

## CHAPTER 3: SUSTAINABILITY OF THE VALUE CHAIN OF HARD CORN IN ECUADOR

### 3.1. Introduction

Commodities as a tool serve to protect price risk or a source of instability for spot markets; its importance lies in the variations in future contracts traded in the spot markets of agricultural raw materials, the transmission of volatility and providing information for the construction of public policies (Coronado et al., 2015; Dos Santos et al., 2020).

Corn is a fundamental input in producing food in the Mesoamerican culture due to its flavour and nutritional benefits (Echeverria & Muñoz, 1988), in addition to the production of balanced feed for animal species. The importance makes it a highly demanded product, considering its different presentations, making it accessible to all audiences. In the national and international market, the commercialization of hard corn is influenced by producers' demand for the food and balanced industry in countries such as the United States, China, and India, among the most important. The demand for the product for cultivation extends worldwide.

Ecuadorian corn and its traditional varieties constitute one of the national agricultural and gastronomic heritages; it is cultivated in all climatic zones, excluding the paramos and subparamos above 3000 meters of altitude. The Ecuadorian indigenous people knew the four varieties of corn being white, yellow, black and hard yellow corn, which they called morocho and used in unique preparations. The grain of corn is a vital principle within the worldview of indigenous peoples as it is part of life and a fundamental element of identity (Arroyo Aguilar, 2019; Echeverria & Muñoz, 1988; Sorhegui-Ortega et al., 2022). Corn as human food is the basis of a variety of gastronomic forms, these are classified according to the state of development and maturation of the grain at the time of consumption and if it were consumed in the form of food, drink and in some cases, medicinal, for example, corn hair as a diuretic if prepared as an infusion.

The production of hard corn in Ecuador has become a source of income for producers, thus improving the region's gross domestic product (GDP). Organized work allows direct and indirect growth and integration into the international market. The opportunities of small producers for economic sustainability, if we consider hard yellow corn in the coastal region, especially with an increase in yield that went from 3 tons per hectare (t/ha) to 6.60 t/ha.

However, its potential for production yield and demand has many expectations, and the crop must be sustainable over time.

Within the research, the objective is to describe the characteristics of the value chain of hard corn in the Ecuadorian economy. Considering the methodology of a documentary type, the development of the levels of performance and commercialization of agricultural raw materials " commodities " is shown.

The research is presented in sections entitled as follows: the commodity market in Ecuador, agricultural commodities in Ecuador, the market and the Ecuadorian hard corn value chain, the global marketing of hard corn, the hard corn chain in Ecuador, Characteristics of local production, corn in the national development strategy and finally the reflections and conclusions of the research are presented.

### **3.2. Materials and methods**

To meet the objective of this research, a documentary or non-intrusive analysis is carried out, where scientific articles are included in indexed journals with the search for the following terms "AND value chain AND hard AND corn", "AND value chain", "corn AND hard AND Ecuador", "value AND chain AND hard AND corn", "value AND chain", "hard AND corn AND Ecuador". Expanded the search in the Journal Indexing Citation Report (JCR) and Scimago Journal Rank (SJR). In the case of Web of Science, the Social Sciences Citation Index (SSCI), Science Citation Index Expanded (SCIE), Art and Humanities Citation Index (AHCI) and Emerging Sources Citation Index (ESCI) were included.

Several articles were selected from 2000 to 2021 for a preselection focused on addressing the problem by reading the title, theme, abstract and keywords. A bank of articles was created on the Mendeley platform, and the study of these articles was deepened, building a systematization of the indicated field and a comparative analysis between the various studies.

The systematization was carried out through each author's conceptual representation and discursive analysis. However, the article's relevance is measured by its impact factor and immersion in the thinking of its scientific discipline, oriented towards the results of substantial changes in praxis and the formative theory of the search for real solutions in multiple problem situations.

### 3.3. Developing

#### 3.3.1 *Commodities Market in Ecuador*

Of the total Ecuadorian exports during 2020, raw materials represent 74.44%, USD 16,623 million, consumer goods with 18.73%, intermediate goods represent 6.05%, and capital goods 0.77 %. Of these, the non-oil raw material products with a higher percentage of participation in the Ecuadorian Gross Domestic Product GDP are agricultural products. The primary sector represents 14.7% of GDP, with the agricultural segment representing traditional products, bananas, cocoa, and coffee, added to developed products such as flowers, fruits, and vegetables such as broccoli, hearts of palm, asparagus, and tomato.

