

Analysis of the Socioeconomic Situation of Small and Medium Sugar Producers in the Canton Marcelino Maridueña, Ecuador

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Abstract

The global production of sugar cane (*Saccharum officinarum*) in 2020 was 1,869,715,086 tons. The countries with the highest production were Brazil, India, China, and Pakistan. Ecuador has approximately 130,000 hectares of land dedicated to sugarcane cultivation. The objective of this study was to analyze the socioeconomic situation of small and medium-sized sugarcane producers in the canton of Coronel Marcelino Maridueña. The research employed a descriptive approach, with the survey technique being used to collect information. A questionnaire was designed for sugarcane producers, which was previously validated. The variables considered were related to social, economic, productive, and market aspects. A total of 75 producers were surveyed. In terms of social aspects, the study found that 81% of families have between two and five members, 67% have completed secondary education, and 73% have access to basic services such as water, electricity, and telephone. In terms of economic aspects, the study found that 87% of producers have Access to credit is a significant issue for producers. In terms of production, 65% of producers have between 21 and 91 hectares of land, with the predominant varieties being ECU-01 and ECU-03. In terms of the market, 95% of producers sell their crops to the San Carlos sugar mill. The agronomic practices employed in this crop are predominantly conventional, encompassing the use of agricultural machinery for plowing, soil turning, and harvesting, in addition to the application of agrochemicals such as fertilizers and pesticides.

Keywords: Analysis, Sugarcane Farmer, Productivity, Socioeconomic

INTRODUCTION

As a developing country, Malaysia has made significant progress in terms of socioeconomic growth. The rapid economic expansion and the creation of microenterprises have been instrumental in achieving this outcome. In the contemporary economic landscape, the pursuit of sustainable development represents a pivotal objective. Consequently, policymakers must identify strategies that can enhance the economic well-being of individuals and bolster national economic growth. Microfinance institutions provide a range of financial and non-financial services that assist clients in developing their human capital capabilities, improving their financial management, and enhancing their business skills. These factors enable microenterprises to gain a competitive advantage over their rivals and achieve superior business outcomes (Abdullah, Zainudin, Ismail, & Zia-Ul-Haq, 2022).

Savings literacy is a challenge for some individuals, particularly those engaged in microenterprise, given that despite high net incomes, many microenterprise owners find it difficult to set aside funds for savings or investment. A savings culture is of critical importance for microbusiness owners in order to enable them to make informed decisions in the future and achieve financial security. Nevertheless, a considerable number of individuals encounter difficulties in accumulating savings despite exhibiting a surplus in turnover. This constraint can be attributed to various financial problems, including a lack of savings culture, low income, and high levels of indebtedness (Tarisha, Ardi, Fatkhurrahman, & Margaretha, 2021).

LITERATURE REVIEW

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In Ecuador, sugar cane cultivation occupies an area of approximately 130,000 hectares, which generates more than 30,000 jobs directly related to the sugar industry. In collaboration with research institutions, these companies invest in the development of high-quality production processes, utilizing sugarcane varieties that have been adapted to the country's climatic and soil conditions. (Castillo, 2018).

The province of Guayas is the largest producer of this crop, accounting for nearly 80% of the national production. It is also home to the largest number of sugar companies, which collectively employ approximately 7,838 individuals (Corporación Financiera Nacional [CFN], 2021). (CFN, 2021).

A study conducted by Damian et al. (2019) found that 55% of producers in the San Jose precinct of Naranjito canton have primary education, with an average age of 50. The size of their production units is between 10 and 50 hectares. The factors that limit sugarcane production in this area are the lack of irrigation systems and the commercialization of sugarcane.

Another factor that affects sugarcane production is the sensitivity of producers' income to sales price variation (Rebollar, Cervantes, Jaramillo, Cardoso, and Rebollar, 2017).

The canton of Coronel Marcelino Maridueña is a sector with a relatively small surface area, representing only 1.7% of the territory belonging to Guayas (Gobierno Autónomo Descentralizado de Coronel Marcelino Maridueña [GAD], 2014). However, the province of Guayas accounts for 76% of national production, with the province of Cañar contributing 18%. Collectively, these two provinces account for 96% of the national total (CFN, 2022).

