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Analysis of Sugarcane Value Chain Actors, their Functions and Existing Linkages in Kebbi State, Nigeria

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Abstract

This study analysed sugarcane value chain actors, their functions, and their existing linkages in Kebbi State, Nigeria. The study specifically described the socio-economic characteristics of sugarcane value chain actors, identified their respective roles, and examined the strength of linkages among them. A multistage sampling procedure was employed to select 400 respondents, comprising 160 producers, 80 processors, 80 retailers, 40 input suppliers, and 40 wholesalers from major sugarcane-producing local government areas. Primary data was collected using structured interview schedules and analysed using descriptive statistics. Results revealed that the value chain is predominantly male-dominated (100%), with most actors (76%) falling within the economically active age range of 31–50 years. A majority (70%) of input suppliers and (71.3%) of farmers had between 11 and 20 years of experience in sugarcane-related activities. Educational attainment was generally low, as 50.6% of farmers had only Qur'anic education, while 70% of input suppliers and 68% of processors attained at least primary or secondary education. About 52.5% of suppliers and 71.3% of farmers cultivated or operated on less than 2 hectares, reflecting smallholder dominance. 65% of suppliers made more than ₦300,000 a year, and 53.8% of farmers made more than ₦400,000 a year. Among processors, 68% operated manually, 60% lacked access to formal credit facilities, and 72% of retailers relied on informal marketing channels. Furthermore, 70% of value chain actors did not belong to any cooperative society, limiting their access to credit, market information, and collective bargaining power. Linkages across the chain were generally weak, informal, and poorly coordinated, resulting in inefficiencies in production, processing, and marketing. Analysis of the value chain revealed six major categories of actors: input suppliers, farmers, processors, traders (collectors, wholesalers, and retailers), and indirect actors such as extension agents, transporters, financial institutions, and government agencies. Input suppliers provide seeds, fertilisers, and agrochemicals; farmers handle cultivation and harvesting; processors transform raw cane into sugar, ethanol, and molasses; traders (collectors, wholesalers, and retailers) ensure market linkages; while indirect actors facilitate technical, financial, and policy support. The linkage analysis shows that interactions among actors are largely informal, weakly coordinated, and dominated by small-scale transactions, limiting efficiency and competitiveness in the sugarcane sector. The study concludes that the sugarcane value chain in Kebbi State is constrained by low levels of mechanisation, weak institutional linkages, and inadequate access to finance and markets. It recommends strengthening cooperative societies, improving access to affordable credit and modern processing technologies, and establishing functional market linkages to enhance productivity, profitability, and sustainable development of the sugarcane sector.

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Keywords: Sugarcane value chain, Kebbi State, Value addition, Institutional linkages, Socio-economic characteristics

INTRODUCTION

Sugarcane (Saccharum officinarum) belongs to the Poaceae grass family, an economically important seed plant family that includes maize, wheat, rice, and sorghum, as well as many forage crops. The main product of sugarcane is sucrose, which accumulates in the stalk internodes, is extracted and purified in specialised mill factories, and is either used as a raw material in human food industries or fermented to produce ethanol; this

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ethanol is produced on a large scale by the Brazilian sugarcane industry (Abdul-Latif, 2004). It is native to the warm temperature and tropical regions of South Asia. According to the Food and Agriculture Organization (FAO, 2013), sugarcane is cultivated on about 26 million hectares in more than 90 countries with a worldwide harvest of 1.83 billion metric tonnes. Brazil is the largest producer of sugarcane in the world; the next five major countries for sugarcane production are India, China, Thailand, Pakistan, and Mexico (Gire and Giroh 2012).

The important sugar-producing countries in Africa are Mauritius, Kenya, Sudan, Zimbabwe, Madagascar, Côte d'Ivoire, Ethiopia, Malawi, Zambia, Tanzania, Nigeria, Cameroon and Zaire, where Nigeria is one of the most important producers of the crop with a land potential of over 500,000 hectares of suitable cane fields capable of producing over 3.0 million metric tonnes of sugarcane (Gari, 2008). If processed, it will yield about 3.0 million metric tonnes of sugar, and Nigeria has vast human and natural resources, in terms of land and water, to produce enough sugarcane not only to satisfy the country's requirement for sugar and biofuel but also for export (NSDC, 2003). Nigeria is noted for being abundantly blessed with human, water, and environmental potential for the production of sugarcane. Areas with high potential for commercial sugarcane/sugar cane production have been identified through studies sponsored by the Federal Ministry of Industry and conducted by Dutch consultants HVA in the early 1980s, which pointed out that most of the areas in the northern states where water for irrigation is available have sugarcane cultivation in as large quantities as possible (Abdul-Latif, 2004). The crop can be rotated or even interplanted with other crops where land with adequate sources of water abounds, like River Basin Development Authority Areas (Gerrei and Giroh 2012).

