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Analysis of white shrimp (*Litopenaeus vannamei*) exports to the Chinese market

Análisis de las exportaciones de camarón blanco (*Litopenaeus vannamei*) hacia el mercado de China

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Abstract

In 2020, Ecuador's shrimp exports to China went from 2,085,077.3 thousand dollars in 2019 to 1,891,383.5 thousand dollars in 2020, i.e. a reduction of -9.29%. The objective of this research was to analyze shrimp exports to the Chinese market in the period 2010-2020. The proposal is to forecast exports and participation in the Chinese market four years into the future. The methodology applied for the research is descriptive, documentary, quantitative, supported by journals and scientific articles in databases such as: Latindex, Scopus, and studies related to the subject. The projections estimated that in 2022 Ecuador will export 1,694,035 thousand dollars to China, by 2023 this will increase by 10.28% with respect to 2022, reaching 1,868,289 thousand dollars. And finally in 2024 it will export 2,042,543 thousand dollars. White shrimp exports to China in 2019 have a share of 29.67%. By 2020 the share increased to 32.01%, i.e. Ecuador became the supplier of shrimp to China after India. In addition, during the period from 2013 to 2020 there will be an average share of 13.27% of shrimp exports from Ecuador to China. Socially, it is estimated that the shrimp sector generates 200,000 direct jobs and indirectly reaches 5% of the Economically Active population, in 210,000 hectares of shrimp. Shrimp alone represents 1.1% of Ecuador's GDP. Ecuadorian.

Keywords: shrimp exports; market; China

Resumen

En el 2020 las exportaciones de camarón de Ecuador hacia China pasaron de 2.085.077,3 miles de dólares en el 2019 a 1.891.383,5 miles de dólares en el 2020 es decir se redujo un -9,29%. El objetivo de esta investigación fue analizar las exportaciones de camarón hacia el mercado chino en el periodo 2010-2020. La propuesta es pronosticar cuatro años a futuro las exportaciones y participación en el mercado chino. La metodología que se aplicó para la investigación es descriptiva, documental, cuantitativa, apuntalada en revistas y artículos

científicos en bases de datos como: Latindex, Scopus, y estudios afines al tema. Las proyecciones estimaron que en el 2022 Ecuador exportará hacia China 1.694.035 miles de dólares, para el 2023 está se incrementará en 10,28% con respecto al 2022 llegando a 1.868.289 miles de dólares. Y finalmente en el 2024 exportará 2.042.543 miles de dólares. Las exportaciones de camarón blanco hacia China en el 2019 tienen una participación de 29,67%. Para el 2020 se incrementó la participación a 32,01%, es decir paso Ecuador a ser el proveedor de camarón para China después de la India. Además, durante el periodo del 2013 a 2020 se tiene una participación media de 13,27% de las exportaciones de camarón desde Ecuador hacia China. En lo social se estima que el sector camaronero genera 200.000 plazas de trabajo directo e indirectamente alcanza el 5% de la población Económicamente Activa, en 210.000 hectáreas de camarón. El camarón por sí solo representa el 1,1% del PIB. Ecuatoriano.

Palabras clave: Exportaciones de camarón; mercado; China

Introduction

Pacific white shrimp (*Litopenaeus vannamei*) production in Ecuador began in approximately 1968, mainly in the province of El Oro, when a group of farmers began to observe shrimp growing in small ponds nearby. By 1974 Ecuador had approximately 600 hectares dedicated to white shrimp farming throughout the country (Bernabé, 2016).

The shrimp industry grew on a larger scale in the 1970s in El Oro and Guayas, where there are salt marshes and an abundance of post-larvae, making this activity a lucrative business. In the 1990s, shrimp production areas increased considerably and with it the processing through packing plants, larvae laboratories and feed factories, as well as a series of inputs for aquaculture activities (Suárez, 2019).

In 1999, Ecuador faced a crisis due to the white spot disease that caused some producers to close their crops or to wait for alternatives to control the disease. (Aguirre et al., 2019). Shrimp farming in captivity supplies most of the volume to the world market; however, it has also been affected by the outbreak of diseases and price variations associated with the high volume of production in 2018 and 2019, leading to low market levels, thereby reducing the participation of shrimp in world trade and affecting the prices of these aquaculture products in international markets. (FAO, 2020; Uzcátegui et al., 2016, p. 165).

The growth of this sector has positioned shrimp as the second most important export product after oil, transporting the banana from this place (Muñoz et al., 2017; González-Illescas, 2019). Shrimp exports reached in 2018, 3,234 million dollars, an amount that represents 15% of total exports of the country, while crude oil sales accounted for 36.3% and banana sales accounted for 14.8% of total Ecuadorian exports. Shrimp alone represents 1.1% of Ecuador's GDP.