The objective of this study was to analyze the socioeconomic situation of small and medium sugarcane growers in the Coronel Marcelino Maridueña canton through the development of surveys.

Table 1. Forms of relationships between children and parents in the event of an absence

Forms of relationship	Percentage
Extreme violent abuse: hitting, locking up, bathing in cold water, insulting, taking people out of the house, leaving them without food.	38%
Indifference: not paying attention, not doing anything.	1%
Good treatment: Dialogue, help.	42%

Note: Prepared from the Social Observatory of Ecuador OSE (2019)

Table 2. Forms of relationships between children and their teachers when they do not complete a task

Forms of relationship	Percentage
Non-violent: talk, lower grades, call a representative.	74%
Violent: hitting, insulting, leaving without recess.	26%

Note: Prepared from the Social Observatory of Ecuador OSE (2019).

METHODOLOGY

The research approach employed a descriptive methodology, as the survey technique was applied. To collect information, a questionnaire was designed for sugarcane producers in the canton of Coronel Marcelino Maridueña, which was previously validated. The inductive method was employed to gain insight into the socioeconomic, productive, and commercialization aspects of sugarcane cultivation. Furthermore, the analytical and deductive methods were employed to analyze the data and draw conclusions regarding the underlying assumptions of sugarcane producers.

The variables that were taken into consideration in this research were as follows:

The social, economic, production and market aspects were considered.

POPULATION AND SAMPLE

This research was conducted in 2022 and considered sugarcane growers located in the canton of Coronel Marcelino Maridueña, which included 94 producers. These producers were divided into two categories: medium (between 200 and 20 hectares) and small (less than 20 hectares). A total of 75 surveys were administered.

$$n = \frac{N \times Z^2 \times p \times q}{d^2 (N - 1) + Z^2 \times p \times q}$$

n: Sample size

N: Population size

Z²: Confidence level

p: Percentage of occurrence of an event

q: Percentage of occurrence of an event

d: Absolute accuracy level

$$\frac{94 \times 1.96^2 \times 0.5 \times 0.5}{0.05^2 (94 - 1) + 1.96^2 \times 0.5 \times 0.5} = 75.67$$

Statistical analysis

Based on the information from the surveys, descriptive statistics were used to analyze the results of this research.

RESULT AND FINDINGS

Social Aspects

In terms of the social aspects of the producer, 89% of sugarcane growers are male, according to the age of the growers. The majority, 73%, are between 51 and 60 years old. In relation to marital status, 68% are married. Additionally, 81% stated that their family is composed of two to five members. In terms of educational attainment, 67% of the sample have completed secondary education, while 10% have only completed primary education. 67% of the sample reside on the same farm. 73% of the farmers indicated that the basic services available on their farm are water, electricity, and telephone, indicating that most farms in the sample lack sanitary sewerage. In Ecuador, the cultivation of sugarcane represents a significant economic contribution to the

agricultural sector, providing both income and employment opportunities (Navarrete, Naikiat and Parrales, 2022).

Table 3: Social aspects of sugarcane producers, canton Marcelino Maridueña

<i>Indicators</i>	<i>Alternatives</i>	<i>Percentages</i>
<i>Sex</i>	<i>Men</i>	89
	<i>Women</i>	11
	<i>< 30</i>	11
<i>Age of producers</i>	<i>30 - 40</i>	4
	<i>41 - 50</i>	12
	<i>51 - 59</i>	31
	<i>60 ></i>	42
	<i>Married</i>	68
<i>Marital status</i>	<i>Singles</i>	21
	<i>Divorced</i>	10
	<i>Singles</i>	1
<i>Number of family members</i>	<i>1 - 3</i>	36
	<i>4 - 5</i>	45
	<i>6 ></i>	19
	<i>Primary</i>	10
<i>Education level</i>	<i>Secondary</i>	67
	<i>University</i>	23
	<i>Yes</i>	67
<i>Residing on the premises</i>	<i>No</i>	33
	<i>Water, electricity and sewerage</i>	27
	<i>Water, electricity and telephone</i>	73

Economic Aspects

Table 4. Economic aspects of sugarcane producers, Marcelino Maridueña canton.

