

## Analysis of the Pecan value chain in the Municipality of Metztlán Hidalgo, Mexico

## Análisis de la cadena de valor de la nuez Pecanera en el Municipio de Metztlán Hidalgo, México

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DOI: 10.35429/JED.2023.30.10.20.24

Received: September 10, 2023; Accepted: December 30, 2023

### Abstract

In this study, through field and documentary research techniques and instruments, the structural situation of the walnut value chain in Metztlán, Hidalgo, where the total number of walnut producers is 125, the sample yielded a total of 44 surveys for its application. In the results of this research, it was observed that the municipality presented a decrease in sales in 2021 due to the closure of municipal and state markets as a result of COVID-19, which caused the nut to be wasted. The conclusion on the walnut value chain showed that different service providers are involved that are directly related to each other within the process of buying and selling walnuts, in addition there are still aspects that do not favor this activity because producers still do not have support programs to equip themselves with specialized machinery.

**Pecan nut, Value chain, Marketing**

### Resumen

En este estudio a través de técnicas e instrumentos de investigación de campo y documental revela la situación estructural de la cadena de valor de la nuez en Metztlán, Hidalgo, donde el número total de productores de nogal es de 125, la muestra arrojó un total de 44 encuestas para su aplicación. En los resultados de esta investigación, se pudo observar que el municipio presentó en 2021 una disminución de ventas debido al cierre de mercados municipales y estatales a consecuencia del COVID-19, lo que ocasionó el desperdicio de la nuez. La conclusión sobre la cadena de valor de nuez mostró que intervienen diferentes prestadores de servicios que se relacionan directamente uno con otro dentro del proceso de la compra y venta de nuez, además continúan existiendo aspectos que no favorecen esta actividad debido a que los productores aun no cuentan con programas de apoyo para equiparse de maquinaria especializada.

**Nuez pecanera, Cadena de valor, Comercialización**

**Citation:** CRUZ-SÁNCHEZ, Eduardo, TREJO-ENCARNACIÓN, Patricia and HERNÁNDEZ-GÓMEZ, Diana. Analysis of the Pecan value chain in the Municipality of Metztlán Hidalgo, Mexico. Journal Economic Development. 2023. 10-30: 20-24

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**Introduction**

The pecan nut (*Carya illinoensis*) is a monoecious deciduous tree that can grow up to 30 metres tall SAGARPA (2017). Its fruit (the nut) is large with a fleshy mesocarp and hard endocarp wrinkled into two brown shells; they have a hard shell and are provided with a skin that separates easily from the edible kernel or kernel inside.

About 22% of the world production of walnuts is traded on the international market. Eight countries account for 63.7% of exports and 51.2% of imports. The United States is the main importing and exporting country in the world. Mexico and the United States are the main producers of pecan nuts, producing around 93% of world production.

According to Durán (2016), pecan production in the municipality of Metztlán dates back more than half a century, initially with criollo varieties (hard shell) and from 1990 onwards the production of improved varieties (paper or soft shell) began. Currently, there are 465 hectares under nut cultivation, and an annual production of 1,274 tons. In the study region, it has been a very important activity for the economic development of both the municipality and its localities. In recent years, this activity has been affected by the decrease in sales and the drop in product prices.

The analysis presented here aims to recover the factors that directly affect this problem at present, in order to raise awareness among local producers about the care of the plantations and the fruit, and thus promote an improvement in the development of the cultivation, production and marketing of walnuts in the region.

At the national level, the document "Challenges and Opportunities for the use of pecan nuts in Mexico" by Angela Suárez Jacobo (2016) is a background for this analysis, in which a discussion and study of the pecan product system is carried out in order to propose the potential for research and development in the agricultural sector.

**Methodology to be developed**

The methodology of the research is mixed, i.e. qualitative and quantitative, derived from the fact that a market research was carried out in the field and the results will be analysed. Determining the sample size of 44 surveys for its application.

