FACTORS AFFECTING THE EXPORTS OF HASS AVOCADO FROM VIRÚ (LA LIBERTAD, PERU) TO THE US

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ABSTRACT

The knowledge and application of marketing strategies by small and medium producers of avocado for exports in the La Libertad region of Peru is limited. Therefore, this article analyzes the business opportunity of Hass avocado *(Persea americana)* for the US market and aims to highlight the relevant factors that facilitate achieving profitability for the producer, through a descriptive and non-experimental quantitative study. 29 avocado producers were surveyed in Virú province, in the La Libertad region, an important producing area in Peru to identify and describe value-generating activities for exportable avocados. Authors investigated ways to develop market opportunities through communication channels and marketing. The main findings pointed out that the avocado from this region, with yields greater than 10 tons per hectare, have good fruit quality and productivity in small and medium-sized areas. Indeed, they are the best in the country to produce Hass avocado managed for export, and from its organization they could have a better productive offer. However, the traditional production system, seasonal production (March-August), farms with less than 5 hectares per producer, little knowledge about customers, their choice, use and acquisition of the product, among other factors, remain part of the benefits. Marketing strategies that adapt to the styles of the US market are necessary for organizations to grow and increase their profitability. In this case, implementing surveys by producers of the proposed marketing plan to increase profitability by expanding placement capacity and developing the avocado production chain to improve supply to the market at more competitive prices are recommended actions (i.e., marketing planning and market expansion that adapts to the needs of the target market). A net present value of US$ 3.1 million has been projected with an internal rate of return of 93%. Statistical verification of these results modeled the increase in exporters' profits through the implementation of marketing.

Key words: *Persea americana*, commercial window, profitability, quality, associativity and market strategies, Peru

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RESUMEN

El conocimiento y aplicación de estrategias de comercialización del aguacate o palta (*Persea americana*) para exportación por parte de pequeños y medianos productores de la región de La Libertad del Perú es limitado. Por ello, este artículo analiza la oportunidad de negocio de la palta Hass para el mercado estadounidense y tiene por objetivo señalizar los factores más relevantes que facilitan alcanzar la rentabilidad a los productores, mediante un estudio cuantitativo descriptivo y no experimental. Con este fin, 29 productores de palta en Virú fueron encuestados en la región de La Libertad, importante zona productora del Perú, para identificar y describir las actividades generadoras de valor para la palta/aguacate exportable. También se investigaron formas de desarrollo de oportunidades de mercado a través de canales de comunicación y comercialización. Los principales hallazgos revelaron que la palta/aguacate de esta región, con rendimientos mayor a 10 toneladas por hectárea, tiene buena calidad de fruto y productividad en áreas pequeñas y medianas. Sus productores son los mejores del país en palta Hass gestionada para exportación y a través de su organización podrían tener una mejor oferta productiva. Sin embargo, el sistema de producción tradicional, la producción estacional (marzo-agosto), las fincas con menos de 5 hectáreas por productor; el escaso conocimiento sobre los clientes, su elección, el uso y adquisición del producto -entre otros factores- restan parte de los beneficios. Se requiere implementar estrategias de marketing adaptadas a los estilos del mercado estadounidense, para que las organizaciones crezcan y aumenten su rentabilidad. Se recomienda aplicar encuestas a los productores sobre el plan de marketing propuesto para incrementar la rentabilidad mediante la ampliación de la capacidad de colocación, así como desarrollar la cadena productiva para mejorar el abastecimiento al mercado a precios más competitivos (i.e., planificación del marketing y expansión adaptada a las necesidades del mercado objetivo). Se ha proyectado un valor actual neto de US$ 3,1 millones, con una tasa interna de retorno del 93%. La verificación estadística de estos resultados modeló el aumento de las ganancias de los exportadores a través de la implementación del marketing.

Palabras clave: *Persea americana*, ventana comercial, rentabilidad, calidad, asociatividad y estrategias de mercado, Perú

RÉSUMÉ

La connaissance et l'application des stratégies de commercialisation par les petits et moyens producteurs pour exporter l'avocat *(Persea americana)* produit dans la région de La Libertad au Pérou sont limitées. Par conséquent, cette étude analyse l'opportunité commerciale de l'avocat Hass pour le marché américain et vise à mettre en évidence les facteurs pertinents qui facilitent l'atteinte de la rentabilité pour le producteur. Pour atteindre l'objectif, une étude quantitative descriptive et non expérimentale a été proposée. Nous avons interrogé 29 producteurs d'avocats à Virú, dans la région de La Libertad, une zone de production importante au Pérou, afin d'identifier et de décrire les activités génératrices de valeur pour les avocats exportables. Nous avons étudié les moyens de développer des opportunités de marché par le biais des canaux de communication et de marketing. Les résultats ont montré que les avocats de cette région, avec des rendements supérieurs à 10 tonnes par hectare, ont une bonne qualité de fruit et une bonne productivité dans les petites et moyennes zones, ils sont les meilleurs du pays pour produire de l'avocat Hass destiné à l'exportation et de son organisation Ils pourraient avoir une meilleure offre productive. Cependant, le système de production traditionnel, la production saisonnière (mars-août), les exploitations agricoles de moins de 5 hectares par producteur, le peu de connaissance des clients, de leur choix, de leur utilisation et de leur acquisition du produit, entre autres facteurs, restent une partie des bénéfices. Il est recommandé de réaliser des enquêtes auprès des producteurs sur le plan de commercialisation proposé afin d'accroître la rentabilité en augmentant la capacité de placement, ainsi que de développer la chaîne de production pour améliorer l'approvisionnement du marché à des prix plus compétitifs (c'est-à-dire une planification et une expansion de la commercialisation adaptées aux besoins du marché cible). Une valeur actuelle nette de 3,1 millions de dollars américains a été projetée avec un taux de rendement interne de 93 %. La vérification statistique de ces résultats a modélisé l'augmentation des profits des exportateurs grâce à la mise en œuvre de la commercialisation.