Indicators	Alternatives	Percentages
Access to credit	Yes	87
	No	13
	Private bank	50
	BanEcuador	15

Sources of financing	CFN	21
	Savings cooperative	1
	None	13
	< 10000	14
Approximate revenues	11000 - 50000	32
	51000 - 100000	28
	101000 - 500000	23
	501000>	3
	< 500	7
Production costs	501 - 800	21
	801 - 1000	49
	1001 - 2000	19
	2001 >	4

Regarding the economic aspects of the producer, 87% of the sugarcane growers have access to credit, where the main source of financing is private banks, as mentioned by 50% of the sugarcane growers, 60% have income between US\$11,000 and US\$100,000 per year from their productive activities, while 70% mentioned that the cost of production per hectare is between US\$501 and US\$1,000, which is why they consider it a profitable activity. Sugarcane cultivation is one of the main sources of income for farming families (Arias, Ramírez and Perea, 2022).

PRODUCTION ASPECTS

Table 5. Production aspects of sugarcane growers in the canton of Marcelino Maridueña

Indicators	Alternatives	Percentages
Area planted in hectares	< 5	3
	6 - 10	17
	11 - 20	15
	21 - 40	27
	41 - 90	17
	91>	21
Type of production systems	Conventional	83
	Mixed	17
	ECU-01	36
Sugarcane varieties	ECU-03	45
	CC 85-92	14
	RAGNAR	5

	Yes	19
Owns agricultural machinery	No	81
	River	62
Water supply	Well	19
	Irrigation canal	19
	Hired	28
Labor	Eventual	28
	Contracted and temporary	39
	Family	5
	1 - 7	44
	8 - 10	28
Personnel per hectare	11 - 15	25
	16 >	3
	Pests and diseases	55
Influencing factors	Climatic conditions	34
	Soil conditions	11
	21 - 60	13
Productivity in tons	61 - 80	43
	81 - 100	39
	101 >	5

The results in the productive aspects show that 65% have a sowing area between 21 to 91 hectares, the predominant varieties are ECU-01 and ECU-03 with 81% and the predominant production system is conventional, where most of the producers do not have tillage machinery. 62% of the sugarcane growers use river water for their crops, and the labor used is mostly hired and temporary with 95%, in relation to the number of people per hectare, 72% indicated that they use between one to 10 people per hectare. The factors that affect production are pests and diseases, while 82% indicated that they have productivity between 61 to 100 tons per hectare. The ECU.01 and ECU-03 varieties are the most widely planted in the country, showing better development and good yields in level soil (Navarrete, Martínez, Martillo, and Centanaro, 2021).

Market Aspects

Table 6. Market aspects of sugarcane producers, canton Marcelino Maridueña

Indicators	Alternatives	Percentages
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	San Carlos	95
Place of sale	San Carlos and Valdez	4
	Trunk	1
	Cash	6
Forms of payment	Check	7
	Transfer	87
	Considers the crop profitable	
	Yes	92
	No	8
Future vision of the market	Very good	1
	Good	63
	Malo	15
	Indifferent	21
Government influence on sugarcane prices	Yes	96
	No	4
Considering the price of sugar cane to be appropriate	Yes	73
	No	27

The market aspects of the sugarcane sector were also investigated, 95% of the producers surveyed sell to the San Carlos mill, the form of payment they use is bank transfer, 92% consider their activity profitable, where in addition, 63% considered that the market has a good future, and that this is due to the influence of the state in setting the price, where 73% of sugarcane growers considered the price set by the government as appropriate, that is, it shows a degree of satisfaction with the price they receive from the mills. Sugarcane has a minimum support price (PMS), which is set annually through Consultative Councils, which also involve other agencies such as the Ministry of Agriculture and Livestock (MAG), representatives of sugarcane growers, sugar mills, and unions such as the National Federation of Sugarcane Growers of Ecuador (FENAZUCAR) and the National Union of Sugarcane Growers of Ecuador (UNCE) (Superintendencia de Control del Poder de Mercado [SCPM], 2021).

Chi-square test of social aspect

H0: Years of work in sugarcane cultivation is not related to dependence on this agricultural activity.

H1: Years of work in sugarcane cultivation is related to dependence on this agricultural activity.