In the same way, it imports consumer goods, intermediate goods and capital goods in 39.79%, 33.40% and 21.59%, respectively. Within imports of raw materials with 4.78%, materials Relevant premiums include non-oil products such as cake and solid residues from soybean oil extraction (Commission & Bank, 2021). This segment of raw material is called commodities (Barrientes, 2017).

Table 4 shows the evolution of the national GDP in thousands of USD, from 2010 to 2019, together with the Gross Added Value and the participation in the national GDP. The GDP is the economic indicator that reflects the wealth generated in the monetary value of the goods and services produced in the territory (Ochoa-Rico, Jimber del Río et al., 2022), its importance in the last decade has had a significant growth until 2015, after a slight fall and achieving a recovery in 2017, possibly being affected by the 2016 earthquake that mainly affected the productive sector of the province of Manabí. These drops in GDP influence the value of goods-services and exports, especially non-traditional agricultural products, and affect the national economy. As argued by (Thomasz et al., 2016), dependence on exports of primary products increases the macroeconomic vulnerability of developing countries, increasing the volatility of the growth rate and reducing the long-term growth rate and risks in the balance of payments.

**Table 4.**

*Evolution of GDP according to variation rates (2010-2020)*

	<b>National GDP</b>	<b>Agricultural GVA</b>	<b>Agricultural GVA</b>	<b>Participation of the Agricultural Sector in the National GDP</b>	<b>Participation of the Agricultural Sector in the Agricultural GVA</b>
2010	56,481,055	4,360,989	3,288,101	5.82%	75.40%
2011	60,925,064	4,689,213	3,526,649	5.79%	75.21%
2012	64,362,433	4,667,557	3,482,558	5.41%	74.61%
2013	67,546,128	4,967,197	3,705,479	5.49%	74.60%
2014	70,105,362	5,258,169	3,912,371	5.58%	74.41%
2015	70,174,677	5,366,126	4,039,443	5.76%	75.28%
2016	69,314,066	5,356,735	4,044,671	5.84%	75.51%
2017	70,955,691	5,593,352	4,288,107	6.04%	76.66%
2018	71,870,517	5,540,844	4,239,635	5.90%	76.52%
2019	71,879,217	5,511,269	4,216,523	5.87%	76.51%

Source: Central Bank of Ecuador (2020).

Primary agricultural products have a share in the Ecuadorian GDP; these products traditionally represent about 9.63% with \$9,626,014 thousand of the Gross Added Value of both the agricultural sector and the agricultural sector, including livestock forestry and fishing, according to preliminary data from the Bank. Central del Ecuador (BCE, 2021), the interannual rate for Gross Value Added (GVA) in the agriculture industry is -2 and a contribution per industry of -0.16 to GDP in 2021 (BCE, 2020). In the same way, world

growth is projected at -4.9 per cent in 2020, reflecting the more significant alteration of commercial activity than expected due to the situation of the Covid-19 pandemic, demonstrating the contraction of production, lower-income and higher costs of commodities and external credits (International Monetary Fund, 2020; World Bank Group, 2020).

Among the macroeconomic indicators related to the trade balance is the People's Republic of China with 25.53% and the United States with 23.83%, the countries that dominate Ecuadorian exports, far behind Panama, Germany, Peru, Japan, France, and South Korea. Similarly, the United States and China dominate imports with 21.65% and 18.93%, respectively, far behind, followed by Colombia, Panama and Brazil.

The oilseed and cereal cultivation sector and industries registered a growth rate of 2.4% of GDP (BCE, 2019). Affected by the fall in the prices of petroleum products worsened the Ecuadorian economy. Being a state's objective with the private sector to find ways to prevent the country from increasing severe economic problems and intelligently and agilely control the economy compromised by external variables.

In this sense (Aguiar de Medeiros & Vital, 2015; Delfín, 2014; Dos Santos et al., 2012; García-Leonard et al., 2022) state: that China, despite being a significant world producer of raw materials with agricultural products, metals and energy, domestic consumption grew at much higher rates than production, generating a high demand for imports, together with the demand came the internationalization of its state companies (Sinopec, CNPC, CNOOC, State grid Corporation, Golden Dragon Precise Cooper Tuhe Group, Chinalco, among others) its focus is trade, mining and oil production.