Mots clés : *Persea americana*, vitrine commerciale, rentabilité, qualité, associativité and stratégies de marché, Pérou

RESUMO

O conhecimento e a aplicação de estratégias de marketing por pequenos e médios produtores para exportar abacate produzido na região de La Libertad, no Peru, são limitados. Portanto, este estudo analisa a oportunidade de negócio do abacate Hass (*Persea americana*) para o mercado norte-americano e tem como objetivo destacar os fatores relevantes que facilitam a rentabilidade ao produtor. Para atender ao objetivo foi proposto um estudo quantitativo descritivo e não experimental. Pesquisamos 29 produtores de abacate em Virú, na região de La Libertad, uma importante área produtora no Peru, para identificar e descrever atividades geradoras de valor para abacates exportáveis. Investigamos maneiras de desenvolver oportunidades de mercado por meio de canais de comunicação e marketing. Constatou-se, pelos resultados obtidos, que o abacate desta região com produtividade superior a 10 toneladas por hectare apresenta boa qualidade de frutos, sendo que a produtividade em pequenas e médias áreas são os melhores do país para produzir abacate exportável. Também se investigou a existência de formas de desenvolvimento de oportunidades de mercado através de canais de comunicação e comercialização. Os principais achados mostram que a palta/abacate de esta região, com rendimentos superiores a 10 toneladas/hectare, possuem boa qualidade de fruto e produtividade em áreas pequenas e médias. Os produtores são os melhores do país em palta Hass orientada para a exportação, sendo que através de uma melhor organização poderiam ter uma melhor oferta produtiva. Não obstante, o sistema de produção tradicional, a produção estacional (março-agosto), o reduzido tamanho dos estabelecimentos (menos de 5 hectares), o escasso conhecimento sobre os clientes, o uso e aquisição do produto, dentre outros fatores, reduzem parte dos benefícios logrados pelos produtores. Recomenda-se a implementação de pesquisas com produtores sobre o plano de marketing proposto para aumentar a lucratividade por meio da expansão da capacidade de colocação, bem como para desenvolver a cadeia de produção a fim de melhorar o abastecimento do mercado a preços mais competitivos (ou seja, planejamento de marketing e expansão do mercado adaptados às necessidades do mercado-alvo). Foi projetado um valor presente líquido de US$ 3,1 milhões com uma taxa interna de retorno de 93%. A verificação estatística destes resultados modelou o aumento dos lucros dos exportadores através da implementação do marketing.

Palavras-chave: *Persea americana*, janela comercial, rentabilidade, qualidade, associatividade e estratégias de mercado, Peru

1. INTRODUCTION

The avocado (*Persea Americana*), known as «aguacate» or «palta» in other American countries, has experienced a notable increase in its demand worldwide in recent years. This boom is due to its recognition as a «superfood», supported by the numerous benefits it provides to health (Association of and Ministry of Foreign Affairs of Peru – ADEX-MRE, 2021). Therefore, it is a food that responds to new consumer needs. As of 2017, Peru ranks third among the world's largest avocado producers, with an 8% share in the international market and the average yield per hectare of 13.02 tons (Ministry of Agrarian Development and Irrigation – MIDAGRI, 2019, 2022), above the global average yield of 10 t/ha and the average yield of Mexico of 10.8 t/ha, the main world producer and exporter (Production statistics of avocado in to 2022. Likewise, Peru is—after Mexico, the second largest exporter of Hass avocados to the United States of America (National Customs Superintendence and Tax Administration – SUNAT, 2023) with a growing participation between May and August, highlighting La Libertad as the main producing and exporting region that coincides with the commercial window in the market American (Global Business and Economy Research Center – CIEN, 2022).

In the United States, people eat more avocados at dinner than at lunch, depending on taste. Avocados are also a common food on May 5th (Latin Pride Day) and July 4th (Independence Day). In addition, 20% of the US population indicates they always consume avocado (Gamarra & Quispe, 2015). According to the Ministry of Agriculture and Irrigation (MINAGRI, 2015), avocado

production in California—a producing area in the United States, is low during the summer from June to September. Therefore, because the production of Mexico has also decreased somewhat, the high output of Peru during this period can satisfy part of the demand. This shows a commercial opportunity (window market) between Peru and the US from June to August, with higher prices than other times (MINAGRI, 2019). Moreover, this production also creates ecosystem services (see, in Annex 1, the supplementary material corresponding to the bibliometric analysis).

Balvin (2016) shows Peru's comparative advantage with an annual growth of 25% and its greater efficiency in relation to Mexico and Chile. In addition, avocado processing projects for export to the US are beneficial (Gamarra & Quispe, 2015), with the implementation of the Peruvian Avocado Committee – CPP, and assuming its leadership role, it would be possible to make Peru the second world producer by the year 2023 (Capcha et al., 2013). A business plan for a company dedicated to the production and export of canned avocado from Ecuador to New York determined the economic feasibility of the project with a net present value (NPV) of US$ 15,906.11 and an internal rate of return (IRR) of 23.37% in five years (Caisapanta, 2020).

This research considers a geographical spatial division focused on the scope of the representative and study units of the intervention area of the main Peruvian exporting producers of Hass avocado to the United States – US. The other considerations are the timeline, which is the basis for the survey period covering 2018 and 2019, the socioeconomic limits consulted with the organizations of the province of Virú (department of La Libertad, Peru) for the export of Hass avocado to the US. In addition, the statistical information on exported volumes and FOB price for the following years (2020 to 2023) is also considered.

The Peruvian supply the avocado to the United States coincides with the lower seasonal supply from Mexico. This is a particular fact that is visible in the seasonal or monthly analysis, not in the annual data.