According to Godhejaet al. (2014), sugarcane provides a livelihood for so many small farmers, as it is a very popular and important crop to the farmers, which gives a high return of manual labour inputs. It is highly responsive to nitrogen fertilisers and very easy to market. The world demand for sugar is the primary driver of sugarcane production. Cane accounts for 80% of sugar produced; most of the rest is made from sugar beets. The crop predominantly grows in the tropical and subtropical regions, and sugar beets predominantly grow in colder temperature regions of the world. Thus, other than sugar products derived from sugar cane, they include bagasse and ethanol (Godheja et al., 2014).

Statement of the Research Problem

A lot of studies have been documented on sugarcane in northwestern Nigeria, yet there is a near absence of empirical information on sugarcane value chain analysis in Nigeria generally and Kebbi State in particular. The dearth of studies that assessed the entire value chain for sugarcane, particularly in the aspect of the profitability of the different actors, informed the decision for this research. If the sugarcane value chain is analysed, the results obtained are likely to stem the tide of inefficiency of sugarcane production, enhance the marketing system and ensure more availability of sugarcane and its associated products. If the problems of sugarcane are assessed, opportunities and prospects are empirically analysed; information from such a study hopes to guide sugarcane producers and prospective investors on how to invest in order to increase their investment opportunities.

Objectives of the study

The main objective of the study is to analyse sugarcane value chain actors, their functions and existing linkages in Kebbi State, Nigeria. The specific objectives are to:

1. Describe the socio-economic characteristics of sugarcane value chain actors in the study area;

2. Identify the existing sugarcane value chain actors, their function and existing linkages in the study area;

METHODOLOGY

Description of the Study Area

The study was conducted in Kebbi State, located in the north-western part of Nigeria. Kebbi State is situated between latitudes 10°8'N and 13°15'N and longitudes 3°30'E and 6°02'E. The state is bordered by Sokoto and Zamfara States to the east, Niger State to the south, the Republic of Benin to the west and the Republic of Niger to the north. Kebbi State occupies an area of about 37,699 square kilometres, out of which 36.46% is made up of farmland (Kebbi State Government, 2018). The state has an estimated population of about 5,563,900 (NPC, 2022), while 49.5% are female and 50.5% are male

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(NPC, 2022). Kebbi State has tropical weather conditions with three seasons: rainy, dry and hot. The annual rainfall is variable and declining, being 600mm to 850mm with an average of 650mm. The monthly temperature in the region ranges from 25°C to 45°C. The State possessed two important agricultural lands, namely, dry land (arid-prolonged dryness) and Fadama (floodplain-significant alluvial clay particles). These two lands remained the key source of income for millions of people in the state (Usman et al., 2016). Agriculture is the most important economic activity, with riverine floodplains producing crops like groundnuts, cotton, rice, millet, sorghum and vegetables such as tomatoes, onions etc. Most of the land in the stateonions, is used to graze cattle, goats, and sheep. The major ethnic groups in the state include Fulani, Hausa, Lel'na (Dakarkari) and Kambari (Amy, 2019).

Sampling Procedure and Sample Size

A multi-stage sampling technique was employed in selecting sugarcane value chain actors in the study area. Kebbi State is made up of 21 Local Government Areas and is divided into four (4) agricultural zones, namely, Argungu, Bunza, Yauri and Zuru. The first stage involved purposive selection of two (2) LGAs from each zone based on the predominant history of sugarcane production from each zone, giving a total number of eight (8) Local Government Areas for the study. The second stage involved purposive selection of two (2) villages based on a high concentration of sugarcane producers from the selected LGAs, giving a total of sixteen (16) villages for the study.

The third stage involved the use of simple random sampling to select ten (10) respondents each from the selected villages, giving a total sample size of 160 sugarcane farmers for the study.

