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The Effect of Economies of Scale on Export Performance of Kenya's Avocado Industry

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Abstract

Export promotion of the Avocado industry is essential for countries looking to tap into international markets. While developed and emerging market countries continue to promote their Avocado varieties for export, most developing countries, such as Kenya, struggle with how best to exploit economies of scale for enhanced export. The objective of this study was to investigate the impact of economies of scale on the export performance of Kenya's avocado industry. The study was anchored on the Resource-Based View and adopted a cross-sectional research design. The targeted population was 137 Avocado export firms in Kenya. A census technique was employed, and a structured questionnaire was formulated and uploaded to Google Forms. A link was shared with respondents. Stata version 17 was used to compute descriptive statistics and Multiple Linear Regression and Pearson Correlation analysis was employed to test statistical association. Findings established that economies of scale have a positive influence on export performance of Kenya's Avocado industry. Larger firms benefit from cost savings, advanced technology adoption, and better negotiation power (mean=3.6). The highest-rated factor was the role of innovation in reducing costs and improving product quality (mean = 3.8). Pearson correlation analysis (r=0.330, p=0.000) and linear regression results (B=0.212, p=0.000) demonstrated that economies of scale enhance firms' export performance through operational efficiency and resource optimization. The paper concludes that economies of scale enhance cost effectiveness, thus making Avocado exports competitive in the global markets. The need for sustained investment in Avocado value addition is recommended so that exports meet international standards.

Key Words: Economies of scale, Innovation, Gross Domestic Product (GDP), Export Performance, International Markets

Introduction

Adam Smiths(1776), proposed the theory of economies of scale. The economies of scale refer to the cost advantage a firm experience when their production output increases, leading to a decrease in the cost per unit. Triggered by fixed cost being spread over a larger number of units, and realizing other efficiencies as production scales up. The theory posits that if economies of scale can be acquired, a said country can obtain economic growth. Mass production can deliver tangible benefits, a classical example, is the Ford Model T being the first car to be mass-produced at a cost which delivered opportunity for lower pricing. This made a car produced with high productivity based on specialization affordable for a regular consumer. This example inspired other industries to apply economies of scale. As a result, export became an enabler

to getting scale in demand, which allows massification of production and application of not only economies of scale but also narrow specializations (Jarzemskis, 2025). The agricultural sector contributes to Gross domestic product (GDP), drives development in countries particularly in rural areas and supports livelihoods (Rafael, 2023). United States is one example of a country that exploits economies of scale supported by information technologies and government policies that embrace and incentivize home industries to focus their production towards international markets. Shahzad et al. (2020), opined that export diversification policies influence the expansion of exports in developed countries. While, Mix (2021), found that global competition from firms in China had nearly saturated the European markets to the extent that companies from the United Kingdom needed help to compete after Brexit. Demir and Hu (2020), found that government policies affect export performance. In Kenya, the export from agricultural sector provides 65% of the total exports, implying that it is an important anchor of employment and income (Food and Agriculture Organization [FAO], 2024).

Kenya is currently ranked third in avocado production, having produced 417,000 metric tonnes in 2023 (Mureithi, 2023). Hass, Fuerte, Pinkerton, and local jumbo are the four major avocado varieties cultivated in Kenya for export owing to their wide range of uses, including cosmetics and culinary purposes (Nyakang'i et al*.,* 2023). According to Horticultural Crops Directorate, (HCD), the avocado industry in Kenya earned the country approximately $137.9 million in 2023, making it a significant source of foreign exchange (Andae, 2024). This sector supports a growing cottage industry, specifically in the extraction of avocado oil, with 90% of this oil being exported to markets including Europe, the USA, and East Asia (Shivachi et al*.,* 2023). However, the influence of export promotion strategies, such as economies of scale have not been well-documented, despite their potential to improve export of avocados. Additionally, achieving economies of scale can enable producers optimize on production costs, enhancing profitability, which holds high significance in improvement of the performance of the sector (Catanzaro & Teyssier, 2021).