This study aimed to identify and suggest an organizational and commercial work plan for been implemented by small exporting producers of Hass of Virú (La Libertad, Peru), for increasing their participation and profitability in the commercial opportunity offered by the US market.

2. MATERIALS AND METHODS

The research focused on the province of Virú, located in the La Libertad region, northern Peru. Through a descriptive and interpretive investigation, reference is made to a case of small avocado exporting producers. According to Amenta (1991) individual case studies can be comparative and balance the advantages and disadvantages in methodologies. Likewise, the current situation of the export of Hass avocado from this region to the United States was analyzed. To this end, information was collected on the incidents, as well as the opinions of two associations of avocado exporting producers in the province of Virú made up of 29 members whose questionnaire is attached in the supplementary material, thus determining a census sample that, according to López (1998) and Hayes (1999), includes the entire population and is used when it is necessary to have the responses of all participants and when the database is easily accessible. For data collection, a questionnaire was applied to characterize the production and value chain of avocados destined for export. In addition, a Likert scale was incorporated to evaluate perceptions about the impact of numerous factors on international marketing. of the Hass avocado. Additionally, secondary information was obtained from the export statistical yearbooks.

The study design was non-experimental, since it did not involve the intentional manipulation of variables. According to Hernández et al. (2010), this approach provides greater external validity, allowing the results to be generalized to other similar contexts due to its proximity to real variables instead of hypothetical ones.

The correspondence test and the Chi-square statistical relationship were used. On the other hand, the reliability of the instrument was evaluated using Cronbach's

alpha coefficient, finding values above 0.7 in all variables. After statistical validation, experts were consulted to obtain their opinion on the instrument, which supports the validity of the field research. This facilitated the analysis, allowing to authors to know the perception of agro-exporters about the key factors that influence export to the destination market (Table 1).

Avocado is a fruit with a high number of proteins, vegetable oils, calories and fats, with antioxidant properties that can reduce the risk of cancer and heart disease (MINAGRI, 2019).

3. RESULTS

3.1. MAIN CHARACTERISTICS OF THE AVOCADO MARKET IN THE US

It was found that the main clients of Peruvian agro-exporters were mainly retailers, followed by wholesalers and the gastronomic industry. The smallest group was the runners (Figure 1).

Regarding the presentation of the product, it is mainly offered in the form of hard fruits, followed by ripe fruit, and finally packaged fruit. In this sense, the ripe fruit showed a better development capacity. The leading exporter has achieved efficient ripening and specializes

Table 1
La Libertad (Virú, Peru): Validation of the evaluated factors (Cronbach's α)

Evaluated factor	Variables (Nº)	Cronbach's α
Crop yield	5	0.782
Product quality	5	0.711
Nutrition	5	0.718
Environmental	5	0.794
Total	**20**	**0.803**

Figure 1
Customers of avocado growers in the US

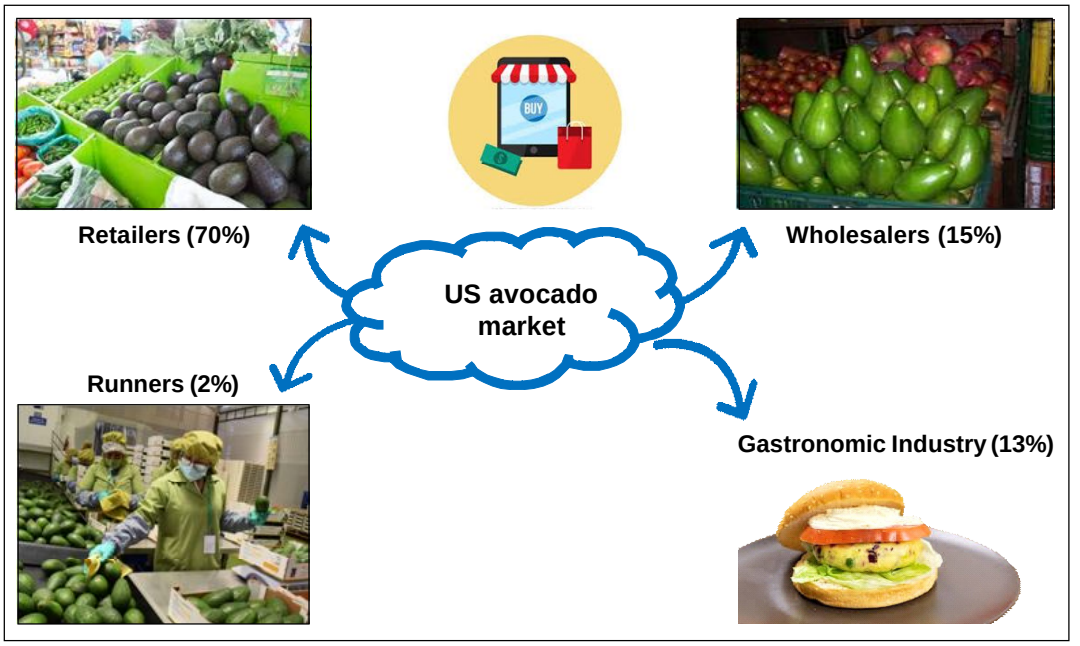
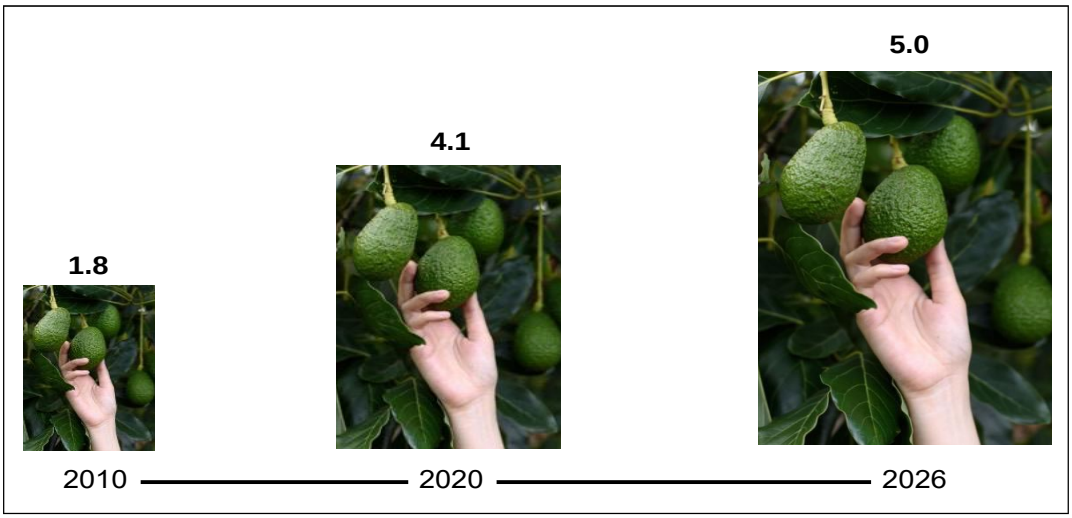