For 2019 the shrimp sector exported 3,901,559 thousand dollars, this would mark a record for the industry, which strengthens Ecuador as the second largest exporter worldwide, after India. The shrimp sector is reaping the investments made since five years ago when the entire production chain was technified. In 2018, shrimp reached 56 countries (Jiménez, 2021; Dávila-López et al., 2020).

In this context, the objective of the research is to analyze white shrimp (*Litopenaeus vannamei*) exports to the Chinese market in the period 2010-2020. The initiative is to forecast shrimp exports four years into the future. Therefore, the question that motivates the need for the study is: What will be the exportable quantities of white shrimp in the next four years in Ecuador? What is the participation of the Chinese market for the Ecuadorian shrimp sector?.

Materials and methods

The inductive scientific method will be used, which is the reasoning that orients from the observation of particular cases to general conclusions, it starts from particular statements to generalize. It generalizes inferences from a set of evidence. The inference is from the bottom up. And the deductive that defines this method which is based on formal reasoning in which the conclusion is obtained by the form of the judgment, from which it starts. The derivation is necessary (Cabezas et al., 2018, p. 16).

Descriptive and documentary research was applied to , the latter defined as the collection of news on books, files, laboratory reports or field work published Baena (2017) as the collection of news on books, files, laboratory reports or field work published in relation to the subject to be studied from two points of view: the general and the particular, very specific. The first works to be collected will be those dealing with the subject of interest from the general point of view (p.69).

In addition, it is quantitative, supported by journals and scientific articles in databases such as: Latindex, Scopus, and studies related to the subject. We worked with shrimp producers, specifically with Grupo Empresarial Rojas, which is headquartered in the city of Machala and has four production units in the provinces of Guayas and El Oro.

A quantitative approach was used, with a linear regression analysis to project exports; to select the compiled data, the most important variables were chosen according to the subject of the study, as well as technical and statistical information from the National Chamber of Aquaculture of Ecuador, Trade Map, Central Bank of Ecuador (BCE), Internal Revenue Service, also taking into account the criteria of experts and experts in the shrimp sector.

Result

According to (Chumpitaz, 2014), China's market is the largest in the world, with 1,361 million inhabitants, which is equivalent to the sum of inhabitants of the USA, Brazil, Nigeria, Russia, Japan, the Philippines and Ethiopia, which is expected to add 50 million more inhabitants by 2030.

The annual per capita income in China is \$5,203 (2014) 58.6% higher than in 2009. It is estimated that between 2015 and 2030, per capita income will grow at an annual average of 5.3% to reach \$ 12,090. 20% of the population is between 40 and 49 years old with average annual incomes above \$ 150,000. 25% of Chinese families belong to the middle class; that is, 111 million households. The cities of Shanghai, Beijing, Guangdong, Tianjin and Zhejiang have the highest levels of per capita spending.

This country China has the world's largest market for seafood products with a total consumption of 38,738,000 tons, which is higher than the sum of the nine major international markets. The demand for quality proteins and the high interest in healthy eating led to an average annual growth of 5.9% for 2018.

China's continued improvements in logistics and storage capacity have led to an increase in seafood consumption in inland regions of the country. The high consumption of shellfish in southern China, the remaining regions prefer fish and crustaceans.

The Pacific white shrimp variety (*Litopenaeus vannamei*) is the most important shrimp cultivated in Ecuador. This aquaculture production has been perfected for more than thirty years to take to captivity during all its phases such as: larval laboratories, fattening farms, which ensures the quality of the product at all times (Peña, 2017). The destination of this production is for the international market, in which China, the United States and the European Union are the most important for Ecuador.

The increase in shipments responds to several factors: among them the high quality production, with improved genetics based on proper nutrition, in addition to the increase in hectares planted with the crustacean (Faillace et al, 2021; Pesantez et al, 2019).

Private investments have focused on maturation processes and larval laboratories, automatic feeding, adjustment of nutrition tables, and harvesting in pools. According to the National Chamber of Aquaculture estimates that the shrimp sector generates 200,000 direct and indirect jobs reaching 5% of the Economically Active population, in 210,000 hectares of shrimp (Guerrero, 2017). Table 1 below shows the assets of the shrimp sector, which for 2019 was in the order of 3,866.46 billion dollars.