Despite the empirical revelations on several export strategies that can positively impact export performance, the results cannot be assumed to hold for Kenya, especially in the avocado industry. Thus, the motivation to undertake this research was on the premise that the findings will contribute to the development of export promotion strategies, that will enable countries to produce products on a mass scale hence, leveraging economies of scale. Given that exports are important in improving a country's capability to deal with currency fluctuations, a country expanding to international markets, can leverage economies of scale, which is significant not only in reducing the cost of production but also optimizing the outputs (Shivachi et al*.,* 2023).

Karing'u et al. (2021), define firm size as the scale at which a company operates. To this context Mota et al. (2021), found a positive influence of Export Promotion Programs (EPPs) on firms' export performance, especially those with previous experience in export. Furthermore, firm size was found to be positively correlated with export performance.

Literature Review

Theoretical Review

The Resource-Based View (RBV) introduced by Birger Wernerfelt in 1984 in a seminal paper was used in the study. The theory was further developed and popularized by Jay Barney in 1991, particularly in his work Firm Resources and Sustained Competitive Advantage. The key principles revolve around the idea that a firm's resources and capabilities are critical determinants of its competitive advantage and performance (Barney, 1991). According to RBV, valuable, rare, inimitable, and non-substitutable resources enable firms to achieve and sustain a competitive edge over rivals (Wernerfelt, 1984). These resources can be tangible (physical

assets and capital) or intangible (brand reputation, organizational culture, and intellectual property).

Originally, RBV was primarily used to analyze how firms could achieve competitive advantages in domestic markets. However, its application has since broadened over time to include international business, strategic management, and marketing. Peteraf and Barney (2003), further refined the theory by introducing concepts such as dynamic capabilities, which consider how firms can adapt and renew their resources in changing environments. In the context of export performance, RBV has been applied to explore how firms leverage internal resources to succeed in foreign markets (Mathew et al., 2021). Karedza and Govender (2020), investigated how unique resources including branding, innovation, and economies of scale contribute to better export outcomes. More recent studies have also integrated RBV with other theories, such as institutional theory, to better understand firm's performance in international contexts. (Sony & Aithal, 2020).

Njuguna (2018), stated that avocado-oriented firms leverage market mix strategies, such as pricing, place, promotion, and product to enhance their performance, taking advantage of RBV by deploying resources to improve their export performance. Muranga (2020) on the other hand applied RBV to argue how organizational capabilities, such as innovation, enable fruit processing firms in Kenya to achieve a competitive advantage. Yabs and Awuor (2016), opined that firms may improve performance by leveraging their tangible and intangible resources in addition to their capabilities. Furthermore, Ngugi and Bwisa (2013), examined the application of the RBV in the Kenyan horticulture industry, exposing how internal capabilities and resources significantly influence export performance, hence, reinforcing the relevance of the RBV in understanding the Kenyan avocado industry's export strategies.

In this study the predictor variable (economies of scale) aligns well with the RBV framework. For instance, economies of scale represent a valuable resource that enhances cost efficiency and improve export performance. While, branding being an intangible resource can provide a competitive edge in international markets. Despite government policies being external, how firms respond to them can also be viewed through the RBV lens, as they impact the utilization and management of internal resources.

Empirical Review

The Effects of the Size of Firm on Export performance

Karing'u et al. (2021), opined that firm size is the scale at which an enterprise operates. To put it into context Mota et al. (2021), did a study on the relationship between Export Promotion Programs and firms' export performance. Their research applied two models using panel data analyses that linking export performance to variables including age of the firm, participation in EPPs, and firm size. The data, retrieved from a database, encompassing 198 firms over the sampling period which was from 2010 to 2018. The finding revealed a positive influence of participation in EPPs on firms' export performance, especially for those firms with prior export experience. The study also highlighted that the firm size positively correlated with export performance. In contrast, firm age revealed a negative effect, supporting the argument that larger firms endowed with more resources positively influenced exports. An increase in the age of a firm might barrier to adaptability, resulting to a decrease in export performance. However, the research suggests that participation in EPPs did not have a significant influence on export performance for firms lacking previous export experience.