Figure 2
Avocado products marketed in the US



in providing high-quality ripe avocados to various customers (Figure 2).

3.2. PROFILE OF THE AMERICAN CONSUMER

Added to the importance of price when deciding to purchase, quality is the most relevant determining factors, where this last which certifies safe, top-of-the-line products for the family. American consumers were interested in seeing nutritional information about the product and knowing the cultural practices in its production and marketing. The most demanding buyers incorporated into their choice the use of good social and environmental practices in the place of origin.

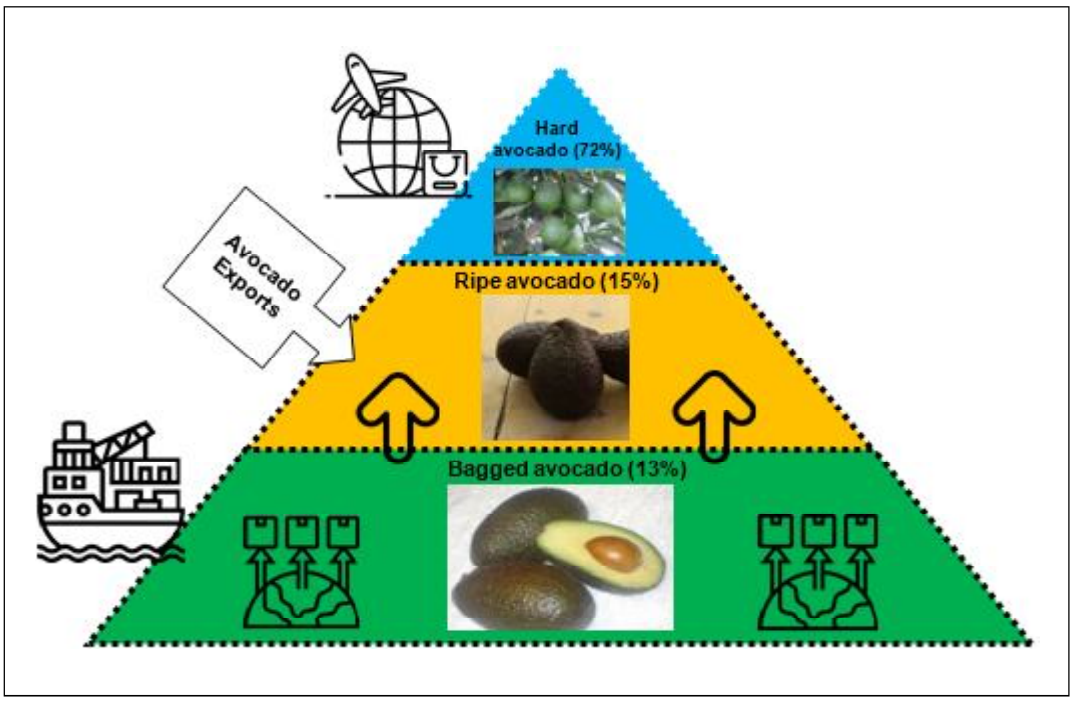
The high incidence of health problems resulting from an unbalanced diet that afflicts the American population, such as obesity and diabetes, has led to the use of corrective measures in food consumption habits through search and incorporation into the diet. of fresh, organic products that simultaneously nourish and care for the health of the population. The trends are towards responsible consumption; whose purchases are more conscious based on the information supported by each product about its characteristics and properties. The varied range of information searches has facilitated the efficient development of purchases, for example, through online sales, many businesses have developed channels that made it possible to obtain, quickly and safely, products that best adapt to each customer and help in their purchasing decision.

In the report on untapped opportunities, Rabobank's senior analyst noted that avocado consumption in the US has been increasing to 4.1 kilos per capita in the decade from 2010 to 2020 and a consumption of 5 kilos is projected for the 2026 (Figure 3). In addition, factors such as sustainability and social responsibility add to transparency and food safety, something that producers will have to be prepared for. To this end, organizations will have to continue working to improve the perception of the product among consumers, through characteristics such as sustainability and environmental impact (CIEN, 2022).

The potential of the Hass avocado to export from Virú, La Libertad in Peru could be seen between May, June and July, the months of greatest production. The month of July showed the peak of the highest production (Figure 4).

According to information from the MIDAGRI Agricultural foreign trade statistical yearbook (2023), avocado exports from Peru increased steadily during the years 2019 to 2023.

