifying and measuring the collected information with specific numbers.

Quantitative research methods include: Surveys through questionnaires using the Likert scale, descriptive statistical analysis, and correlation and regression analysis. The goal of this method is to test the theoretical model by quantifying and measuring the collected information using specific numbers, as facilitated by SPSS software.

Analyze the reliability and value of survey data as well as the value of the scale. The purpose of this step is to test the correlation between observed variables and evaluate the reliability of the scales (or observed variables) based on the level of correlation between observed variables and factors.

Using descriptive statistics to evaluate the average of the factor components (or initial factor groups) to generalize the impact of the factor components and each detailed component (each observed variable) on improving the competitiveness of coffee exports at enterprises in the Central Highlands, Vietnam. The response to the observed variables in the research model is related to the level of interest of the research subjects. Using analytical tools in quantitative research, such as Exploratory Factor Analysis (EFA) [30]. The EFA analysis method belongs to the group of interdependent multivariate analysis, meaning that there are no dependent variables and independent variables. Still, it is based on the correlation between the variables. EFA is used to reduce a set of k observed variables into a set F (F<k) of more meaningful factors. The basis of this reduction is based on the linear relationship between the factors and the observed variables. The purpose of EFA analysis is to eliminate spurious factors, assess the reliability of the values of the scales, explore (new scales) and confirm (adjust existing scales). After analyzing the correlation between variables, the author performs regression techniques based on the least significant average estimation, with the condition that the normal distribution is guaranteed. The study employs multivariate regression according to the method, which involves including all variables in the model simultaneously and examining the statistical results related to the variables included. The adjusted coefficient of determination R2 is used to determine the suitability of the model. Analysis of variance is an analysis method that focuses on variance. ANOVA analysis of variance tests for statistically significant differences with 95% confidence (or significance level Sig.< 0.05). See the results in the ANOVA table. If sig. in this table is >0.05, it is concluded that there is no difference between the qualitative variable groups. If sig. in this table is <=0.05, it is concluded that there is a difference between the qualitative variable groups [31].

4. Results and Discussion

The author conducted a survey and directly collected responses from 280 coffee-exporting enterprises in the Central Highlands, representing a total of 2,000 enterprises, both large and small, participating in the coffee export sector in the region. The author selected medium and large enterprises with a full range of components to ensure the highest possible representativeness of the sample. After screening invalid responses (such as blank or multiple answers for a single question), a total of 271 valid surveys were collected, representing the enterprises. The respondents were export executives or department heads of the export department at companies that were well aware of the characteristics of coffee export activities within their own companies as well as in the broader market.

Through the results of **Table 1**, the number of coffee exporting enterprises in the private sector accounts for almost an absolute proportion, with 257 enterprises; the remaining state-owned enterprises have only 8 enterprises, and the Foreign Direct Investment (FDI) and joint venture enterprises have only 1 enterprise. Among the private enterprises, the majority of enterprises have participated in the export market for 5 years or more; only 15 enterprises were newly established for less than 5 years. State-owned enterprises and FDI enterprises all have a seniority of 10 years or more.

Table 1. Statistics of the sample number of coffee exporting enterprises in the Central Highlands provinces.

Types of Coffee Exporting Businesses	< 5 years	5 - 10 years	10 - 15 years	> 15 years	Total
Private Enterprises	15	50	85	107	**257**
State Enterprises	-	-	-	8	**8**
FDI Enterprises, Joint Ventures	-	-	5	1	**6**
Total	**15**	**50**	**90**	**116**	**271**

Source: Survey of the author.

Regarding the characteristics of the survey sample in **Table 2**, the number of men accounts for a higher proportion of 68.27%. In comparison, the remaining women account for only 31.73% of the surveyed people, which is quite understandable because the nature of the expertise is related to agricultural products, not to mention the purchase at the garden requires men to be healthy and have a good understanding of the quality of the goods. Regarding the age of the survey, most are 35 years old or older, the number under 35 years old accounts for only 7.75%, showing a reality that the level of commitment to work as well as the rate of job stability in this industry is quite good. The majority of respondents have over 10 years of working experience, accounting for 53.51%, these are people with whole experience through many stages of ups and downs in coffee export development, they will be the appropriate evaluators for the questions in the survey of this study, the number with less than 5 years of experience is very low, about 10.7%. In terms of qualifications, the majority of respondents hold a university degree, accounting for 67.53%, while those with a postgraduate degree account for approximately 28.04%. This indicates that the job does not require a very high level of qualification, but rather is primarily based on the worker's work experience.