According to Goulart & Bragatti (2020) and Michelotti & Siqueira (2019), make an essential dimension in the economic dynamics of Latin America and its relative boom period during the decade of the 21st century due to the appreciation of raw materials in the market. Globally, China is the primary buyer of its exports of agro-industrial products, metals and hydrocarbons, strengthening income and contributing to the expansion of the margin of autonomy of Latin American countries. Since finance is the instrument of Chinese political power to promote and guarantee the supply of agricultural commodities (Macedo & Costa, 2017), with the Covid-19 pandemic, speculation by East Asian financial institutions influence the value real value of raw materials (Franz, 2021; García Leonard et al., 2021).

In the Brazilian case, according to Fauro et al. (2016), the state supports actions in agricultural policies such as credit incentives, technical assistance, subsidies and others to encourage prices in soybean, corn and wheat crops, in addition to the acquisition of machinery, inputs, seeds, among others. All these essential products for food security. In addition to these incentives in Argentina, an increase in the area planted with agricultural commodities is observed (Parnás & Fonzo, 2021). While in Colombia, the formal recognition of coffee cultivation, the associative and collaborative style of coffee growers, and international experience regarding international price risk use future standardized contracts as alternatives to avoid speculative risks in raw materials (Moreno & Pereira, 2015).

### ***3.3.2 Agricultural Commodities in Ecuador***

Concerning the price of commodities in dollars, a devaluation of this currency increases the relative purchasing power of the rest of the world currencies, raising its price. In addition, as the participation of the demanding nations in world trade increases, this indicator is amplified (Ortega-Santos et al., 2021; Rondinone & Thomasz, 2016).

Thus, the participation of the primary agricultural commodities that are produced in Ecuador is crustaceans (19%), bananas (18.2%), flowers (4.1%), cocoa beans (4%), being the main destinations States United States (23.7%), China (15.8%), Panama (12%), Russia (4.5%), Chile (4%), Colombia (3.9%).

In table 5, it is observed that the agricultural commodities that show significant development are bananas, plantains and shrimp, on which the country has been developing strategies in the differentiating market promoted by State agencies and the private sector local and global.

Corn is also part of the international commodity market, but its production volume does not occupy an important place in the national economy. There have been improvements in production in recent years; however, yield is not very competitive if we consider other products, with Colombia and Guatemala being the leading exporters.

**Table 5.**

*Exports of traditional agricultural products from Ecuador (2016-2020)*

<b>Products</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>	<b>2020</b>
banana and plantain	2,734.2	3,028.2	3,215.9	3,295.2	3,669.0
Coffee and processed	148.6	119.4	83.4	80.2	69.8
Shrimp	2,580.2	3,043.0	3,189.7	3,890.5	3,823.5
Cocoa and processed	750.1	672.4	788.0	763.9	935.1
tuna and fish	244.3	252.6	308.1	308.0	315.2
Non-traditional*	4,875.2	5,050.9	5,235.1	5,306.1	6,157.6

Note: \*Excludes goods for repair or storage without transfer of ownership.

Source: Central Bank of Ecuador (2021)

Ecuador, in the past decade, experienced an "economic Big Bang", a product of the rise of China, which implied the great global shocks: first, imports of Chinese manufacturers flooded the world, and second, an increase in the demand for imports of primary products and the latter, an increase in global savings associated with current account surpluses in China and other emerging countries (De la Torre et al., 2020; Vergara-Romero, 2021c).

According to figures from the (BCE, 2019; CFN, 2017), imports of merchandise during the last five years concerning the agricultural sector, as shown in Table 3, have a progressive evolution until the subsequent 2018 tend to decrease both for agricultural raw materials and agricultural capital goods, reaching values in USD of 1401.2 (million), and USD 155.0 (million) respectively.

**Table 6.**

*Evolution of Ecuadorian merchandise imports (millions of dollars)*

Years	2016	2017	2018	2019	2020
Raw Materials	5,687.7	6,711.4	7,490.6	6,940.8	5,992.7
agricultural	1,042.1	1,164.1	1,401.2	1,351.1	1,337.5
Capital goods	3,935.2	4,675.5	5,196.8	5,367.7	4,146.0
agricultural	110.0	134.0	155.0	111.0	119.0

Source: Central Bank of Ecuador (2021).