Table 1. *Shrimp sector assets in Ecuador*

Years	Total Assets (Thousands of USD)	Variation in Total Assets (Thousands of USD)
2016	2.043,99	
2017	2.637,29	593,3
2018	3.164,85	527,56
2019	3.866,46	701,61
TOTAL	11.712,59	

Source: Internal Revenue Service (2021)

Table 2 below shows white shrimp exports to China from 2010 to 2021 (September) as consolidated figures. A simple linear regression analysis was applied to make the projection up to 2024.

Table 2. *Exports of white shrimp to China and Projection to 2024*

Period	FOB (Thousands of USD)
2010	9.190,5
2011	37.413,4
2012	43.933,0
2013	71.846,8
2014	125.454,6
2015	186.823,2

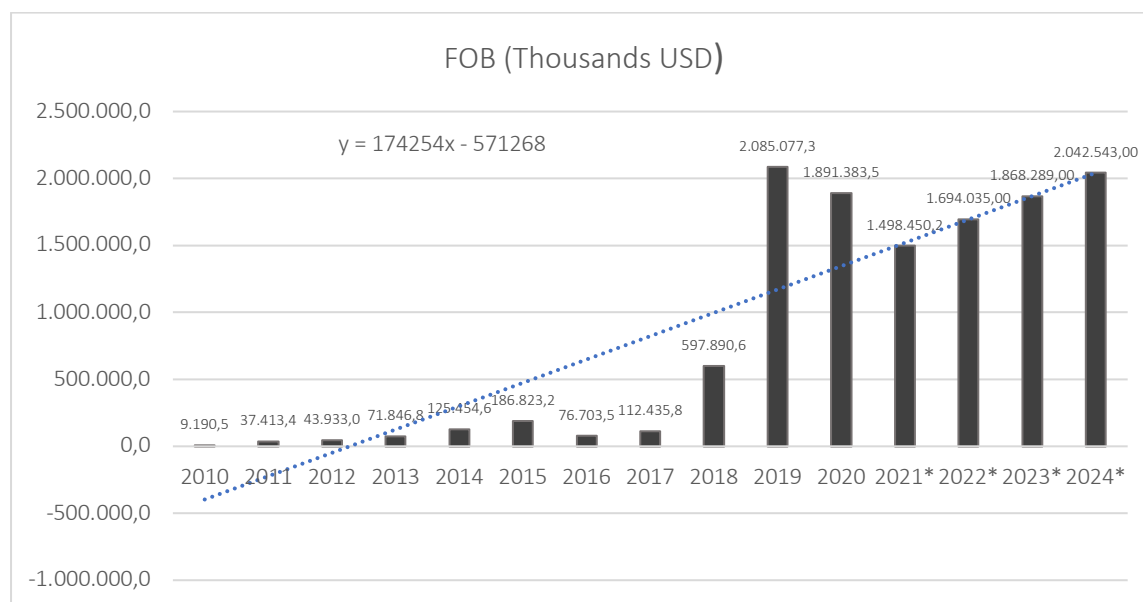
2016	76.703,5
2017	112.435,8
2018	597.890,6
2019	2.085.077,3
	1.891.383,5
2021	1.498.450,2
2022*	1.694.035,00
2023*	1.868.289,00
2024*	2.042.543,00

*Projection

Source: Central Bank of Ecuador (2021)

A descriptive analysis was carried out where the average exports during the period 2010 to 2020 was 476,195.6 thousand dollars. In 2019 it reaches the highest export of 2,085,077.3 thousand dollars and in 2010 the lowest of 9,190.5 thousand dollars. For 2022 it is estimated that 1,694,035 thousand dollars will be exported, for 2023 it increases by 10.28% with respect to 2022 reaching 1,868,289 thousand dollars. And finally in 2024 it is projected to export 2,042,543 thousand dollars, almost reaching the maximum values exported in 2019.

Figure 1. White shrimp exports to China and projection through 2024



***Projection**

Source: Central Bank of Ecuador (2021)

White shrimp exports from Ecuador to the world

Table 3 below shows the exports of white shrimp from Ecuador to the world from 2013 to 2020.

Table 3. Exports of white shrimp from Ecuador to the World and projection until 2024.