At the fourth stage, simple random sampling was used, in which five (5) respondents each from the selected villages were chosen, giving a total sample of 80 sugarcane retailers and sugarcane processors in the study area, respectively. The fifth stage involved simple random sampling: two (2) respondents were selected from eight (8) villages out of sixteen villages randomly selected, and three (3) respondents were also selected from the other remaining eight (8) villages randomly selected, giving a total sample size of 40 sugarcane input suppliers and sugarcane wholesalers, respectively. Substantially, the total respondents were 160 farmers, 80 retailers, 80 processors, 40 input suppliers and 40 wholesalers, giving a total of 400 sugarcane value chain actors as the sample size for the study.

Method of Data Collection

The instrument for data collection is the administration of interview schedule questionnaires, which are used as a source of primary data. The questionnaires have alternative responses for the respondents to fill in as appropriate or tick in the appropriate boxes as provided by the researcher. Secondary information was collected from materials, such as journals, seminars, conference proceedings, and related literature. The data of the study was collected with the help of trained enumerators. After data cleaning, the data was coded and entered in the computer for analysis using the Statistical Package for Social Sciences (SPSS). The data was analysed in line with the objectives of the study.

Analytical Techniques

Descriptive statistics was used to achieve objective 1, while objective 2 was achieved using functional analysis.

Functional Analysis

Functional analysis is a technique employed to measure the labour competencies of value chain actors in a productive function. This involves identifying the key players involved in bringing sugarcane from its initial growth to final consumers and detailing the specific role and activities each actor performs. Sugarcane value chain actors include sugarcane input suppliers, sugarcane producers, sugarcane wholesalers, sugarcane retailers and sugarcane processors.

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RESULTS AND DISCUSSION

Table 1: Distribution of Sugarcane Input Suppliers according to their Socio-economic Characteristics in the Study Area (A)

Variables	Frequency	Percentage	Mean	Standard Deviation
Age				
21-30	10	25.0		
31- 40	22	55.0		
41-50	5	12.5		
51-60	3	7.5		
Total	40	100.0	10.00	8.20
Gender				
Male	40	100.0		
Total	40	100.0	40.00	-
Household size				
≤5	28	70.0		
6-10	9	22.5		
11≥	3	7.5		
Total	40	100.0	13.33	13.05
Educational status				
Qur'anic	7	17.5		
Primary	12	30.0		
Secondary		40.0		
Tertiary	5	12.5		
Total	40	100.0	10.00	4.97
Years of Experience				
≤5	3	7.5		
6-10	3	7.5		
11-15	12	30.0		
16-20	18	45.0		
>20	4	10.0		
Total	40	100.0	8.00	6.75
Farm Size				
< 1	21	52.5		
1-2	12	30.0		
2.1-3	3	7.5		
> 3	4	10.0		
Total	40	100.0	10.00	8.37
Income Level (₦'000)				
< 200	6	15.0		
200-300	8	20.5		
301-400	17	42.5		
>401	9	22.5		
Total	40	100.0	10.00	4.83
Cooperativeness				
Yes	11	27.5		
No	29	72.5		
Total	40	100.0	20.00	12.73

Source: Field survey, 2022

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Table 1 Age: The results revealed that the majority (55%) of sugarcane input suppliers fall within the range between 31 and 40 years old. This implies that the majority of the sugarcane stem (31 and 40 stems) cutting suppliers in the study area fall below 50 years of age, suggesting that the average age of sugarcane input suppliers is relatively young and that they are of working age.

Table 1 Gender: The table shows the distribution of sugarcane input that they are of working age. inputs suppliers based on their gender. The result revealed that only male input suppliers are 100% engaged in sugarcane inputin the study area. This indicated that participation by females in sugarcane input suppliers is very low compared to their male counterparts, and this may be due to the fact that male counterparts control decision-making in the household. Conversely, the high level of male involvement may also be due to the high demand for labour in terms of feeding and medication, which females may not be able to combine with household activities.

Table 1 Household Size: The table shows medication and shows that the distribution of sugarcane input suppliers is based on their household size. The result revealed that the majority of sugarcane inputsuppliers (70%) had a household size between 1 and 5. This result indicated that sugarcane input suppliers have small household sizes compared toother sugarcane value chain actors in the study area.