Ecuador is highly dependent on commodities and the cyclical sensitivity of its income. Hence, it is necessary to build effective countercyclical fiscal policies avoiding cuts in public investment, and that social transfers are not cut, thus avoiding possible shocks in the volatile oil revenues thus avoiding boom and bust cycles (Camino & Brito, 2021).

### **3.3.3 The market and value chain of Ecuadorian hard corn**

The behaviour of the economic flows that articulate a sector and the difference in its environment is perceived by the analysis of the value chains, all the essential activities to have a product or service from the initial phase through different production stages and/or services until it reaches the consumer and the final availability of being used or consumed (Dilla et al., 2020; García et al., 2014). As a whole, it is possible to improve the economic analysis of the value chain by coordinating and optimizing activities in the calculation of added value in operations in supply chain activities (Pocaterra, 2019; Vinajera et al., 2017; Vergara-Romero, 2021a).

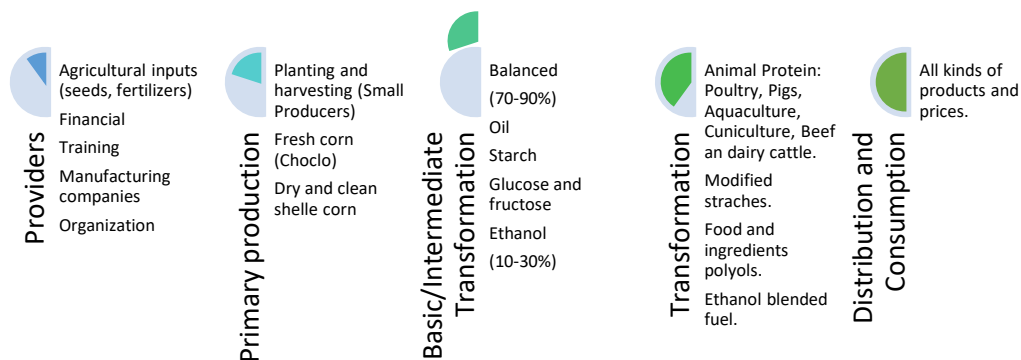
Countries with abundant natural resources and participation in exports exhibit lower rates of economic growth because they block the diversity and modernization of the economic structure. Illustrating the "Sickness of the Dutch economy", affecting the competitiveness of primary exports compared to an alternative manufacturing economy. This is due to the greater volatility of the prices of primary goods, reducing the possibility of long-term economic growth.



Figure 5 shows the supply, production and marketing chain of hard yellow corn. The initial suppliers give rise to agricultural inputs, manure, fertilizers, and tractors for ploughing, among others; financial ones are also included due to the requirements and high costs of credit, factors that limit access to small producers, whom many times look for the user or “chulquero” as a source of money. Some companies sometimes provide this requirement in exchange for the safe purchase of the production. In the case of manufacturing companies, a division is observed, locating two types: 1) industrial processing with a national presence in which companies such as Pronaca, AFABA, Agripac, Balanced Nutrients, Nutril, Alibaec, Bioalimentar, Avesca, Liris are identified, Wayne, Unicol, Alcón, Coprobalan, Grupo Fernández, together produce 53% of national balanced livestock feed, 2) processing within the farms, especially poultry. The influence of the former reaches the management of the corn crop; that is, they are not only concerned with production and purchase but also with the development of the crop and grain.

**Figure 6.**

*Chain of production, transformation and distribution.*



According to the Ministry of Industries and Productivity (MIPRO, 2019), 386 companies process around 87% of corn, its destination being balanced production, while the rest is dedicated to the industry of other derivatives such as starch-based foods, canned ingredients and others.

In the international market, there is a demand for new or alternative products, prices must be considered, and factors demand a competitive advantage. One factor to consider is the product innovation and their presentation formula. One of the innovative products in the market for Colombia and Guatemala in 2020, according to the report of exportable products

such as vegan hamburgers, vegan sausage and snacks are among the leading products in the market based on modified corn starch and corn flour for processed products (MIPRO, 2020). One contribution of value chains is the ability to generate structural changes in economies, especially in agricultural countries whose benefits would generate quality jobs associated with the knowledge and research economy (Almonacid Z., 2018; Gilles, 2018; Vergara-Romero, 2019). Regarding price formation, raw materials are influenced by the national supply and fluctuations in demand, as well as by the currency exchange rate and tariff rates (Henrique et al., 2017; Vergara-Romero, 2021d).