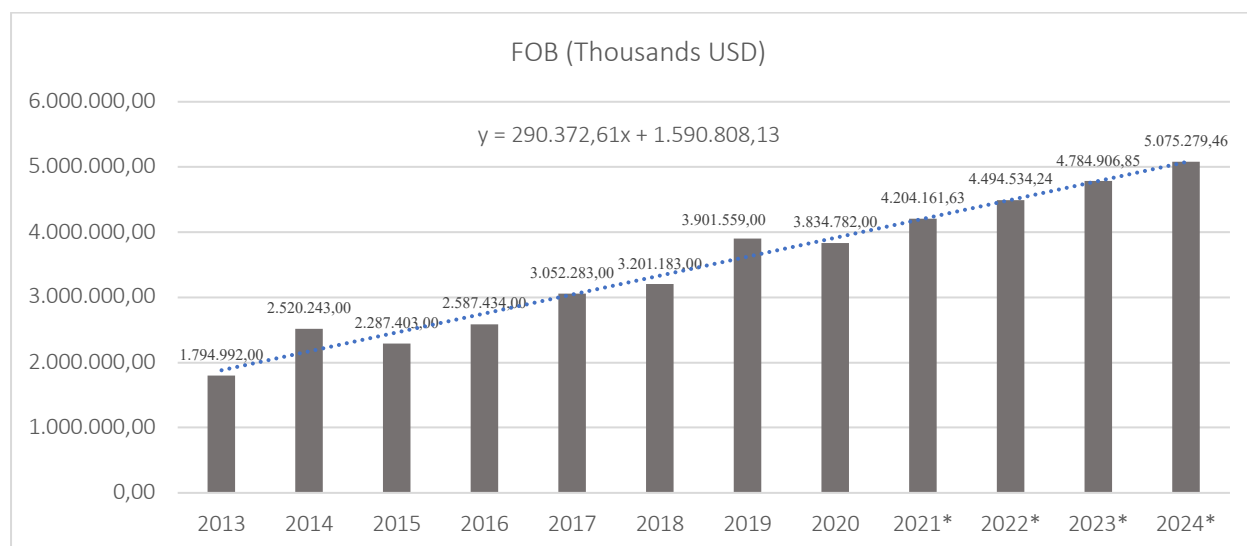
Period	FOB (Thousands of USD)
2013	1.794.992,00
2014	2.520.243,00
2015	2.287.403,00

2016	2.587.434,00
2017	3.052.283,00
2018	3.201.183,00
2019	3,901,559 ,00
	3.834.782,00
2021*	4.204.161,63
2022*	4.494.534,24
2023*	4.784.906,85
2024*	5.075.279,46

*Projection

Source: TradeMap (2021)

Table 3 shows the projected exports of white shrimp from Ecuador to the world for 2021, which is expected to increase by 9.62% compared to 2020, which was an atypical year due to COVID-19. In 2022, an increase of 6.89% is obtained compared to 2021. For 2023, an increase of 6.43% is projected with respect to 2022, and finally, the projection for 2024 shows an increase of 6.06% with respect to 2023. Figure 2 below shows projections of white shrimp exports from Ecuador to the world.

Figure 2. Exports of white shrimp from Ecuador to the World and projection until 2024.

*Projection

Source: TradeMap (2021)

The following table 4 presents China's imports of white shrimp from 2013 to 2020 and its projection to 2024.

Table 4. Imports of white shrimp from China and projection until 2024

Period	FOB (Thousands of USD)
2013	1.427.276,00
2014	1.664.162,00
2015	1.852.667,00
2016	2.114.244,00
2017	2.504.487,00
2018	4.374.488,00
2019	7.027.305,00
	5.908.141,00
2021*	6.902.176,00

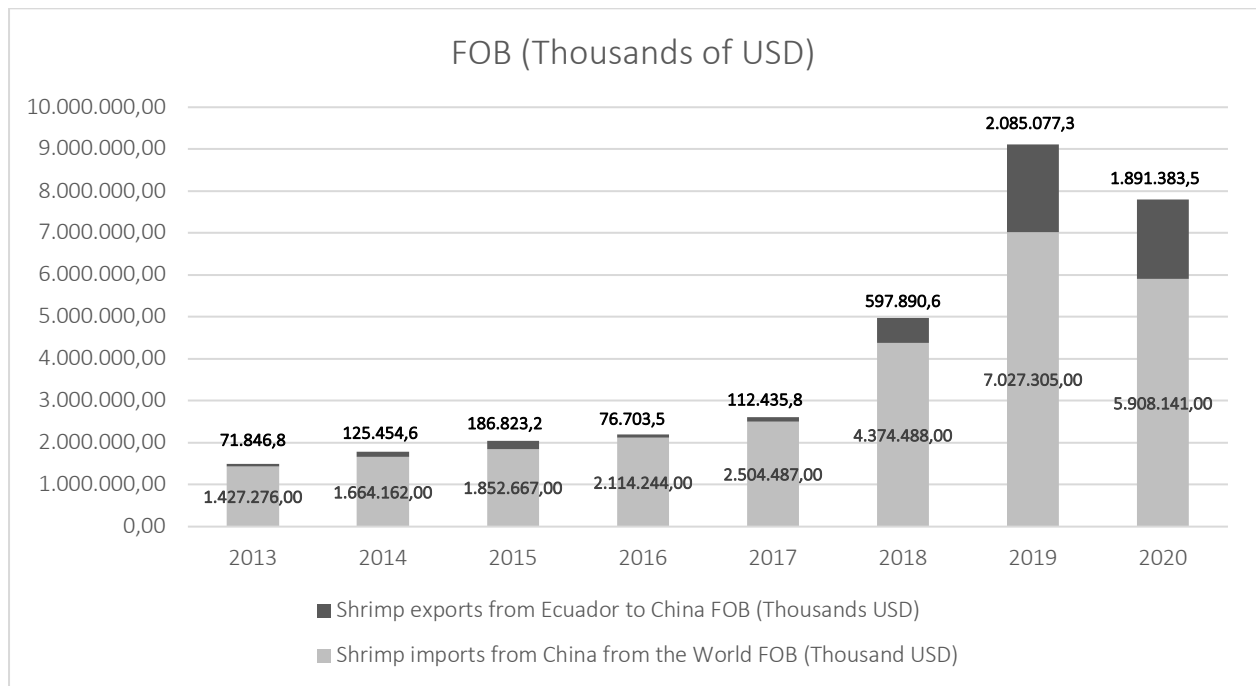
2022*	7.689.527,00
2023*	8.476.878,00
2024*	9.264.229,00