Table 2. Characteristics of the representative survey sample for businesses.

Characteristic	Frequency	Ratio %
1. Sex	*N = 271*	*100%*
Male	**185**	**68.27%**
Female	**86**	**31.73%**
2. Age	*N = 271*	*100%*
< 35 years old	**21**	**7.75%**
35 - 45 years old	**116**	**42.8%**
> 45 years old	**134**	**49.45%**

Table 2. *Cont.*

Characteristic	Frequency	Ratio %
3. Work experience	*N = 271*	*100%*
< 5 years	**29**	**10.7%**
5 - 10 years	**97**	**35.79%**
> 10 years	**145**	**53.51%**
4. Degree	N = 271	100%
Under university	**12**	**4.43%**
University degree	**183**	**67.53%**
Postgraduate	**76**	**28.04%**

Source: Survey of the author.

4.1. Cronbach's Alpha Reliability Assessment

Cronbach's Alpha measures the internal consistency of a scale. It indicates whether the questions in a scale are closely related and whether they measure the same concept. If your scale contains questions that do not correlate well with each other, the Cronbach's Alpha value will be low. The author tested the reliability of Cronbach's Alpha of the scales in the components of 06 independent factors and 01 dependent variable, which is the level of competitiveness of Vietnamese exported coffee. Through the results in **Table 3**, all independent factors and dependent factors have a reliability greater than 0.6, as well as the total correlation coefficient of each scale is greater than 0.3, so it is concluded that all scale components of the factors are reliable for use. That shows that the scale is built with statistical significance and achieves the necessary reliability coefficient. The author continues to weigh these factors against each other using the EFA exploratory factor analysis. Among the independent factors, the Readiness to apply technology factor has the largest Cronbach's Alpha coefficient at 0.895, and the Financial capacity factor have the smallest Cronbach's Alpha coefficient at 0.740. This means that the research concepts are closely connected, ensuring they can be consistently included in the model analysis in subsequent steps.

Table 3. Reliability according to Cronbach's Alpha coefficient.

Variable	Variable Abbreviation	Cronbach's Alpha
Product diversity and quality	PROD	0.882
Factors in the agricultural production process	PROC	0.888
Financial capacity	FINA	0.740
Government support	GOVE	0.886
Readiness to apply technology	TECH	0.895
Employee qualifications	EMPL	0.814
The competitiveness of coffee exports	COMP	0.931

Source: The authors collected.

4.2. Exploratory Factor Analysis (EFA) for Independent Factors

The author continues to conduct exploratory factor analysis EFA, to ensure the reliability of the Cronbach's Alpha coefficient for both independent and dependent factors. This is the technique used to extract 06 independent variables as the initially proposed research model into one or several factors, which once again confirms the reasonableness of the scales when building it related to explaining the nature of the initially proposed research scales, the assessment of the scales of 06 independent factors when performing exploratory factor analysis EFA is widely used in research to preliminarily evaluate the measurement scales [32].

Table 4. Exploratory EFA factor analysis of independent factors.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.804
Bartlett's Test of Sphericity	Approx. Chi-Square	3461.855
	df	276
	Sig.	0.000

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.845	20.188	20.188	4.845	20.188	20.188	3.078	12.826	12.826
2	3.307	13.781	33.969	3.307	13.781	33.969	3.046	12.691	25.517
3	3.156	13.148	47.117	3.156	13.148	47.117	3.018	12.577	38.094
4	2.335	9.728	56.845	2.335	9.728	56.845	3.011	12.545	50.639
5	2.179	9.079	65.924	2.179	9.079	65.924	2.529	10.538	61.177
6	1.197	4.989	70.913	1.197	4.989	70.913	2.337	9.737	70.913
7	0.803	3.348	74.261						
8	0.652	2.716	76.977						
9	0.558	2.323	79.300						
10	0.554	2.307	81.607						
11	0.498	2.074	83.681						
12	0.492	2.051	85.732						
13	0.467	1.944	87.676						
14	0.402	1.677	89.353						
15	0.386	1.608	90.961						
16	0.333	1.386	92.347						
17	0.308	1.282	93.629						
18	0.291	1.211	94.840						
19	0.267	1.113	95.953						
20	0.244	1.018	96.970						
21	0.217	0.905	97.875						
22	0.210	0.875	98.750						
23	0.160	0.669	99.419						
24	0.139	0.581	100.000						

Extraction Method: Principal Component Analysis.