Among the market alternatives, a new type of buyer must be sought, and added value must be added, so the question must be considered to create and strengthen the competitive advantage of the producer: How to be more competitive in the Ecuadorian corn industry?

### ***3.3.4 The global marketing of durum corn***

In the international trade of corn, as shown in table 7, it is appropriate to analyze the market for yellow corn exports, with the United States predominating in total exports worldwide with 44.1%, followed by the countries South Americans such as Brazil and Argentina with 8.4% and 14.1%, this relationship possibly goes hand in hand with the extension of the countries. Most of the exports will continue to be dry beans, despite attempts by producers to add value.

**Table 7.**

*World exports of yellow corn during 2019*

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<b>No</b>	<b>Country</b>	<b>Total, Exports 2018 (millions of USD)</b>	<b>Value in Tons</b>
1	USA	8013010	41562313
2	Brazil	7289548	42752102
3	Argentina	5948632	36075720
4	Ukraine	4761997	24463903
5	Romania	1377507	6676219

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## Sustainable value chain of dry hard corn within the analysis of food sovereignty

6	France	1350725	3672345
7	Hungary	820156	3025729
8	Russian Federation	617625	3119665
9	Serbian	550951	3132823
10	Bulgaria	460578	2588956
11	Paraguay	399833	2993286

Source: Food and Agriculture Organization (2021).

The values of Ecuadorian yellow corn exports in 2020 as shown in table 8. The countries of Colombia and Venezuela are the largest consumers of Ecuadorian yellow corn; the contribution of corn concerning exports of the international FOB price in 2019 is USD 30,501 million.

**Table 8.**

*Net weight of yellow corn exports and FOB prices.*

Destination country code	Destination country	MT (Net Weight)	FOB
BEL	Belgium	42.80	26.30
CABBAGE	Colombia	117,741.60	24,469.30
ESP	Spain	52.70	95.90
ITA	Italy	49.20	39.40
MEX	Mexico	600.00	184.80
PER	Peru	70.80	39.60
USES	USA	33.80	90.60
COME	Venezuela	18,438.70	5,555.60
<b>Total</b>		<b>137,029.60</b>	<b>30,501.50</b>

Source: Central Bank of Ecuador (2021).

We must highlight the characteristics of productive specialization in each country and the governance structure of global value chains. The consequences on economic growth and the effectiveness of macroeconomic policy decisions to influence international trade flow at the national level based on internal development plans (Chena & Noguera, 2020; OECD/FAO, 2019; Vergara-Romero, 2014).

With the above background, it can be seen in table 9 that the trend of the price the producer received per metric ton has the highest peak in 2016 and the lowest value in 2018.

**Table 9.**

*Producer prices for corn.*

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<b>Annual Average Producer Price (USD/t)</b>	
2014	335.6
2015	357.1
2016	381.6
2017	363
2018	314
2019	324.5

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Source: Food and Agriculture Organization (2021).

In the Mexican case, the short- and long-term price elasticities vary in the total supply, the unit changes in the real rural average price of corn, the subsection to coverage of future contracts, the number of placements, the behaviour of world growth and the global food uncertainty (Delgadillo et al., 2016; Guzmán et al., 2012; Ortiz & Montiel, 2017). For Latin American countries, on the other hand, in general, the export prices of corn are lower than in 2019, in the case of Chile, Peru, Uruguay and Paraguay, due to the wide availability of the product, in Colombia, a factor to consider is the depreciation of the currency for the drop in prices, while Argentina and Brazil have an upward trend in prices in the first quarter of 2020, possibly due to sustained demand and abundant exports in the feed industry (Organization of the United Nations for Food and Agriculture, 2020).