Table 1 Educational Status: The table shows the distribution of sugarcane input area inputs suppliers based on their educational status. The result indicated that the majority of sugarcane inputs suppliers (70%) had a primary and secondary educational level in the study area. The implication is that sugarcane input suppliers are engaged in 70% of one form of educational knowledge that allowed them to adopt and appreciate new technology that would improve their efficiency with increasing outputs.

Table 1: Years of Experience in the Sugarcane Value Chain: The table shows the distribution of the sugarcane inputsuppliers according to their years of experience. It revealed that 75% of sugarcane input suppliers have been in the value chain for about 11-20 years in the study area. This indicated sugarcane input suppliers have adequate experience that helps them to use their resources efficiently, which increased output in the study area.

Table 1 Farm Size: The table represents the distribution of resources efficiently, the distribution of sugarcane input, and the distribution of input suppliers according to their farm size. It revealed that sugarcane input suppliers obtained farmland for the production inputs to the farmers. However, it further revealed that the majority of sugarcane input suppliers (52.5%) cultivated less than one (1) hectare of farmland. This implies that most of the sugarcane suppliers in the study area were small-scale. the sugarcane input-scale suppliers that operated on a subsistence-level scale of production.

Table 1 Income Level: The table presents the distribution of sugarcane input-level inputs suppliers according to their level of input income. The result indicated that the majority (6the majority %) of sugarcane input suppliers obtained more than three hundred thousand naira (₦300,000) as their income level. This implies that the sugarcane input suppliers obtained low incomes, which is why they have had to secure another source of income. Income diversification is the norm among rural households, and different income-generating activities offer alternative pathways out of poverty for households as well as a mechanism for managing risk in an uncertain environment.

Table 1 Membership of Cooperative Society: The table shows the distribution of sugarcane input suppliers on the basis of their cooperative society. The result revealed that the majority (72.5%) of sugarcane suppliers have not belonged to any cooperative society. The implication is that sugarcane input suppliers are left behind in the formation of cooperative society as a result of a lack of concentration of government policy on the sugarcane value chain. The sugarcane chain, which assists the sugarcane input chain, inputs suppliers to form a cooperative input, and a cooperative society that can boost the marketing chain in the study area.

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Table 2: Distribution of Sugarcane Farmers According to their Socio-economic characteristics **(B)**

Variables	Frequency	Percentage	Mean	Standard Deviation
Age				
<20	2	1.3		
21-30	5	3.1		
31- 40	60	37.5		
41-50	72	45.0		
51-60	19	11.9		
>60	2	1.3		
Total	160	100.0	26.67	28.60
Gender				
Male	160	100.0		
Total	160	100.0	160.00	-
Household size				
≤5	58	36.2		
6-10	55	34.4		
11-15	31	19.4		
>15	16	10.0		
Total	160	100.0	40.00	17.36
Educational status				
Qur'anic	81	50.6		
Primary	54	33.8		
Secondary	25	15.6		
Total	160	100.0	53.33	22.87
Years of Experience				
≤5	15	9.4		
6-10	26	3.1		
11-15	55	34.4		
16-20	59	36.9		
>20	5	16.3		
Total	1 60	100.0	32.00	21.50
Farm Size				
< 1	32	20.0		
1-2	114	71.3		
2.1-3	1	0.6		
> 3	13	8.1		
Total	160	100.0	40.00	44.13
Income Level (₦'000)				
< 200	9	5.6		
200-300	24	15.0		
301-400	41	25.6		
>401	86	53.8		
Total	160	100.0	40.00	28.87
Cooperativeness				
Yes	48	30.0		
No	112	70.0		
Total	160	100.0	80.00	32.00

Source: Field survey, 2022

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Table 2 Age: The table shows the socio-economic characteristics of sugarcane farmers in the study area. The results revealed that 82.5% of sugarcane farmers fall within the age range of 31 to 50 years old, indicating that most farmers are relatively young. This implies that the majority of the respondents in the study area fall below 50 years of age (82.5%), suggesting that the average age of sugarcane farmers is relatively young, that they are energetic and of working age, and that the population is strong and active in the production activities.

Table 2: Gender The table presents the distribution of sugarcane farmers according to their gender. The result revealed that only male farmers are 100% engaged in sugarcane farming in the study area. This indicated that participation by females in sugarcane valmales The sugarcane chain is very low compared totheir male counterparts, and this may be due to the fact that male counterparts control decision-making in the household. Conversely, the high level of male involvement may also be due to the high demand for labour in terms of feeding and medication, which females may not be able to combine with household activities. This result is in line with Muhammad (2021), who reported that sugarcane farmers were 100% male.