Figure 3
Customers of avocado growers in the US



In 2019, 312,714 tons were exported, for an FOB value of approximately USD 757 million. By 2023 the exported volume was 599,208 tons, with an FOB value of USD 963 million, which meant an increase in volume of 91.61% and in FOB value of 127%. However, the annual average FOB prices per ton show an oscillation over the last five years. The percentage share in the international avocado market is growing, while the price does not show a direct proportionality of increase—or on the contrary, it is variable. This market behavior is due to several economic, political, environmental, social and cultural factors of the destination country and export competitors (Table 2).

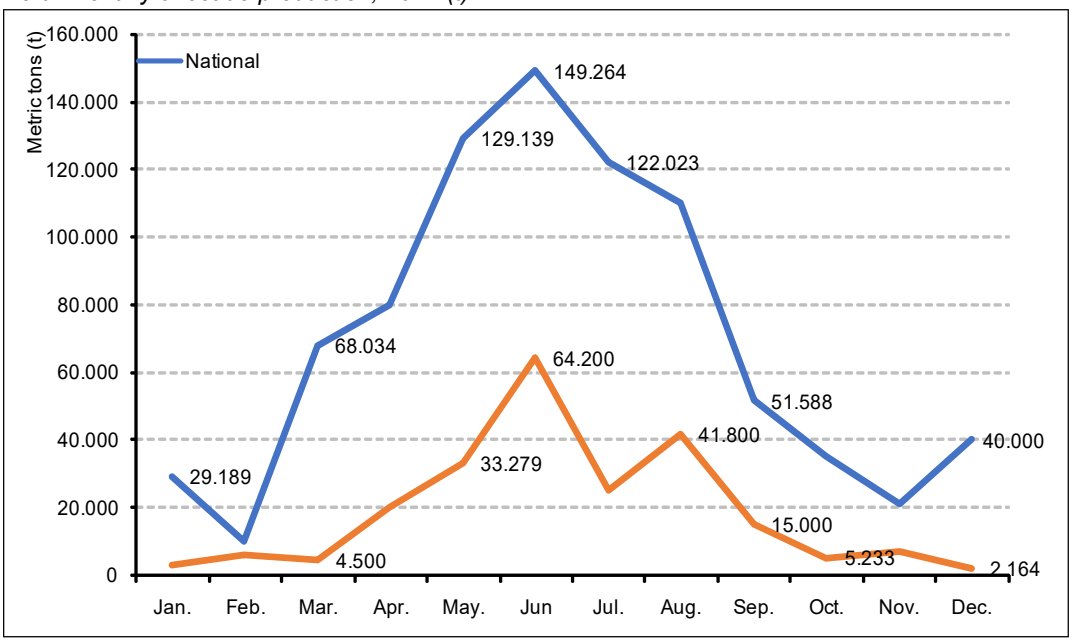
As characteristics of the production and producers of Virú, La Libertad region,

Table 2
Peru: Total avocado exports, period 2019 – 2023

Period (January – October)	Net Weight (t)	FOB value (US$)
2019	312.714,41	757.272,26
2020	409.513,43	753.715,08
2021	541.671,14	1.048.474,32
2022	613.947,00	976.000,00
2023	599.208,00	963.510,00

Note. Source: Prepared from the MIDAGRI Agricultural foreign trade statistical yearbook (2023)

Figure 4
Peru: Monthly avocado production, 2022 (t)



Note. Source: prepared based on MIDAGRI (2022)

the results shown below were obtained (Table 3).

When analyzing the commercial window of the Hass avocado market in the United States, the increase in the participation of Peruvian exporters was observed due to the coincidence of the period of greatest production with demand. According to TradeMap reports (2024), the seasonality in the production of Peruvian Hass avocado, significantly driven by the La Libertad region —the main producing area for the United States

Table 3
La Libertad (Virú, Peru): Evaluated characteristics of avocado production

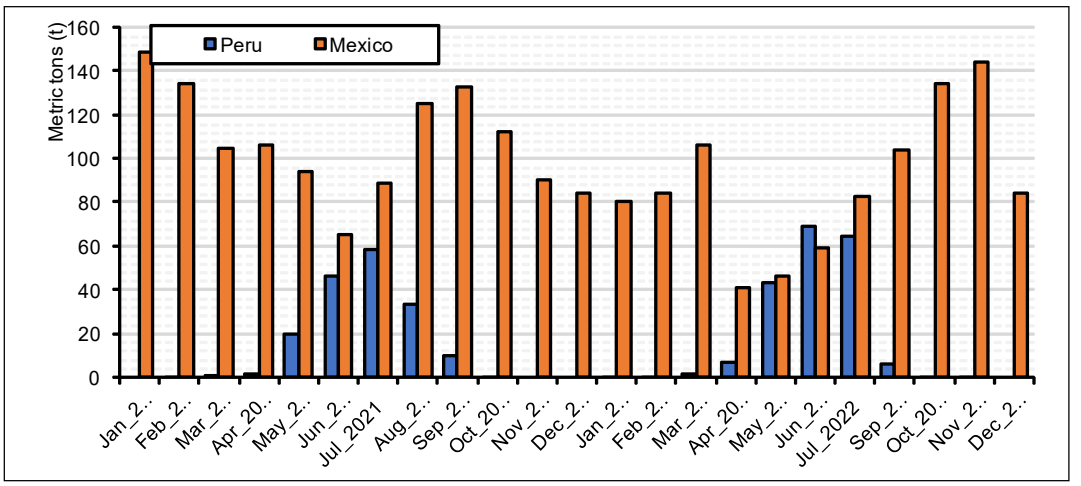
Characteristics	Observations
Small producer	42 percent have 01 to 05 hectares of land for production, 58 percent have less than 01 hectare of land
Traditional production System	The type of production system does not support benefits for organic certification, however, it reduces production costs and is adapted to the traditional knowledge of the producers
	100% have products between March and August
Product quality	Quality is important in the concept of producers
Yields greater than 10 t/ha	Important factors for producers
Associativity	100% of respondents are affiliated with a producer organization
Participation in training	88%
Comes in fresh fruit	92% is sold as fresh fruit, eight percent are processed and sold
Knowledge about product care	100% know about avocado care for export
Product presentation	76% percent sell selected; 24 percent sell in bulk
Features that differentiate them	According to the opinion of producers in order of importance: Fruit size, nutritional properties, flavor and color

market, generates a key commercial opportunity for Peru between the months of May and August. This period coincides with lower production in Mexico, the main supplier to the US market (Figure 5).