### **3.3.5 The hard corn chain in Ecuador**

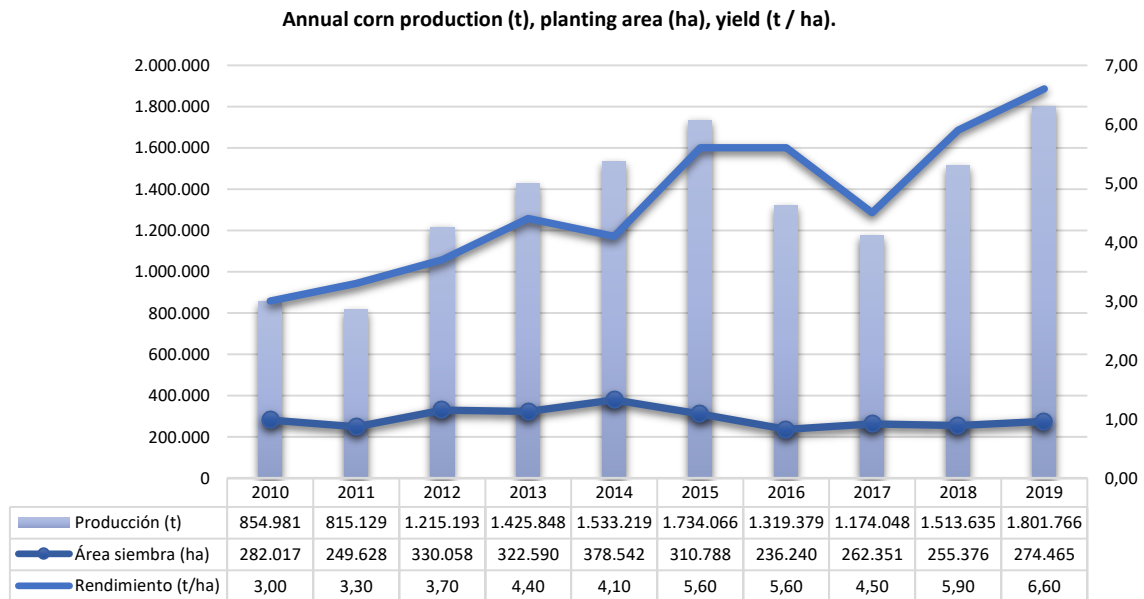
In Ecuador, the yields in the production of corn are closely related to the environmental conditions of the sector where it is grown; the climatic conditions can affect the production in the plantation, humidity, and temperature; they must be adequate for the crop. Thus, the period of the plant is regulated by the climate, the climatic seasonality and the vegetation period, allowing two planting and harvesting periods to be established.

- **Productive link and support services in production.** Corn farmers who produce their Agricultural Productive Unit (UPA's) participate. Among the external economic agents that intervene, we have suppliers of supplies, training, machinery, transportation, and financial system (formal and informal).
- **Transformation link.** Within the chain, it constitutes the most complex link. Information on this segment is limited. From the grain to its processing, intermediate products (flour, beverages) and finished products (biodegradable packaging) can be obtained.
- **Marketing link.** Mainly involved are organizations, associations, and owners of collection centers of industrial companies that set the price. The concepts of quality and appreciation are subject to the degree of humidity and percentage of impurities.
- **Consumer link.** Various intermediate and final products are involved, resulting from processing and/or industrialization: flours, balanced meals, beverages, and biodegradable containers.

The links must consider current trends worldwide (Padilla, 2017), active participation in the markets allowing farmers and producers to meet the demand for the base product, protect the environment, strengthen the social and economic development of small and medium producers, together with the community.

**Figure 7.**

Annual production, planting area and corn crop yield.