The National Water Commission (CONAGUA) has a register based on the Irrigation Module No. 1 "Association of users of District 008 Metztlán, Hidalgo", where it mentions that currently the total number of walnut producers is 125 in the region. Therefore, to determine the number of surveys to be applied, a confidence level of 90% was used, equivalent to 1,645, a probability in favour of 50%, a probability against 50% and a margin of error of 10% was used, resulting in 44 surveys to be applied.

The field research started from September to November 2021. A mixed method was used to recover both quantitative and qualitative information through 44 structured surveys; 28 of them using the Google Drive Form application, and 16 surveys carried out in person to various producers and intermediaries of walnut production in the different communities of Metztlán such as: San Cristóbal, Cerro Partido, Buena Vista, Jilotla, Tecruz Cozapa, Tlamaxa, Coyometeco, Palo Blanco, San Pedro, El Carrizal, among others. Informal conversation was also used to obtain information directly from the producer.

For the data analysis, first of all the SWOT tool was used to diagnose the weaknesses and threats in the walnut production sector, and another analysis tool was the elaboration of diagrams to graphically represent the commercialisation of walnuts.

**Results**

The SWOT tool was used as a diagnostic tool to obtain a general perspective of the problems to be studied, emphasising the weaknesses and threats to the cultivation and production of walnuts. The results obtained were that production is affected by diseases and pests, as well as deficient management of cultivation and production processes, lack of cheap credit, high percentage of walnut product waste and crop abandonment.

In terms of threats, destructive aspects of nature such as storms and climatic events, competition from substitute products and high input prices were found.

Addressing this analysis involved field research by visiting different localities in the municipality of Metztlán in order to compare the results of the diagnosis. During the journey, we met some of the main walnut producers who were surveyed, among them; C. Alfredo Morales, C. Rafael Morales, C. Jesús Durán and C. Antonio Gonzales (Metztlán). Antonio Gonzales (Metztlán) being the largest producer in the region, C. Gregorio Calva (San Cristóbal), C. Gabriel Gómez (Pie de la Cuesta), C. Ernesto Pérez (Jilotla), C. Lázaro Durán (Tecruz Cozapa) and C. Octavio Gómez (Buena Vista). Octavio Gómez (Buena Vista); the oldest with 20 and 15 years of walnut production in the municipality, while the youngest producers started approximately 4 years ago.

In the municipality of Metztlán and surroundings, the annual period of walnut harvest starts in the last week of August and continues in September and October. The walnut harvest is divided into two seasons according to the variety. The first harvest corresponds to the "ordinary" or hard walnuts, which opens the harvesting period between the last week of August and the second week of September.

The second harvest is the most intense and corresponds to the "fine" walnuts, whose varieties are: Wester, Wichita, Dos puntas, Cherokee, Fructuoso, Barton and Chihuahua, and is carried out between the second week of September and the last week of October.

In this season, the average annual yield was approximately 1 tonne per hectare for smaller producers, while wholesale producers obtained around 120 tonnes of Criollo walnuts and 30 to 40 tonnes of fine walnuts. In general, the nut with the highest production was the Dos puntas nut with 38.6%, while 20.5% corresponded to the Wester, 11.4% to the Wichita and 6.8% to the Cherokee, and finally nut varieties such as the fructuoso and others produced 22.7%.

With regard to marketing, the price of walnuts in Metztlán depends on the variety, quality (whole and healthy kernel) and flavour, a prior assessment made directly by the buyer through a sample of the product in which he tastes, smells and feels the walnut. Walnuts are sold in two presentations; on the one hand, shelled walnuts of varieties such as Dos puntas, Wichita, Wester, Cherokee, Borton, Fructuoso and Chihuahua are sold for between \$80 and 100 pesos, while the price of ordinary walnuts ranges between \$20 and \$25 pesos. On the other hand, unshelled or "clean" walnuts are sold in "halves" for \$220 pesos per kilo, while "pieces" cost \$160 pesos per kilo.

It is important to mention that, for many consumers living in the region, the walnut has no economic cost because it is harvested directly from the walnut plantations to the home, as opposed to foreign exports, where the cost of the walnut rises approximately twice as much when exported internationally.