3.4 APPROACH TO MARKET STRATEGIES

Its purpose is to strengthen Hass avocado exports from Virú, La Libertad in Peru during the US trade opportunity to increase the profitability of exporters. As seen in Table 4, marketing strategies related to forward integration, increased production, international promotion, increased sales, quality certification and effective marketing channels are proposed. Through the achievement of the objectives of each strategy and the respective tactics implemented, it is expected that the profitability of exports from the studied area will increase considerably.

Figure 5
Hass avocado exports from Peru and Mexico to the US



Note. Source: Taken from AdexdataTrade (2024) and SIAP with customs data from Mexico (2023)

Table 4
La Libertad (Virú, Peru): Projected avocado sales (US$)

Strategies	Goals	Tactics
Forward integration	• Have financial resources	• Associativity • Trade promotion
Increase in production	• Increase supply volume • Competing with other regions	• Raising awareness about economic • Promoting productivity • Training in Good Agricultural Practices (GAP)
International promotion	• Increase demand • Increase consumption	• Promotion at US trade shows
Increase in sales	• Increase profitability • Present in new markets	• State participation: INIIA, SENASA, Innova Perú
Quality certification	• Offer high quality products • Generate new markets	• GAP implementation • SENASA certification • Certification of other entities
Effective marketing channels	• Increase sales • Lower marketing costs • Improve the supplier-customer relationship • Reduce delivery time	• Local channel • Export channel

Statistically significant differences are manifested in the elements of the marketing system in avocado exports to the US. Based on an ad-hoc analysis, four factors were identified: yield/ha, quality, nutrition and sustainability (Table 5).

Table 5
La Libertad (Virú, Peru): Importance of factors in the Hass avocado market plan

Factors evaluated	Average
Yield/ha	4.32[a]
Quality	4.34[a]
Nutrition	3.85[b]
Sustainability	2.92[c]

Note. ([a, b, c]) Values within a column with a common superscript do not differ significantly ($p > 0.05$)

Nutrition and sustainability are key points to identify how the avocado marketing system works in the US market. This means that factors not only of quality and performance are important in economic behavior. Driving increased interest in the product among American consumers were nutritional and sustainability features. However, in the opinion of Virú avocado producers, the yield and quality guaranteed the export of the avocado. This indicates that nutritional and sustainability factors are relevant, not only for the defense of the product as useful in food but also for the planning of commercial strategies.

In the economic analysis, a net present value (NPV) was obtained from a reference rate of 15% of US$ 3.1 million, with a residual investment of US$ 880,000 (market value of the land and facilities), and an internal rate of return (IRR) of 93%. These results indicate that implementing the marketing plan would generate an increase in profitability (Table 6).

When calculating income and expenses, it is observed that most of the products are exported, with only a small remainder being sold on the domestic market. Regarding the tax obligation of the project, the current Law establishes that exported products are not subject to the general sales tax (Value Added Tax – VAT, also known in Peru as IGV, *Impuesto General a las Ventas*). Therefore, the VAT paid for the percentage of the exported production cost must be refunded and is considered income. Likewise, there is an income tax rate of 15% established by Law for the export sector of agricultural products.

Table 6
Projected avocado sales from Virú La Libertad, Peru (US$)

Year	0	1	2	3	4	5
Income	1,539,705.54	1,675,559.75	1,825,369.34	1,988,288.86	2,169,829.84	2.367,123.08
Export	2,377,222.58	1,519, l.57.08	1,675,880.25	1,846,597.93	2,036,875.96	2.243,902.70
National sale	150,761.92	144,681.63	137.768.04	129,969.89	121,232.83	111,499.34
Loss sale	11,721.04	11,721.04	11,721.04	11,721.04	11,721.04	11,721.04
Expenses	847,670.55	893,204.87	942.464.76	995,784.86	1,053,533.45	1,116,111.53
Production costs	342,843.65	359,985.68	377,984.81	396,883.94	416,728.09	437,565.38
Postharvest costs	285,057.34	313,449.63	344.710.40	379,131.36	417,035.80	458,776.59
Sales costs						
	219,769.56	219,769.56	219,769.56	219,769.56	219,769.56	219,769.56
Gross profit	692,034.98	782,354.88	882,904.58	992,504.00	1,116,296.39	1,251,011.55
IGV (+18% costs)	76,290.35	84,407.86	93,516.07	103,747.09	115,251.88	128,202.53
Income tax 15%)						
	103,805.25	117,353.23	132,435.69	148,875.60	167,444.46	187,651.73
Net profit	664,520.09	749,409.51	843,984.96	947,375.49	1,064,103.81	1,191,562.35

The return on investment (ROI) is 208%. This means that for every US$ 1 invested in marketing strategies, there is a return of US$ 2.08. The increase in profitability associated with the application of the marketing plan is 17% (Table 7).

Among the current trends of American consumers, the search for responsible consumption stands out. This means buying consciously with information about the place of origin, production, marketing and a production system, that guarantees a fair benefit for all those involved in the value chain.