Table 7: Chi-square tests

	Value	Degrees of freedom	of Asymptotic (bilateral) significance
Pearson's Chi-square	17,232 ^a	9	0.045
Likelihood ratio	20,717	9	0.014
N of valid cases	75		

Note: a. 13 boxes (81.3%) have expected a count of less than 5. The minimum expected count is 0.56.

Chi-square test of economic aspect

H0: Annual net income from sugarcane cultivation (dollar \$) has no relationship with the area under sugarcane production (hectares).

H1: Annual net income from sugarcane cultivation (dollar \$) is related to the area under sugarcane production (hectares).

Table 8: Chi-square tests

	Value	Degrees of freedom	Asymptotic (bilateral) significance
Pearson's Chi-square	246,184 ^a	180	0.001
Likelihood ratio	191,267	180	0.269
N of valid cases	75		

a. 222 ballot boxes (100.0%) have expected a count of less than 5. The minimum expected count is 0.03.

Chi-square test of productive aspect

H0: Sugarcane seed varieties have no relationship with sugarcane crop productivity (t/ha).

H1: Sugarcane seed varieties are related to sugarcane crop productivity (t/ha).

Table 9: Chi-Square Tests

	Value	Degrees of freedom	of Asymptotic (bilateral) significance
Pearson's Chi-square	34,074 ^a	21	0.036
Likelihood ratio	35,126	21	0.027
N of valid cases	75		

a. 29 boxes (90.6%) have expected a count of less than 5. The minimum expected count is 0.05.

Chi-square test of market appearance

H0: The profitability of sugarcane cultivation is not related to the expectation of the sugarcane market in the future.

H1: The profitability of sugarcane cultivation is related to the expectation of the sugarcane market in the future.

Table 10: Chi-Square Tests

	Value	Degrees of freedom	Asymptotic (bilateral) significance
Pearson's Chi-square	8,589 ^a	3	0.035
Likelihood ratio	7,440	3	0.059
N of valid cases	75		

Note: a. 5 boxes (62.5%) have expected a count of less than 5. The minimum expected count is 0.08.

Diagnosis of the current situation of sugarcane growers in Coronel Marcelino Maridueña Canton

A SWOT analysis was conducted to identify the high points such as opportunities and strengths and the low points such as weaknesses and threats, which are part of the sugarcane grower and with which improvement actions can be taken to take advantage of the strengths and opportunities offered by the sector for sugarcane growers.