*Projection

Source: TradeMap (2021)

In 2019, exports of white shrimp from Ecuador to China represented 29.67%, in 2020 the share increased to 32.01%, i.e. almost a third of this market is shrimp of Ecuadorian origin. It is projected that by 2021 China will import white shrimp from the world 6,902,1766 billion dollars and will increase in 2022 to 7,689,527 billion dollars. Figure 3 below compares shrimp exports from Ecuador to China and imports from China from the World from 2013 to 2020.

Figure 3. Shrimp exports from Ecuador to China, and imports from China to the world.



Source: TradeMap (2021)

Table 5. Imports of white shrimp from China, exports of shrimp from Ecuador to China and percentage participation

Period	Shrimp imports from China FOB World (Thousands of USD)	Shrimp exports from Ecuador to China FOB (Thousands of USD)	Participation % of Ecuador's exports to China
2013	1.427.276,00	71.846,8	5,03
2014	1.664.162,00	125.454,6	7,54
2015	1.852.667,00	186.823,2	10,08
2016	2.114.244,00	76.703,5	3,63
2017	2.504.487,00	112.435,8	4,49
2018	4.374.488,00	597.890,6	13,67
2019	7.027.305,00	2.085.077,3	29,67
	5.908.141,00	1.891.383,5	32,01

Source: TradeMap (2021)

During this period from 2013 to 2020, there is an average share of 13.27% of white shrimp exports from Ecuador to China.

Conclusions

The importance of the shrimp sector is evident; the increase in exports responds to two factors: quality shrimp production, with good genetics based on proper nutrition; and the increase in the number of hectares planted with the crustacean. Private investments have focused on maturation processes and larvae laboratories, automatic feeding, adjustment of nutrition tables, and harvesting in pools. Investments in the shrimp sector according to the Internal Revenue Service in 2019 reach 3,866.46 thousand dollars.

Socially, according to the National Chamber of Aquaculture , it is estimated that the shrimp sector generates 200,000 direct jobs and indirectly reaches 5% of the economically active population, in 210,000 hectares of shrimp. Shrimp alone represents 1.1% of Ecuador's GDP. In the period analyzed between 2010 and 2020 there is an average export of white shrimp to China of 476,195.6 thousand dollars. In 2019 it reaches its highest export of 2,085,077.3 thousand dollars and in 2010 the lowest of 9,190.5 thousand dollars.

In the projections it is estimated that by 2022 Ecuador will export to China 1,694,035 thousand dollars, by 2023 this will increase by 10.28% with respect to 2022 reaching 1,868,289 thousand dollars. And to culminate in 2024 it is projected to export 2,042,543 million dollars.

White shrimp exports to China in 2019 have a share of 29.67%. By 2020, the share increased to 32.01%, making it the second largest supplier of white shrimp to China after India. In addition, during the period from 2013 to 2020, the average share of white shrimp exports from Ecuador to China was 13.27%. Finally, it is expected that by 2021 China will import white shrimp from the world 6,902,176 thousand dollars and will increase in 2022 to 7,689,527 thousand dollars. Then in 2023 it will import 8,476,878 thousand dollars and in 2024 it will reach a maximum import of 9,264,229 thousand dollars.

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