Table 2 Household Size: The table presents the distribution of medication and the distribution of the sugarcane farmers according to their household size. The result revealed that the majority of the distribution The majority of sugarcane farmers (70.6%) had a household size range between 1 and 10 members. the majority and 10bers. This result indicated that sugarcane farmers have large household sizes, between 1 and 10, as a result of the family size and the family labour requirement in sugarcane production, as it consumes more time and demands a lot of activities from planting to harvesting periods. This agrees with the findings of Muhammad (2021), production (2021); he observed that family labour accounted for a significant proportion and reduced (2021) the cost of hiring labour.

Table 2 Education Status: The table shows the distribution of the sugarcane farmers based on their educational status. The results indicated that the majority of sugarcane farmers, represented by 50.6%, have a Qur'anic educational level in the study area. The implication is that sugarcane farmers are engaged inform of educational knowledge that allowed them to adopt and appreciate new technology that would improve their efficiency with increasing outputs.

The table outputs. Table 2.e: 2 Years of Experience in Sugarcane ValTable 2, the Sugarcane Chain, shows the distribution of the sugarcane farmers according to their years of experience. It revealed that 71.3% of the sugarcane farmers have been in the value chain for about 11-20 years. This indicated sugarcane value chain actors have quite a bit of experience that helps them to use their resources efficiently, which increases output. This agrees with the efficient allocation of resources and the findings of Haruna et al. (2014), who reported that most of the sugarcane farmers have experienced between 11 and 20 years of sugarcane farming, which will help them to understand problems and how to solve them.

Table 2 Farm Size: represents the distribution of them. the distribution of sugarcane farmers according to their farm size. It revealed that the majority (71.3%) of sugarcane farmers cultivated less than two (2) hectares of farmland. This implies that most of the sugarcane farmers in the study area were small-scale sugarcane farmers. This situation will not promote agricultural machines as a result of fragmentation of land into small plots. Therefore, sugarcane farmers have to look for other sources of income to improve their living standard. This result agreed with Issa et al. (2020), that the majority of the farmers had less than 2 hectares of land. Small farms impede agricultural mechanisation because some farm machinery, like tractors, cannot be operated on them.

Table 2 Income Level: The table presents the distribution of sugarcane farmers according to their income level. The result indicated that the majority (53 tractors, 53.8%) of the sugarcane farmers obtained more than four hundred thousand naira (₦400,000) as their income level. This implies that the sugarcane farmers obtained low incomelevels, with the majority having income levels such that they had to secure another source of income. Income diversification is the norm among rural households, and different income-generating activities offer alternative pathways out of poverty for households as well as a mechanism for managing risk in an uncertain environment.

Table 2 Membership of Cooperative Society: The table shows the distribution of sugarcane farmers on the basis of their cooperative society. The result revealed that the majority (70%) of the sugarcane farmers have not belonged to any cooperative society. The implication is that the majority of sugarcane farmers do not consider cooperative society as a means of agricultural development. This may be due to lack of. This lack of

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concentration of government policy on sugarcane affects the sugarcane chain, which assists sugarcane farming and boosts the marketing chain.

Table 3: Distribution of Sugarcane Wholesalers According to their Socio-economic Characteristics in the Study Area (C)

Variables	Frequency	Percentage	Mean	Standard Deviation
Age				
21-30	5	12.5		
31- 40	28	70.0		
41-50	4	10.0		
51-60		7.5		
Total	40	100.0	10.00	10.42
Gender				
Male	40	100.0		
Total	40	100.0	40.00	-
Household size				
≤5	15	37.5		
6-10	22	55.0		
11≥	3	7.5		
Total	40	100.0	13.33	7.85
Educational status				
Qur'anic	15	37.5		
Primary	23	57.5		
Secondary	2	5.0		
Total	40	100.0	13.33	8.65
Years of Experience				
6-10	5	12.5		
11-15	8	20.0		
16-20	12	30.0		
>20	15	37.0		
Total	40	100.0	10.00	3.81
Income Level (₦'000)				
< 200	5	12.5		
200-300	6	15.0		
301-400	11	27.5		
>401	18	45.0		
Total	40	100.0	10.00	5.15
Cooperativeness				
Yes	31	77.5		
No	9	22.5	20.00	11.00
Total	40	100.0		
Benefits of cooperatives				
Access to credit	3	7.5		
Marketing information	18	45.0		
Bulky sales	4	10.0		
Less taxation	7	17.5		
Price fix -	8	20.0		
Total	40	100.0	8.00	5.33