Table7
La Libertad (Virú, Peru): Expected increase in exports

Year	0	1	2	3	4	5
Base value (earned profits)	1,377,222.58	1,446,816.27	1,520,072.79	1,595,160.72	1,675,742.90	1,758,156.48
Increase in profits	0	72,340.81	155,807.46	251,437.21	361,133.07	485,746.22
Marketing improvement plan costs		115,379.02	121,147.97	127,205.37	133,565.64	140,243.92

4. DISCUSSION

Consumers in the United States are characterized by a demand for quality foods. They usually check labels for nutritional information. Therefore, the American buyer is undoubtedly demanding, going beyond quality considerations and preferring products that have ideal conditions for production with the incorporation of appropriate social and environmental practices (Hass Avocado Board, 2019). Part of the health problems prevalent in the United States is associated with an unbalanced diet due to poor diets. For this reason, the search for foods and nutritional supplements that provide a healthy diet is booming. In this sense, it is organic products, fresh fruits and vegetables that improve public health in general. Avocado is a product that meets these conditions and that in turn contains monounsaturated fatty acids (MUFA), in addition to being rich in tocopherols, ascorbic acid, pyridoxine, β-carotenes and potassium (Özdemir & Topuz, 2004), it is appropriate for human consumption, since it can contribute to reducing the risk of cardiovascular diseases (Gurr, 1992). On the other hand, the presence of the Latino population in the United States is increasing; of the more than 337 million inhabitants, 19% are Hispanic (PROMPERU, 2023). Therefore, the consumption of avocado is an important part of their habits.

Without a doubt, the Internet and related social networks have had a great impact, since each customer can quickly and safely obtain the most suitable products through online sales channels. Media that indicates quality and information about the final product are critical in Americans' purchasing decisions.

Hass avocado production in Peru, and particularly in the La Libertad region, extends from March to September (Figure 4). In contrast, the US has production for net domestic consumption between February and August, covering 7% of domestic demand. Faced with low production in Mexico—an important supplier of avocado to the United States, Peru's participation in this commercial window is important due to the growing seasonal gap in the US market that occurs between the months of April to September (Blog Agricultura, 2021; Trademap, 2024). Despite Peru's growing participation in this period, demand exceeds supply. In this context, the Peruvian marketing window in the US market opens the way for the supply of Hass avocado from May to September. These months coincide with the Hass avocado export season from Peru, mainly from the La Libertad Region, which is also a non-competitive season for Mexico, the main avocado exporter.

Therefore, market strategies are designed with the objective of providing solutions to

the anticipated needs to achieve the sales objectives of the product (Kotler & Armstrong, 2008). Similarly, marketing avenues that have superior resources and capabilities should enable the organization to achieve the desired floating state. The strategy must be realistic, efficient, fixed or relevant and executable (Manuera & Rodríguez, 2007). On the other hand, profitability is a measure of the return on invested capital over a period. The profit generated is compared with the capital invested or generated (Gironella, 2005), and commercial windows are the opportunities to market the products; that is, the coincidence of the moment of demand in one place with production in another (Celi & Niño, 2002).

Access to external markets is a challenge for avocado producers, especially in terms of developing the management capacity that allows them to take advantage of these opportunities effectively. Farmers' management capacity can be defined as: (i) possessing adequate personal characteristics; and, (ii) the decision-making capacity to address problems and opportunities in a timely and accurate manner. In other words, it is the ability to manage the agricultural business efficiently to obtain the desired agricultural results (Rougoor et al., 1998). A farmer with high management capacity is expected to obtain better agricultural results in terms of productivity, profitability and efficiency (Taramuel-Taramuel et al., 2023).

On the other hand, the strategy to improve productivity and profitability is the adoption of agricultural innovations (Fuglie et al., 2020). According to Taramuel-Taramuel et al. (2024), in the avocado sector, the sum of efforts to improve efficiency in production and marketing is essential to contribute to the continuity of the business in the market.

The appropriate approach to determine improvements in the market strategy for agricultural export products is the qualitative analysis of expert information supported by quantitative data (Abello & Esmeral, 2018), the analysis of the destination market and the characterization of potential consumers. existing for the product, are determined by quantitative methods (Caisapanta, 2020) and (Campoverde, 2018). In this sense, the study shows coherence with previous studies because —through quantitative analysis, the characteristics of the US market were identified, and the profile of consumers were contrasted based on the characteristics of the producers. On the other hand, the strategy to improve productivity and profitability is the adoption of agricultural innovations (Fuglie et al., 2020). According to Taramuel-Taramuel el al. (2024), in the avocado sector the sum of efforts to improve efficiency in production and marketing is essential to contribute to the continuity of the business in the market.

Demand for avocado is increasing in the US market. This is partly due to the growing presence of Latin Americans. In addition, avocado is a highly appreciated food for its high nutritional value. However, maintaining the quality and yield of the Peruvian Hass avocado guarantees export to the US market (Gamarra & Quispe, 2015; Balvin, 2016; Ñaupari, 2017). In this sense, a farmer with high management capacity is expected to obtain better agricultural results in terms of productivity, profitability, and efficiency (Taramuel-Taramuel et al., 2023). Changes in the global avocado market resulting from rapid growth in demand, the expansion of orchards in Latin America, and food quality and safety requirements imposed by food and non-food markets in Europe and the US make a transition from a traditional agricultural approach to sustainable agricultural management is necessary (Taramuel-Taramuel, 2024).

In relation to the design of the market strategy, significant improvements must be made in the production chain and logistical management of the harvested and selected products, which is why the integration and intervention of public institutions of training, technological development and business management It is essential for financing and access to international markets (Campoverde, 2018; Ñaupari, 2017; Capcha et al., 2013). A promising strategy is the use of biostimulants in avocado production systems. So much so that, Rojas-Rodriguez et al. (2023) have shown that biostimulants can significantly improve

yield and pre-harvest quality in both, traditional and organic avocado production systems. Incorporating biostimulants into integrated crop management plans could be a valuable tool for avocado producers to improve productivity and fruit quality, thus addressing some of the technical challenges in cultivation.