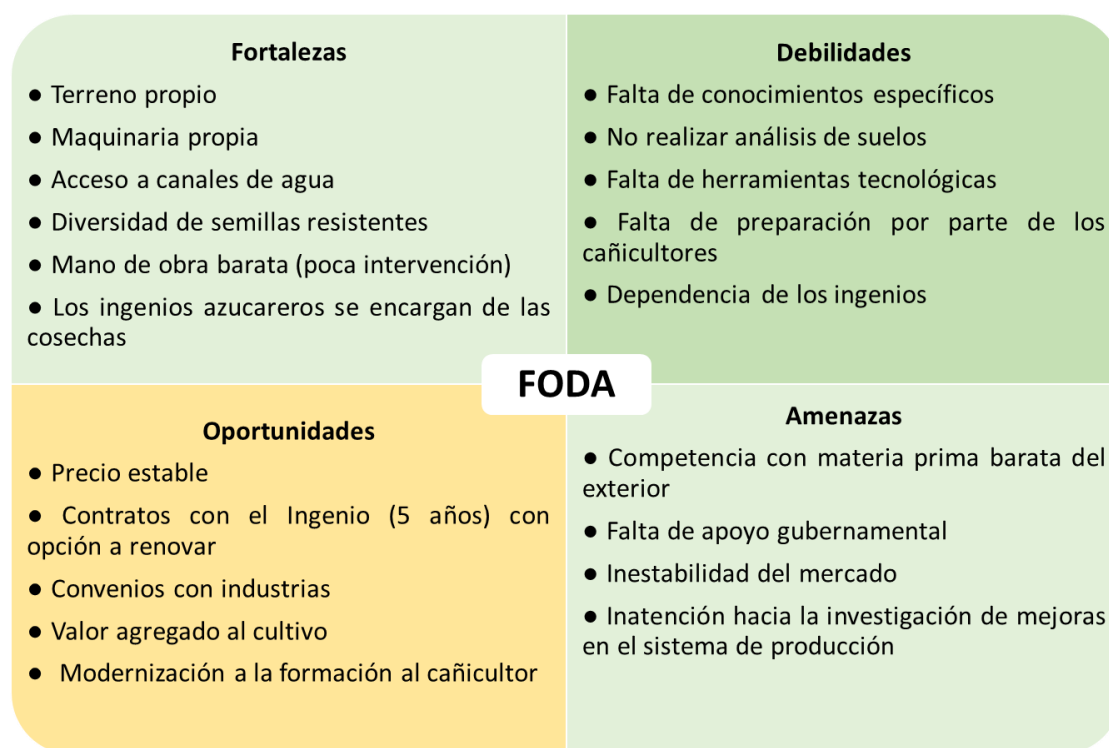


Figure 1: Diagnosis of the situation of sugarcane producers in Marcelino Maridueña canton.

The sugar cane producers of Marcelino Maridueña possess several strengths that should be leveraged, including secure land tenure, access to modern machinery, reliable access to water, a diverse range of high-quality seed varieties, a plentiful labor force within the sector, and the sugar mills are responsible for harvesting.

It can be reasonably assumed that environmental factors, such as opportunities, will have a positive impact on the sugarcane growers' activity. This may include price stability, contracts with sugar mills for receiving the harvest, the opportunity to generate added value to the crop, and the possibility of modernizing agricultural activity. However, some weaknesses were identified in the research, including a lack of knowledge about the crop, a failure to perform soil analysis, a lack of technological tools, a low level of schooling among producers, and a dependence on sugar industries. Consequently, it is necessary to propose a strategy to achieve the transformation of actions and to turn weaknesses into opportunities in agricultural activity. This strategy should

align with the findings of Pardo et al. (2018), who mention that the limiting factors in sugarcane production are the limited availability of mechanized means, the lack of training for technicians and producers for the development of cultural practices in the cultivation of sugarcane, and the need for more research to improve sugarcane production systems in the sector.

The potential threats to producers include competition with inexpensive raw materials in the market, limited government support, market instability, and a lack of attention to research projects aimed at improving sugarcane production systems in the sector. Caballero (2022) corroborates this assertion, noting that in the sugar industry, various factors can have a negative impact, including the emergence of new value chains, a lack of effective leadership, and low production prices.

DISCUSSION

The objective of this study was to identify and describe the most significant indicators in the socioeconomic field that affect the lives of small and medium-sized sugarcane growers in the Coronel Marcelino Maridueña canton. These were divided into four categories: social aspects, economic aspects, productive aspects, and market aspects.

In terms of the social aspect of the producer, it is observed that most sugarcane growers are male, with 89% participation, while the female population has 11% participation. These findings align with those of Velasco and Cardenas, Cajamarca, and Condolo (2018), who reported that 95% of sugarcane growers in Huamboya canton, Ecuador, were male. Another aspect of the social scope of the respondents was that the majority of sugarcane growers (42%) were over the age of 60, with a further 31% falling within the 51 to 59 age brackets. In this same context, 69% of the respondents have more than 11 years of experience in sugarcane cultivation, which correlates with the observation that most sugarcane growers are over 50 years of age. This can be attributed to the initial interest in the profitability of sugarcane and its by-products that emerged at the beginning of the 1980s, which led to the generation of income sources for families engaged in this economic activity.

These results are consistent with those reported by León et al. (2022), who indicate in their study that sugarcane production is a significant contributor to local economic development, as it generates income, creates employment opportunities, and produces other valuable products. Most respondents (67%) have completed secondary school, while 23% have obtained a university degree, and 10% have completed only primary or basic education.

These findings are inconsistent with the findings of Valle (2021), who reports that sugarcane producers in Pastaza, Ecuador, have a primary education level, with 66% of their study population.