Source: Field survey, 2022

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Table 3 Age: The table shows the socio-economic characteristics of sugarcane wholesalers in the study area. The results present the distribution of sugarcane wholesalers according to their age. The results revealed that the majority of sugarcane wholesalers, as shown by 70%, fall within the range of 31-40 years old. This implies that the sugarcane wholesalers in the study area fall below 50 years of age, suggesting that the average age of sugarcane wholesalers was 35 years and 6 months. This indicated that sugarcane wholesalers are middle-aged people, which refers to the working population that is strong and active within the population.

Table 3: Gender. The table presents the distribution of sugarcane wholesalers according to their gender. The result revealed that 100% of males are engaged in sugarcane wholesaling in the study area. This indicated those males are the only participants in sugarcane wholesaling. The high level of male involvement may be due to the high demand of labour in terms of frequent travelling to different locations, which females may not be able to combine with household activities.

Table 3 Household Size: The table presents the distribution of the sugarcane wholesalers according to their household size. The result revealed that the majority (55%) of sugarcane wholesalers had a household size range between 6 and 10 members. This result indicated that sugarcane wholesalers have an average household size of 8 members that is reasonable to manage in the study area.

Table 3: Educational Status: The table shows the distribution of sugarcane wholesalers based on their educational status. The result indicated that the majority of sugarcane farmers, as shown by 57.5%, obtained a primary educational level in the study area. The implication is that sugarcane value chain actors are engaged in one form of educational knowledge that allowed them to adopt and appreciate new technology that would improve their efficiency with increasing outputs.

Table 3, Years of Experience in the Sugarcane Value Chain, shows the distribution of the sugarcane wholesalers according to their years of experience. It revealed that 58.8% of the sugarcane wholesalers have been in the value chain for about 11-20 years each. This indicated sugarcane wholesalers have an average of 15 years and 6 months of experience, which adequately helps them to use their resources efficiently.

Table 3 Income Level: The table presents the distribution of sugarcane wholesalers according to their income level. The result indicated that the majority (72.5%) of sugarcane wholesalers obtained above three hundred thousand naira (₦300,000) as their income level. This implies that sugarcane wholesaling plays a vital role in the sugarcane value chain that serves as an income-generating activity, offering alternative pathways out of poverty for households.

Table 3 Membership of Cooperative Society: The table shows the distribution of sugarcane wholesalers on the basis of their cooperative society. The result revealed that the majority (77.5%) of the sugarcane wholesalers have belonged to a cooperative society. The implication is that only sugarcane wholesalers belong to cooperative societies in sugarcane value chains of actors in the study area. This means that there is a lack of concentration of government policy on the sugarcane value chain, which assists in boosting the marketing chain.

Table 3 Benefits of Cooperative Society: The table represents the distribution of sugarcane wholesalers according to their benefits derived from the cooperative society. The result indicated that the majority of sugarcane wholesalers benefited from the participation of the cooperative society to access marketing information, as shown by 45%. While 20% of the sugarcane wholesalers benefited from participation in the cooperative society by fixation of price, 17.5% of the respondents benefited from participation in the cooperative society by reduction of taxes, 10% of the respondents benefited from participation in the cooperative society by bulky sales of their products and 7.5% of the respondents benefited from participation in the cooperative society by access to credit, respectively. This implies that participation in the cooperative society increased the sugarcane value chain as adequate marketing information was obtained that boosted their income level. It means that individuals and businesses become financially independent by addressing the need for quicker and more accurate decision-making of market demand.