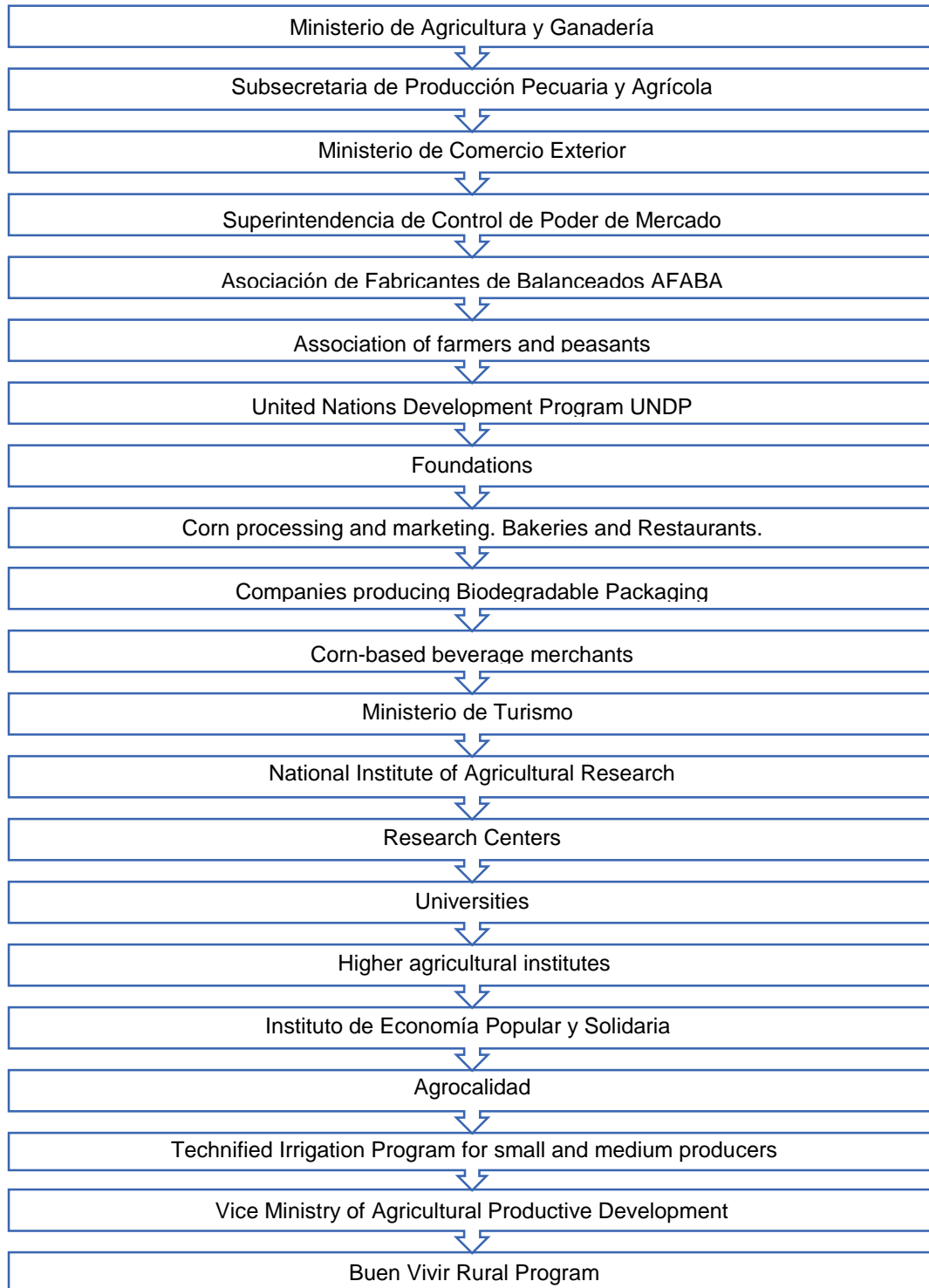


The production of corn-based on the seed and the yield per hectare of improved and certified seed, added to the quality of the cob, give it competitive advantages in terms of price. Figure 6 shows the yield of tons/hectare, its evolution in production, the increases in the results from 2010 to 2019, observing decreasing values in 2017, and subsequent recovery. In 2019, a maximum yield figure of 6.6 (t/ha) was reached. The growth was 220%, considering corn is a product of recent economic importance in exports. The improvements in yields are thanks to the quality of certified and improved seeds, farming activities, favourable weather conditions, research, links with the corn sector and the development of crops in the Ecuadorian coastal zone, being the provinces of Los Ríos, Manabí and Guayas as well as the province of Loja with the best yield per hectare at the national level.

3.3.6 Main actors in the Ecuadorian hard corn value chain

Figure 8.

Actors in the production of Hard Yellow Corn.



Ecuadorian corn has very little representation in the international economy, with less than 1% of the global; this figure in the medium term can improve, considering the improvements in free trade agreements, and commercial activities with importers. Sometimes, corn prices exceed international prices, so the challenge is to be more competitive at the time of marketing if we consider that the demand for dry corn grain exceeds the capacity of producers.

The research works that analyze the impact on the primary activities of the value chain are scarce (Cardona, 2020; González et al., 2013; Ochoa-Rico, Concha-Bucaram et al., 2022); the value chains are characterized by the production of manufactured and/or finished products for the final consumption and by the chains are made up of the public, private, research and linkages with the sector (Oddone & Padilla Pérez, 2017; Vergara-Romero, & Ceular-Villamandos, 2022), with the leading actor being the farmer or corn producer who generates the base product (see figure 7).