He et al. (2020), studied the effect of de-globalization on economic transformation in China through the evidence drawn from manufacturing exports. The researchers focused on

measurement of the cost of trade for specific manufacturing sectors and provinces. Revealing that the rise in cost of trade had a negative influenced China's economic transformation. Increased costs of trade given the low economies of scale was an impediment of firms' export behaviors and scales. However, the impact was different across types of firms (size), revealing several factors including upgrades in the manufacturing sector, ownership reforms, and coordinated regional development. This study provides valuable evidence on how trade costs, through the lens of the level of economies of scale, influences China's economic transformation, in the local context the results may not hold true since the study applied firm-level data and had economic growth as a response variable. In contrast, this research used cross-sectional data to offer valuable trends and patterns into the manifestation of economies of scale on exports and test whether economies of scale are significantly associated with performance Kenya's avocado industry.

The effect of GDP on Performance of Export of Kenyan's Avocado firms

Mogaji and Falade (2020), defined GDP as being the total monetary value of all final goods/ services produced within a country in a specific period (usually a year). while, Al Hemzawi and Umutoni (2021), evaluated the impact of exports and imports on economic growth of Rwanda. The researchers analyzed quarterly time-series trade and economic growth data through GDP measurement from 2000 to 2020, findings a positive and significant increase in exports associated with a rise in GDP, while an increase in imports corresponded to a decrease in GDP. However, it did not directly test the influence on export performance. The current study focused on the export performance of the avocado firms in Kenya given that, avocado represents about 17% of the total horticultural exports from Kenya (Ouma et al., 2019). In the year 2023, avocado production reached 633 TMT, placing Kenya as the sixth-largest global producer. Avocado's exports increased to 122,581 MT in 2023 from 103,254 metric tons (MT) in 2022. While, in 2024 the value of exports was estimated to have increased by 11 percent reaching $159 million. This increment in value was informed by an increase in international demand of avocado from Kenya boosting its competitive advantage in these markets. While domestic consumption accounted for 47 percent, given that Kenya as a country has the highest avocado consumption per capita in Africa, averaging six kilograms per person. Due to their availability, affordability, and significant role in local diets, avocados are widely consumed.

The 2025 projections of production stood at 280 thousand metric tons, while, exports were projected to grow by five percent to 135 TMT, anchored on expanded markets including Iraq, India, South Korea, amongst other international markets. In year 2024, the Netherlands emerged as a leading export destination for avocados from Kenya, with 32 percent of the total market share. The United Arab Emirates (UAE) followed by 16 percent, France 13 percent, Spain 11 percent and Germany accounting for 0.7 percent. Supporting the upward trajectory of Kenyan's avocado exports, with post forecast of $175 million by end of 2025. This growth is primarily driven by increasing production and global demand for the product, specifically in European and Middle East markets, and a depreciating local currency the Kenyan Shilling. (United Stated Department of Agriculture, 2025).

The GDP growth in Kenya's avocado sector is a direct driver of economies of scale by increasing production, investment in technology/infrastructure including cold chains, attraction of private sector/government support, expansion of international markets and the creation of the value addition such as avocado oil, leading to lower average costs and higher competitive advantage for all players, especially smallholder farmers. A significantly profitable avocado industry boosts Kenya's national GDP, which in turn funds further improvements, hence, the creation of a positive feedback loop for economies of scale.

Impact of Innovation on Export Performance of Kenya's Avocado firms

Ortigueira-Sánchez et al. (2022), defined innovation as the development of a new or improved products that cater to the needs of international markets. This may involve introduction of new features, designs or functionalities that differentiates a firm's offerings from competition. Yokota et al. (2021), when studying the learning-by-exporting effect, which refers to a firm enhancing its productivity by venturing into the export market. Through Chinese firm-level data, they found that the role of economies of scale and the choice of production technology is crucial in bridging the gap between exporting and firm performance. The researchers, applied stratified sampling method and considered causality, revealing that the learning-by-exporting effect is more likely to occur in firms that are producing large quantities of outputs to exploit economies scale. Since, export firms are capital-intensive, this allows them to absorb new knowledge and information from global markets, primarily embodied in capital goods.