Rotated Component Matrix[a]

	Component					
	1	2	3	4	5	6
TECH4	0.877					
TECH3	0.865					
TECH2	0.857					

Table 4. *Cont.*

Rotated Component Matrix[a]						
	Component					
	1	2	3	4	5	6
TECH1	0.848					
PROC4		0.908				
PROC2		0.896				
PROC1		0.858				
PROC3		0.783				
GOVE1			0.905			
GOVE2			0.847			
GOVE4			0.842			
GOVE3			0.823			
PROD4				0.869		
PROD3				0.849		
PROD1				0.836		
PROD2				0.820		
EMPL4					0.782	
EMPL1					0.751	
EMPL3					0.729	
EMPL2					0.727	
FINA4						0.829
FINA1						0.806
FINA2						0.662
FINA3						0.635
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.						
a. Rotation converged in 6 iterations.						

Source: The authors collected.

Based on the results in **Table 4**, the author found that after conducting Cronbach's Alpha reliability testing and EFA exploratory factor analysis, no observation variables were removed from the original 24 observed variables belonging to 6 independent factors. These 24 observed variables were still grouped into 6 factors, and these 6 factors remain unchanged compared to the initially proposed research model, although the presentation order was altered.

4.3. Exploratory Factor Analysis EFA for Dependent Factor

Table 5. Exploratory EFA factor analysis of dependent factors.

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.903
Bartlett's Test of Sphericity	Approx. Chi-Square	1072.801
	df	10
	Sig.	0.000

Total Variance Explained						
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.924	78.485	78.485	3.924	78.485	78.485
2	0.331	6.617	85.101			
3	0.299	5.980	91.081			
4	0.278	5.559	96.640			
5	0.168	3.360	100.000			
Extraction Method: Principal Component Analysis.						

Table 5. *Cont.*

Component Matrix[a]	
	Component
	1
COMP4	0.928
COMP2	0.894
COMP5	0.875
COMP3	0.873
COMP1	0.857
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Source: The authors collected.

The author also conducted a similar procedure to assess the reliability when performing an EFA exploratory analysis with the dependent variable in the research model. In **Table 5**, the results of EFA exploratory factor analysis with a KMO coefficient value of 0.903> 0.5 and Bartlett's test with a sig. of 0.000<0.05 confirm that the data is suitable for analyzing the dependent factor to improve the efficiency of coffee export of enterprises in the Central Highlands, Vietnam. In addition, the results also confirmed once again that the observed components of this factor have been extracted from 5 scales to assess the competitiveness of Vietnamese coffee exports into a main factor with an Eigenvalue of 3.924 and total extracted variance of 78.485%>50%. From there, it is confirmed that the observed variables of the dependent factor ensure the conditions and reliability to proceed with the next testing steps.

4.4. Regression analysis

After extracting 06 independent factors (including 24 observed variables) and 01 dependent factor (including 05 observed variables), all of which have the meanings presented above, the author proceeds to calculate the average value representing the observed variables and conduct regression analysis. The purpose of the regression analysis is to determine the extent to which the 06 independent factors have an impact on improving the competitiveness of exported coffee in the Central Highlands, Vietnam.

The author proposes the following regression **Equation (1)**:

$$COMP = \beta 0 + \beta 1PROD + \beta 2PROC + \beta 3FINA + \beta 4GOVE + \beta 5TECH + \beta 6EMPL + Ui \quad (1)$$

The regression model will evaluate which of the 06 independent factors (proposed model) have an impact on the dependent factor, aiming to improve the efficiency of coffee exports for enterprises in the Central Highlands, Vietnam. At the same time, the results of the model will describe the level of strong or weak impact, thereby helping us predict the value of the dependent variable.

Table 6. Results of regression model analysis.

Model Summary[b]										
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.676[a]	0.457	0.444	0.46397	0.457	36.987	6	264	0.000	1.854
a. Predictors: (Constant), EMPL, PROC, GOVE, TECH, PROD, FINA										
b. Dependent Variable: COMP										

Table 6. *Cont.*

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.423	0.342		-1.238	0.217
	PROD	0.181	0.042	0.208	4.264	0.000
	PROC	0.182	0.042	0.204	4.381	0.000
	FINA	0.012	0.043	0.014	0.279	0.780
	GOVE	0.141	0.041	0.162	3.433	0.001
	TECH	0.223	0.042	0.254	5.311	0.000
	EMPL	0.493	0.081	0.343	6.103	0.000
a. Dependent Variable: COMP						

(Resource: The authors collected)