For the year 2021, walnut sales were down due to the closure of municipal and state markets as a consequence of sanitary measures due to COVID-19, which denied access to supply centres and commercial shops. This resulted in the loss of economic profits due to product wastage.

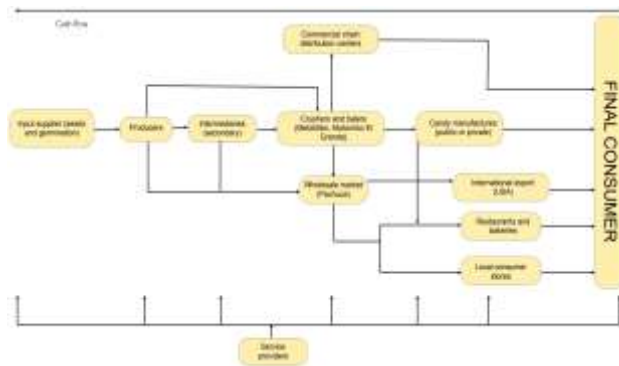
In the region, walnuts are mainly used in gastronomy for the elaboration of dishes and drinks such as chiles en nogada, walnut cream, sauces and smoothies, as well as in the elaboration of sweets such as walnut palanqueta, pepitorias and ice cream, and in confectionery for breads, cakes and jellies.

The value chain is a model that classifies and organises business processes or activities, generating customer value (CCMTY 2018). The primary activities of this chain relate to the production and distribution of the company's products and services, such as operations, inbound logistics, outbound logistics, service, sales and marketing.

Durán (2016) coined a similar term called "value network", which he defines as an analytical tool which allows to decipher the capacity of cooperation between economic and non-economic actors that make up a company, and aims to generate wealth.

On the other hand, based on the data collected in the survey applied in this study, the walnut producer defines a value network as the way of marketing a product and the relationship between expenses and profits.

Figure 1 shows the relationship between the service providers for the production and distribution of walnuts in Metztitlán and external marketers.



**Figure 1** Walnut value chain in Metztitlán, Hidalgo

The first input corresponds to the seed or sprout supplier who supplies the different producers who carry out the cultivation. Once the nut has been harvested, the producer depends on his economic resources and interpersonal relationships to carry out the commercialisation process, when this does not happen, he transfers his product to others called "intermediaries" who are only in charge of paying for the nut under an agreement between him and the main producer; Afterwards, the intermediary or producer carries out the remaining marketing process; he temporarily stores the nuts in warehouses and spaces with machinery such as crackers where the nuts are cleaned and selected, where they are packed in sacks or sacks to be sold wholesale, which are loaded in torton trucks that can hold approximately 22 tons.

The process continues with the distribution of the product to commercial centres such as the central supply centres of Pachuca and Tulancingo locally, and abroad to states such as Mexico, Puebla, Guadalajara, among others. The region also has the capacity to export to international markets such as the United States via parcels, Cruz (2021). Finally, the product is distributed to consumer shops, restaurants and bakeries where the final consumer goes.

In this whole chain, the flow of money goes the other way round; the economic point of exit is the final consumer and the entry corresponds to the supplier and producer.

## Conclusions

Based on the results of this research, Metztitlán presented this year a decrease in sales and a drop in walnut prices due to the closure of municipal and state markets as a consequence of the sanitary measures by COVID-19, which caused the waste of walnuts. On the other hand, the reflection on the walnut value chain showed that different service providers are directly related to each other in the process of buying and selling walnuts.

Among the most important needs for the producers are the equipment of high-performance machinery such as fumigators, cleaners, nut crackers and shakers. At this point, it is important to mention that if the producers would have access to these machines, they would be able to save expenses in payments to secondary workers such as nut shellers, fumigators and cleaners.

It is concluded that the cultivation and production of walnuts is a sustainable economic activity for the Metztitlán region and its localities. However, there are still aspects that do not favour this activity, due to the fact that the producers still do not have relevant federal support programmes that allow them to equip themselves with high performance machinery, which would favour the reduction of expenses and the obtaining of higher incomes in this activity and to be able to maximise the distribution at a local, national and in the future at a higher global level..

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