Ortigueira-Sánchez et al. (2022), further delved into the association between innovation and export performance in the context of low levels of innovation, characteristic of developing markets. The study focused on SMEs in Peru that received government subsidies for innovation. Through application of theoretical model incorporating innovative inputs, types of innovation, and performance, employing PLS-SEM on data from 237 SMEs. They found that human capital, government innovation subsidies, and cooperation positively influenced innovation types. Furthermore, innovation types positively affected both production and export performance. Production performance was found to be a significant mediator between innovation types and export performance. The study also found that economies of scale to be an enabler of production performance, which eventually predicted export performance and promotion, the study largely focused on the SMEs in Peru. On the contrary, this study focused on the effect of economies of scale on the export performance of Kenyan's the avocado industry.

Spitsin et al. (2020), studied the manufacturing industry in Russia, which is characterized by economic instability, crises, external sanctions, and a trend for import substitution. Analyzing the factors that influence the profitability of enterprises in foreign, joint, and domestic ownership, the study applied panel data derived from 6134 enterprises across several industries from 2012 to 2016. The researchers found that production efficiency and scale efficiency positively affected profitability. Production efficiency was found to be impactful in the automotive, machinery, and metal industries, while internal financial factors had a significant impact in the chemical, electrical, optical manufacturing, and food processing industries. Despite the rigorous methodological approach adopted by the study and the use of panel data, its focus was conducted in firms Russia. Hence the results may not be replicated in the local Kenyan context. However, innovation significantly contribute to economies of scale in Kenya's avocado industry, a driver of efficiency, reduction of waste, and improvement international market access through technologies like artificial intelligence, precision agriculture, and value addition for example, avocado oil, enabling smallholder farmers to meet global standards and unlock profitability despite traditional challenges like pests and infrastructure gaps.

Methodology

The current study adopted a cross-sectional survey research design with an intend to offer a contextual and holistic analysis of export promotion strategies and performance of Kenya's avocado industry. The target population constituted 137 avocado exporting firms in Kenya (HCD, 2020). The unit of analysis was the performance of avocado exporting firms in Kenya, while the information sources, considered as the units of observation, comprised avocado export-oriented firms in Kenya. Given that the study population is accessible and relatively

small, the study employed census technique to determine participants in the study. To ensure that appropriate data is collected from each HCD registered firm to export avocado, information was sought from knowledgeable respondents, including export managers, operational managers, sales and/or marketing managers, supply chain managers, among others who had desirable experience and knowledge in the avocado export industry. Stata version 17 was applied in computing both descriptive and inferential statistics. The use of Stata statistical software is justified because it has advanced predictive capability. Relating to descriptive statistics, measures of central tendency (mean) and dispersion (standard deviation) was generated to provide a glimpse into the patterns and trends of the data. While, inferential statistics (Multiple Linear Regression and Pearson Correlation analysis) was computed to establish the association between the predictor and dependent variables. The linear regression model is detailed below:

$$\mathbf{Y = \beta_0 + \beta_1 X_1 + \varepsilon}$$

Where:

Y = Performance of the avocado exporting firms

β_0 = Constant Term

β_1 = Regression coefficients

X_1= Economies of scale

Results

The aim of the study was to elucidate the effect of economies of scale on performance of the avocado industry in Kenya. Questions presented to the respondents were in form of a 5-point Likert scale. Table 1 summarizes results of the analyzed data.