Through the results in **Table 6**, all sig. values of the factors are less than 5%, except for the FINA factor with a sig. value of 0.78>0.05, so it is recommended to eliminate this factor or in other words, the regression results show that 05 independent factors affect the competitiveness of exported coffee in the Central Highlands (PROD, PROC, GOVE, TECH, and EMPL) 01 factor that does not affect is financial capacity (FINA). In which, the factor of staff qualifications (EMPL) has the strongest impact, followed by the factor of readiness to apply technology (TECH). The factors of product diversity and quality (PROD), factors related to the production process (PROC), and finally, the factor that has the least impact on the competitiveness of Vietnamese exported coffee is the factor of support from the Government (GOVE). The Adjusted R-Square value of the model is 0.444, which means that the model results have 05 factors affecting the competitiveness of exported coffee in the Central Highlands, Vietnam, which explain 44.4%, the remaining 56.6% will be affected by other factors not mentioned in the research model. Furthermore, the Durbin-Watson value of the model is 1.854 (approximately 2), indicating that the model does not exhibit autocorrelation.

Table 7. Results of ANOVA analysis.

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.772	6	7.962	36.987	.000[b]
	Residual	56.831	264	.215		
	Total	104.603	270			
a. Dependent Variable: COMP						
b. Predictors: (Constant), EMPL, PROC, GOVE, TECH, PROD, FINA						

Source: The authors collected.

Based on the results of the ANOVA with a sig. value of 0.000 < 0.05, the hypothesis H0 is rejected and the alternative hypothesis H1 is accepted (**Table 7**). That is, the model exists or in other words, with a significance level of 5%, it can be concluded that the competitiveness of Vietnamese coffee exports of enterprises in the Central Highlands is affected by at least 1 of 5 factors (staff qualifications, readiness to apply technology, product diversity and quality, factors related to the production process, support from the Government).

The level of staff is the factor that has the strongest impact on the competitiveness of Vietnamese coffee exports for businesses in the Central Highlands provinces. The main reason is that the areas in these provinces are quite harsh, far from the economic and cultural centers of the country, so it is difficult to attract truly qualified personnel to these businesses. Most highly skilled workers prefer to focus on living and developing in large cities such as Ho Chi Minh City, Da Nang, and Hanoi. The solution to mitigate these disadvantages is for businesses to develop attractive incentive policies to attract talented employees and enhance their com-

petitive advantage. Additionally, businesses must apply technology at various stages to improve their competitiveness in the coffee export sector [14]. The application of technology in business, such as product digitization, digital marketing, and market research, is very necessary; it will help increase the presence of businesses in the market. Given that Vietnam is promoting digital transformation at a rapid pace, applying artificial intelligence and science and technology strongly in production and business, and promoting the private economy, coffee export businesses in the Central Highlands cannot afford to stand aside if they want to remain competitive. When it comes to competition in the coffee export sector, quality is always put first [3]. The application of advanced science and technology combined with strict control of product-related indicators such as origin, pesticide residues, product composition index, and ripening rate is things that need to be focused on. This is similar to the fact that factors in the production process must comply with the standards and regulations of the import market [33]. Production must strictly comply with conditions regarding varieties, types of pesticide residues, and coffee picking processes, as well as not being produced in encroached forest areas, among other conditions. Policies on loans, as well as planning of coffee-growing areas, are very necessary from the Government, which will affect the competitiveness of exported coffee. The government needs to have preferential policies on loans for businesses in the coffee export business ecosystem; moreover, supporting science and technology, and regenerating the coffee growing environment are also very urgent at present. Another issue that the government can help coffee export businesses with is stabilizing the exchange rate, creating a certain advantage in exporting this essential commodity [12].