The data obtained from the surveys conducted revealed that most sugarcane growers, 87%, have access to bank credit, while 13% of those surveyed denied having access to bank credit. In consideration of the results, the primary sources of financing utilized by sugarcane growers are 50% private banks or private financial institutions, 21% indicated the National Finance Corporation (CFN), 15% responded BAN Ecuador, and 1% mentioned that their primary source of financing is savings cooperatives. The 13% of respondents who provided a negative response indicated a source of financing.

Most sugarcane growers (73%) indicated that their financial credit is primarily directed towards agricultural activities. However, 14% of respondents reported that they not only utilize their financial credit for agricultural purposes, but also for personal use. Additionally, 13% of sugarcane growers reported that they do not have any bank credit.

Indeed, the availability of credit is beneficial, as it was found that the production costs of sugarcane cultivation vary considerably, from less than \$500 per hectare with 7% to more than \$2001. The mean value within the range is \$801 to \$1000 with 49%. These data are comparable to the findings of Valle (2021), who reported that the costs of sugarcane cultivation in Pastaza were \$1,032 per hectare for production and preparation, with an additional \$2,260 per hectare if planting was done with new seed.

Another economic aspect that merits attention is the selling price of sugarcane. The results of this study indicate a fixed price of \$31 per ton of sugarcane. The results are consistent with those of Quishpe, Valle, and Heredia (2020), who indicate that the price per ton of sugarcane is determined by the mill, with prices ranging from \$30.28 to \$31.25 depending on the degree of sucrose in the crop.

In terms of agricultural machinery, most respondents (83%) reported having access to such equipment, while 17% indicated that they lacked such resources. Among those who possess agricultural machinery, 62% indicated that they have a tractor, followed by a boom (16%), a rototiller (4%), and other machinery (1%). The most prevalent type of production system employed in sugarcane cultivation is conventional, with 83% of respondents indicating this as their method. A total of 17% of those surveyed utilize a mixed production system, which involves the application of fertilizers or composts in conjunction with chemical inputs.

One of the most crucial aspects of sugarcane production is the variety of sugarcane utilized. The most prevalent varieties are ECU (16%), CC (14%), RAGNAR (5%), and a combination of different varieties (64%). It is noteworthy that this percentage encompasses the combination of ECU, CC, and RAGNAR. These findings are consistent with the findings of Castillo (2018), which indicate that the ECU variety occupies 42% of the sugarcane cultivated area of the San Carlos, COAZUCAR, and Valdez mills collectively, while the ECU variety is the most popular. The average yield of the sugarcane crop, as determined by this study, was 61 to 80 tons per hectare, representing 43% of the total, followed by 81 to 100 tons per hectare, which constituted 39% of the total. These data are comparable with those of Macías, Balmaseda, Ponce, and Mora (2022), which indicate that the national average is 76 tons per hectare in their work on the agronomic performance of eight varieties of sugarcane in the province of Santa Elena. In addition, Viera and Escobar (2015) indicate that income is directly proportional to yields and the price received by producers.

The SWOT analysis enabled the identification of the strengths, opportunities, weaknesses, and threats of the sugarcane producers of Marcelino Maridueña canton. The most notable strength is the land tenure, with most producers having land titles. The most notable opportunities are long-term contracts and price stability for the delivery of production. However, the producers' weaknesses include a lack of knowledge about the crop and a lack of government support, which is corroborated by Mendoza, Bravo, and Albán (2022). These authors argue that government and private sector support is essential for the sugarcane sector to overcome its weaknesses in the country.

CONCLUSION

The results indicate that the agronomic practices employed in sugarcane cultivation in the canton of Coronel Marcelino Maridueña are predominantly conventional. This entails the utilization of agricultural machinery for most field operations, including plowing, soil turning, and harvesting. Additionally, the application of agrochemicals is a common practice, occurring daily, either as fertilizers or as chemical pesticides.

The typical sugarcane grower is a family man with a high school education, with over a decade of experience in sugarcane cultivation. Most sales are made to the San Carlos sugar mill, with an average of 20 to 40 hectares under cultivation. Their income is derived from agricultural activity, and they are satisfied with the yields of their crop. They have access to bank credit from public or private institutions.

The sugar mills remunerate the growers at the minimum support price (PMS), which is reviewed annually by a Consultative Council. This Council includes a representative of the sugarcane producers and other public and private sector entities.

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