Table 1

Economies of Scale effect on Performance of Kenya's Avocado Industry

	1	2	3	4	5	Mean	S.D.
The size of our firm has allowed us to achieve significant cost savings through economies of scale.	2.6%	13.8%	18.1%	42.2%	23.3%	3.7	1.06
Larger firm size has enabled us to negotiate better deals with suppliers and buyers.	5.2%	8.6%	29.3%	34.5%	22.4%	3.6	1.09
Our firm's size has provided us with the resources to invest in advanced technologies and infrastructure.	4.3%	18.1%	19.8%	44.0%	13.8%	3.5	1.07
The expansion of Kenya's GDP has enhanced our firm's ability to invest in quality control and export-related infrastructure.	6.9%	14.7%	20.7%	43.1%	14.7%	3.4	1.12
Increased GDP has led to more favorable exchange rates, benefiting the profitability of our avocado exports.	3.4%	12.1%	23.3%	43.1%	18.1%	3.6	1.03

EA growing GDP has led to improved infrastructure, benefiting our export operations.	2.6%	12.9%	25.0%	41.4%	18.1%	3.6	1.01
Investing in innovation has helped us enhance the efficiency and productivity of our avocado production.	6.0%	6.9%	24.1%	37.1%	25.9%	3.7	1.11
Innovative practices and technologies have enabled us to reduce costs and improve product quality.	6.0%	8.6%	19.0%	32.8%	33.6%	3.8	1.18
Our commitment to innovation has provided a competitive edge in the global avocado market.	5.2%	12.1%	19.0%	40.5%	23.3%	3.7	1.12
Average	4.7%	12.0%	22.0%	39.9%	21.5%	3.6	1.09

Key: 1-Strongly Disagree; 2-Disagree; 3-Moderate; 4-Agree; 5-Strongly Agree

As presented in Table 1, The respondents agreed that the size of their firms has enabled them to achieve significant cost savings through economies of scale (mean = 3.7). Equally, larger firm sizes were reported to have benefited from facilitation of better negotiations with suppliers and buyers (mean = 3.6). Firms also moderately accepted that their size allowed them to invest in advanced technologies and infrastructure (mean = 3.5). The expansion of Kenya's GDP was perceived as enabler for firms to invest in quality control plus export-related infrastructure (mean = 3.4). Additionally, favorable exchange rates supported by increased GDP were found to contribute to the profitability of avocado exports (mean = 3.6).

Respondents also affirmed the significance of innovation in leveraging economies of scale. Investment in innovative practices was found to contribute to enhancement of efficiency and productivity in the production of avocado (mean = 3.7), while innovative technologies were credited with cost reduction and the improvement of product quality (mean = 3.8). Furthermore, the commitment to innovation was reported to provide a competitive advantage in the international avocado market (mean = 3.7). Overall, the average mean score of 3.6 suggests that economies of scale significantly contribute to the performance of Kenya's avocado exporting firms. The findings confirm the centrality of firm size, innovation, and macroeconomic growth in the enhancement of cost efficiency, productivity, and competitiveness.

Pearson Correlation Analysis

The study sought to establish the strength and direction of the relationship between economies of scale and export performance of the avocado industry in Kenya. As shown in Table 2, Economies of scale showed a moderate positive and statistically significant correlation with export performance ($r = .330$, $p = .000$), which suggests that achieving efficiencies in production and operations contributes to better export outcomes.

Table 2

Pearson Correlation analysis

		Economies of scale	Export performance
Economies of scale	Pearson Correlation	1	.330**
	Sig. (2-tailed)		.000
	N	116	116
Export performance	Pearson Correlation	.330**	1
	Sig. (2-tailed)	.000	
	N	116	116

**. Correlation is significant at the 0.01 level (2-tailed).

Linear Regression

This section presents the results of the univariate linear regression analysis conducted to determine the effect of economies of scale on the export performance of the avocado industry in Kenya. The analysis evaluated the strength of the relationship between the economies of scale and the dependent variable, as well as the overall explanatory power of the model. The result is presented in Table 3.