5. Conclusion

Based on the results of this study, the authors propose some management implications for enterprises, producers, and exporters in the Central Highlands provinces to achieve effective solutions for restoring the competitiveness of Vietnam's fiercely competitive coffee exports. Accordingly, enterprises and exporters need to master the following important factors. Quality meets standards; most of the main leading coffee importing countries, such as Vietnam, are markets that require high-quality and diverse coffee products. Vietnamese coffee producers and exporters need to ensure that their products meet the quality and food safety standards of the importing country. Marketing, branding, and understanding import market trends, export enterprises need to invest in effective marketing strategies, branding and timely grasp the consumption trends of the export market [34]. Strengthening cooperation in the supply chain: Building strong relationships with partners in the coffee supply chain is also crucial. Cooperation with importers, distributors and other business partners can help coffee producers and exporters in the Central Highlands provinces of Vietnam optimize opportunities and minimize risks in exporting [35]. "According to Mr. Le Thanh Tung, Deputy Director of the Department of Crop Production in charge of the South, Ministry of Agriculture and Rural Development, it is necessary to build and shape the awareness of farmers, the main participants in the coffee production cycle, they must be aware of the benefits of implementing the correct production process, ensuring product quality, which not only brings economic benefits to them but also ensures benefits in brand value for Vietnam in coffee exports in particular and other agricultural products in general. The remaining issues, such as expanding the market and improving the processing techniques of enterprises, are mandatory if we want to increase coffee exports sustainably [36]. Developing and perfecting the logistics system of enterprises is very urgent, as it helps enterprises reduce the cost of export capital to the lowest level, leading to a certain competitive advantage in price when exporting compared to other countries [37]. The EU-Vietnam Free Trade Agreement (EVFTA) is a crucial agreement that promotes trade relations between Vietnam and the European Union (EU), especially in the export of agricultural products, including coffee. It is one of the most advanced free trade agreements that Vietnam has signed, with outstanding benefits for both parties. Vietnamese coffee can be protected under geographical indications in the EU. This means that some speciality coffee products from Vietnam, such as Buon Ma Thuot coffee, will have the opportunity to be recognized as products with distinct origin

and quality, helping to increase value and build a strong brand in the EU market.

Building a competitive tariff policy will also greatly support coffee exports, which will bring a certain advantage in the current fiercely competitive context [38]. It is necessary to proactively supply coffee to businesses in order to ensure the sustainable competitiveness of coffee exporting businesses. Issues regarding coffee product quality require more attention [39]. Enterprises need to build an advertising system on social platforms to reach different audiences more quickly, without facing border barriers [40]. The stability of exchange rates for foreign currencies during exports is also a concern for the banking system in Vietnam, which creates the most favorable conditions for coffee exports [41].

In addition, the study is limited in time and cost as it has not been conducted in some specific importing countries, and has not been expanded to other provinces in Vietnam. This is also a suggestion for future research directions.

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Data Availability Statement

The source of the data used for analysis in this study, including the link, has been included in the "3. Methodology and 4. Results and Discussion" section.

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Conflicts of Interest

The authors declare that they have no conflict of interest.

Appendix A

Symbol	Scale	Answer				
		1	2	3	4	5
PROD	**Product diversity and quality**					
PROD1	Ensure food safety and hygiene					
PROD2	The characteristic aroma, flavor, and color of the product					
PROD3	Environmentally friendly products					
PROD4	Variety of designs and models					
PROC	**Factors in the agricultural production process**					
PROC1	Good soil and climate conditions					
PROC2	Maximum mechanization in the production process					
PROC3	Guaranteed seed and fertilizer services					
PROC4	Production model ensures VietGap standards					
FINA	**Financial capacity**					
FINA1	The scale of production and business capital of the enterprise is guaranteed					

Symbol	Scale	Answer				
		1	2	3	4	5
FINA2	Enterprises have the ability to mobilize production capital easily					
FINA3	Business owners ensure self-funding					
FINA4	Business ensures solvency					
GOVE	**Government support**					
GOVE1	Building a comprehensive development plan and strategy for coffee exports					
GOVE2	Policy to support financial system for coffee export					
GOVE3	Policy to support local coffee quality testing					
GOVE4	Building transportation and irrigation systems to support production					
TECH	**Readiness to apply technology**					
TECH1	Businesses begin to collect, manage and share information.					
TECH2	Digital transformation has a significant impact on decision making					
TECH3	Enterprises identify technology application as a core strategy, capable of creating effective impact for stakeholders.					
TECH4	Ready to apply Artificial Intelligence (AI), Internet of Things (IoT) to ensure operational efficiency					
EMPL	**Employee qualifications**					
EMPL1	The level of workers at the enterprise meets the needs of coffee export activities.					
EMPL2	Good worker discipline					
EMPL3	Strategic planning and production forecasting capacity of business leaders					
EMPL4	Experience of workers in coffee export activities to meet					
COMP	**The competitiveness of coffee exports**					
COMP1	Good quality competitive export coffee					
COMP2	Export coffee brand is built, consumption market is expanding					
COMP3	Uniqueness and diversity of exported coffee products					
COMP4	Coffee export prices are competitive in the market.					

1: Strongly disagree; 2: Disagree; 3: No opinion; 4: Agree; 5: Strongly agree.

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