### ***3.3.7 Characteristics of local production***

The Ministry of Agriculture and Livestock (MAG, 2019) stated that the main characteristics of corn producers are the following, in some cases, they are being strengthened by other members of the value chain:

- The average age is 46 years, and most have primary education (Castellanos Dorado et al., 2021; Ortega-Ortega et al., 2021).
- Yellow corn producers self-identify as Montubios (51%), mestizos (46%) and others (3%).
- Regarding training related to corn cultivation, 40% received training, with the MAG responsible for 91%.
- Most farmers do not control production costs.
- Most producers do not have access to productive credit (37%).
- Concerning land ownership, 44% are owners with title, 30% are owners without title, multiple groups lease the land to produce 20% and the remaining 4% are produced on communal lands; of the total, a 4.57 is obtained ha as average cultivation area.



- The destination of the production at the moment of commercialization is with the intermediary mainly 58%, the delivery in the collection centers is 36%, and the rest is to another 6%.
- Among the provinces with the best performance are Loja with 7.64 t/ha, Los Ríos with 6.97 t/ha, and Guayas with 6.59 t/ha.

### ***3.3.8 Maize in the national development strategy***

From the above, it can be reflected that the possibilities are favourable for Ecuadorian corn; the current yields give it greater importance in the innovation of the international market. Influenced by new behaviours in consumption patterns, consumer demand for new forms of product presentation, and being friendly to the environment. The national strategy is to promote new forms of innovation and generate ventures within the market (Chamba & Cordero, 2017; Vergara-Romero, 2021e).

It is necessary for Ecuador to determine differentiated strategies and competencies that allow taking advantage of comparative competitive advantages in raw materials concerning free trade agreements and treaties, approaches in agricultural policies to incorporate climate-smart programs (OECD/FAO, 2019; Tezanos, 2019), adopt strategies that account for the solution of complex problems in an integral way and define training strategies with training based on competencies with the interaction of knowledge, abilities, skills and international agricultural standards, product differentiation (Aguilar et al., 2018; Carvajal et al., 2019; Mercado, 2021), as well as the non-use of transgenics, such as the proposal of the Constitution of the Republic on maintaining the natural heritage, conservation of biodiversity and food sovereignty (Constituyente, 2008; MAG, 2016).

Decentralized governments must follow up on social programs, especially cash transfers and peasant social security, to reduce rural poverty, address health needs, and improve the living conditions of small producers. The strengthening of organizations, cooperatives, fair prices, and popular and solidarity economy, for the revitalization of trade and exports, as well as the improvement in the differentiation of products (organic, geographical denomination), horizontal and vertical integration of strategic areas.

The state must plan and generate strategies that allow access to socio-cultural diversity according to the context in production that are highly efficient in demonstrating significant variables or facts in the added value of the raw material for a more excellent socio-productive approach with the industry and national manufacturing and consider an exchange of experiences and their requirements.

“Feminization in agriculture” is necessary as part of differentiated policy strategies as management of this segment of the population in agricultural activities is becoming more noticeable as men seek new opportunities in other sectors.

### **3.4. Conclusions**

In the case of agricultural commodities, Ecuador involves products such as bananas, coffee, and cocoa, of which the banana maintains a sustainable and profitable behaviour over time. Coffee and cocoa show scattered behaviours over time and in exports. Regarding yellow corn, also as a commodity, it is not representative in terms of production volume, but it improves annual yields, enabling future projections.

The analysis of the results achieved in this research, under the prism of the development conditions of the corn value chain, allows reaching relevant conclusions. The estimates highlight the national tendency to structure the value chain limited by exchange policies as an instrument to promote productivity growth and increase net exports, reduce the effects on the trade balance and enhance the sensitivity of trade flows to domestic income and external.

The strengthening of the value chain must promote trade policy and promote, manage and execute actions to guarantee fair prices for small and medium producers as a market strategy for the world economy. The development of the rural maize sector under the associative perspective implies building a favourable context for producers and investors, fostering complementary incentives in the rural territory, and promoting sustainable development at the local level. The goal of zero hunger, the fight against rural poverty, and the guarantee of sovereignty and food security proposed in the changes in the productive matrix may be possible in a social environment with policies that favour the agricultural activity of corn and complementary incentives.

In Ecuador, the corn value chain focuses on the use and preparation of balanced foods, favouring national consumption of the protein produced, similar to other countries such as Brazil and Argentina. Research efforts should be made to maintain or improve grain quality and yields per hectare. Likewise, it is necessary to strengthen the value chain that ensures the storage and purchase of products at fair prices, maintaining the grain's quality as a productivity culture.