Table 3

Linear regression

Economies of scale	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
Export performance	.212	.057	3.73	0	.099	.325	***
Constant	2.958	.205	14.42	0	2.552	3.365	***

Mean dependent var	3.690	SD dependent var	0.690
R-squared	0.109	Number of obs	116
F-test	13.922	Prob > F	0.000
Akaike crit. (AIC)	232.898	Bayesian crit. (BIC)	238.405

*** *p<.01, ** p<.05, * p<.1*

The model indicates an R-squared value of 0.109, which signifies that economies of scale explain approximately 10.9% of the variation in export performance. This suggests a meaningful explanatory power, which is expected in a univariate model where only one predictor is considered. The positive association between economies of scale and export performance is further supported by the correlation (R=0.33), which indicates a moderate positive relationship between the two variables. To establish the goodness of fit of the model, an F-test was conducted. The results show an F-statistic of 13.922 with a corresponding probability value of $p < 0.01$, which indicates that the regression model is statistically significant. This confirms that economies of scale significantly improve the prediction of export performance and that the model provides a good fit for the data.

The univariate regression model yielded the following equation:

$$Export\ Performance = 2.958 + 0.212\ (Economies\ of\ Scale)$$

The constant term ($\beta = 2.958$, $p < 0.01$) represents the baseline level of export performance when economies of scale are held constant at zero. The coefficient for economies of scale is positive and statistically significant ($\beta = 0.212$, $p < 0.01$), which suggests that a one-unit increase in economies of scale leads to an average increase of 0.212 units in export performance. The t-value of 3.73 confirms the statistical significance of this relationship, while the 95% confidence interval (0.099, 0.325) does not include zero, further reinforcing the robustness of the estimate. The univariate linear regression analysis demonstrates that economies of scale have a significant and positive influence on export performance.

Discussion

This study investigated the impact of economies of scale on the Kenya's avocado industry employing a quantitative research approach to analyze the relationships between the variable and the performance of avocado exports. Applying cross-sectional research design, which allowed for the collection of quantitative data at a single time. Respondents agreed that larger firms benefit from cost savings, advanced technology adoption, and better negotiation power, as reflected in the average mean score of 3.6. The highest-rated aspect was the role of innovative practices in reducing costs and improving product quality (mean = 3.8). Pearson correlation analysis showed a positive and statistically significant relationship between economies of scale and export performance (r=0.330, p=0.000). Linear regression results demonstrated that economies of scale positively influence export performance (B=0.212, p=0.000).

Economies of scale were also positively associated with export performance, though their impact was less pronounced. Larger firms in the avocado industry benefitted from cost efficiencies and better resource allocation, which align well with the findings of Aghazadeh et al. (2022), who emphasized the importance of experiential resources in achieving economies of scale in export markets. However, in contrast to He et al. (2020), who identified trade costs as a significant barrier to achieving economies of scale in China, the present study indicated how firm-level practices such as innovation and strategic partnerships can mitigate these barriers in the Kenyan context. This divergence suggests that economies of scale may be more context-dependent, which requires targeted strategies that address specific market and operational constraints.

Conclusion

The study concludes that economies of scale positively influence export performance by enabling firms to achieve cost efficiencies, negotiate better deals, and invest in advanced technologies. Larger firms with greater operational scales and innovative practices are better positioned to improve productivity, reduce costs, and maintain a competitive edge in the global avocado market.

Recommendations

The study underlined the significance of economies of scale significantly contributing to cost efficiency, productivity, and competitive advantage in the international avocado markets. Based on this evidence, the study recommends that firms should explore strategies so as to scale up their operations, including the formation of cooperatives or partnerships to leverage on resources, improve bargaining power, while investing in innovative technologies. Given that larger-scale operations enable firms to achieve significant cost savings, negotiate better trade deals, and access the required resources needed to satisfy the demands from international market.

Areas of Future Research

The study focused on the impact of economies of scale on export performance of Kenya's avocado industry. Suggesting that further research could investigate export promotion strategies in other agricultural sectors so as to appreciate their effect on export performance. This may help establish whether similar strategies could be applied across various export-oriented industries. Since the study used a quantitative approach, a qualitative approach could further deepen the understanding of the international export markets to further promote the export of Kenya's avocado in the global arena.

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