Finally, to boost the Hass avocado sector, it is crucial to increase investment in R&D, as it is linked to greater increases in agricultural productivity (Fuglie et al., 2020; Taramuel et al., 2021). It is also necessary to strengthen public technical extension and farm management programs, which is associated with an improvement in crop performance (Mariano et al., 2012). In addition, the State must invest in infrastructure, such as logistics for exports (Hass Avocado Board, 2022). Associativity is vital for small farmers (Gutiérrez, 2014), and public subsidies can support in times of crisis. Pérez & Gómez (2022) highlight the fundamental role of institutions in the consolidation of the export chain.

4. CONCLUSION

The United States is one of the main markets for the export of Peruvian avocados. Annual shipments exceeded USD 134 million in 2023 (TradeMap, 2024). It has proven to be an interesting and growing market over the years (2016–2021). In addition, it is a well-informed market with a strong emphasis on the search for healthy, nutritious and socially and environmentally sustainable foods, these are changes to which the avocado producers of Virú, La Libertad in Peru must adapt. Virú producers are characterized by achieving quality and productivity in the harvest, their fields yield more than 10 tons per hectare. They are the main producers of Hass avocado in the country for export. However, they need marketing strategies that can adapt to the food consumption styles of Americans to grow their organization and increase profitability. In that sense, the months of March to August in the United States are a commercial opportunity for the Peruvian Hass avocado. June and July are the turning points for the US and an opportunity for Virú, La Libertad Perú, due to the decreased participation of Mexico, an important supplier to the United States and main competitor of the Peruvian avocado.

The Virú avocado producer organizations implement marketing strategies based on factors related to quality and productivity in the production fields, not giving the same importance to nutritional and sustainability aspects, which are an important part of the current trends that They dominate avocado consumption in the American market. On the other hand, if the marketing and expansion plan is implemented to meet the expectations of the target market, a net present value of US$ 3.1 million and an internal rate of return of 93% would be achieved. This indicates profitability. Given the indicated results, it is recommended: (i) Implement surveys by producers of the proposed marketing plan to increase profitability by expanding placement capacity and developing the avocado production chain to improve supply to the US market. at more competitive prices. (ii) To increase the international market share, especially in the United States, it is recommended to expand the results obtained in this research with a qualitative approach study to analyze the identified gaps. Findings on selection bias obtained in quantitative studies can be applied more fruitfully in qualitative studies (Collier & Mahoney, 1996). (iii) To diversify the supply of Peruvian avocado in this market, it is recommended to consider other varieties of avocado that can expand the commercial opportunity between Peru and the United States.

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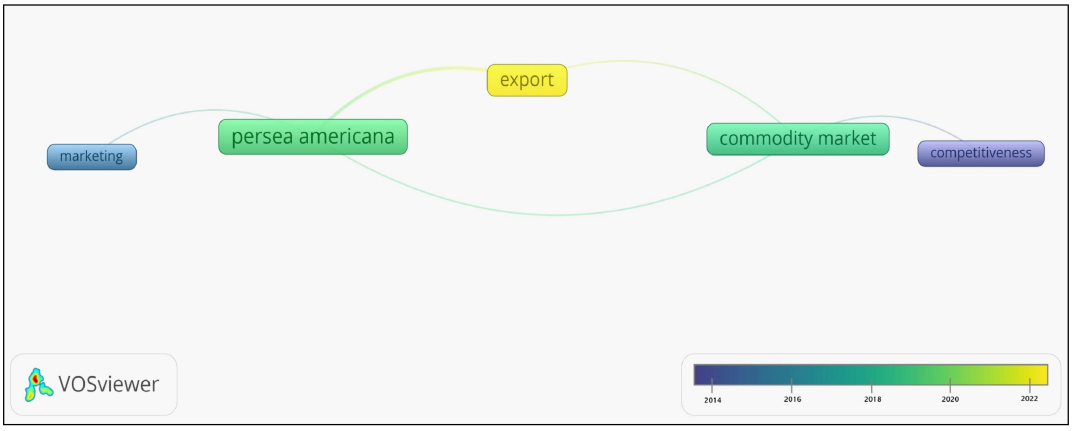
Annex 1
Supplementary material

Figure 6a shows the connections between the key words with the reference point «*Persea americana*», which acts as the core of the analysis. Secondary nodes are connected around it that represent key concepts: «export», «marketing», «commodity market» and «competitiveness». The lines that join these nodes indicate thematic relationships between them, and their thickness or closeness could reflect the strength or frequency of these relationships in the analyzed data.

Figure 6a
Bibliographic mapping



Note. Source: Scopus; TITLE-ABS-KEY («export», AND «market» AND «strategies» AND «avocado»); Co-occurrence Mapping using VosViewer (Normalization Method: Association Strength)

Figure 6b
Word cloud

Note. Field: Keywords Plus; Word count: 40; Words without meaning for the topic were removed (bee, viroid, Kenya, bees, world, maize, gender disparity, plant virus, viroids, leagilendia, maize, *Zea mays*). Generated by Bibliometrix

In Figure 6b, with greater size and emphasis, «*Persea americana*» appears, indicating that it is the central theme. Other key terms are distributed around it, whose sizes reflect their relevance or frequency.

Some notable terms include «export», «crop yield», «marketing», «agricultural market», and «plant diseases». Concepts related to agricultural economics also appear, such as «commodity market», «agricultural economics», and «supply chain management».

Likewise, geographical and trade terms such as «North America», «Mexico», «United States», «international trade», and «western hemisphere» are mentioned. The word cloud also includes concepts related to sustainability, such as «soil quality» and «sustainability». This word cloud shows the most important and recurring themes associated with *Persea americana* in various areas such as economics, trade, agriculture, and sustainability from the Scopus search.