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Table 4: Distribution of Sugarcane Retailers According to their Socio-economic Characteristics in the Study Area (D)

Variables	Frequency	Percentage	Mean	Standard Deviation
Age				
<20	4	5.0		
21-30	18	22.5		
31- 40	37	46.3		
41-50	14	17.5		
51-60	7	8.8		
Total	80	100.0	16.00	11.61
Gender				
Male	69	86.3		
Female	11	13.7		
Total	80	100.0	40.00	29.00
Household size				
≤5	17	21.3		
6-10	60	75.0		
11≥	3	3.7		
Total	80	100.0	26.67	24.25
Educational status				
Qur'anic	25	31.3		
Primary	54	67.5		
Secondary	1	1.2		
Total	80	100.0	26.67	21.67
Years of Experience				
≤5	5	6.2		
6-10	12	15.0		
11-15	28	35.0		
16-20	19	23.8		
>20	16	20.0		
Total	80	100.0	16.00	7.62
Income Level (₦'000)				
< 200	43	53.8		
200-300	21	26.3		
301-400	12	15.0		
>401	4	5.0		
Total	80	100.0	20.00	14.58
Cooperativeness				
Yes	26	32.5		
No	54	67.5		
Total	80	100.0	40.00	14.00

Source: Field survey, 2022

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Table 4 Age: The table shows the socio-economic characteristics of sugarcane retailers in the study area. The results revealed that the majority of sugarcane retailers, as shown by 68.75%, fall within the 21–40 age range. This implies that the majority of the respondents in the study area fall below 50 years of age, suggesting that the average age of sugarcane retailers was estimated to be 30 years and 6 months, which shows they are relatively young retailers.

Table 4: Gender: The table presents the distribution of sugarcane retailers according to their gender. The result revealed that only sugarcane retailers have females that are engaged in the value chain, as shown by (13.75%) and (86.25%) male engaged in sugarcane retailing in the study area. This indicated that participation by females in the sugarcane value chain is very low compared to their male counterparts, and this may be due to the fact that males control decision-making in the household. Conversely, the high level of male involvement may also be due to the high demand of labour in terms of feeding and medication, which females may not be able to combine with household activities.

Table 4 Household Size: The table presents the distribution of the sugarcane retailers according to their household size. The result revealed that the majority of sugarcane retailers, as shown (75%), have a household size between 6 and 10 members. This result indicated that sugarcane retailers have an average of 8 members in their household.

Table 4: Educational Status: The table shows the distribution of sugarcane retailers based on their educational status. The result indicated that the majority of sugarcane retailers, as shown by 67%, have a primary educational level. The implication is that sugarcane retailers are engaged in one form of educational knowledge that would improve their efficiency with an increasing output.

The table 4 Years of Experience in the Sugarcane Value Chain: The table shows the distribution of the sugarcane retailers according to their years of experience. It revealed that 58.8% of the sugarcane retailers. This indicated sugarcane value chain actors have adequate experience that helps them to use their resources efficiently, which increased output.

Table 4 Income Level: The table presents the distribution of sugarcane retailers according to their income. The result indicated that the majority (53.8%) of the sugarcane retailers obtained less than two hundred thousand naira (₦200,000) as their income level. This implies that the sugarcane retailers obtained low incomes, so they have to secure another source of income apart from sugarcane retailing, which may be food production, to sustain their living standard.

Table 4 Membership of Cooperative Society: The table shows the distribution of sugarcane retailing on the basis of their cooperative society. The result revealed that the majority (67.5%) of the sugarcane retailers have not belonged to any cooperative society. The implication is that sugarcane retailers do not belong to any cooperative society; this means that the lack of concentration of government policy on the sugarcane value chain, which assists sugarcane retailers, means that the marketing chain is neglected.

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Table 5: Distribution of Sugarcane Processors According to their Socio-economic characteristics in the Study Area (E)

Variables	Frequency	Percentage	Mean	Standard Deviation
Age				
<20	10	12.5		
21-30	17	21.2		
31- 40	33	41.3		
41-50	15	18.8		
51-60	5	6.2		
Total	80	100.0	16.00	9.47
Gender				
Male	80	100.0		
Total	80	100.0	80.00	-
Household size				
≤5	32	40.0		
6-10	46	57.5		
11≥	2	2.5		
Total	80	100.0	26.67	18.35
Educational status				
Qur'anic	44	50.0		
Primary	24	35.0		
Secondary	12	15.0		
Total	80	100.0	26.67	13.20
Years of Experience				
≤5	5	6.2		
6-10	14	17.5		
11-15	27	33.8		
16-20	16	20.0		
>20	18	22.5		
Total	80	100.0	16.00	7.07
Income Level (₦'000)				
< 200	6	7.5		
200-300	30	37.5		
301-400	34	42.5		
>401	10	12.5		
Total	80	100.0	10.00	5.15
Cooperativeness				
Yes	34	42.5		
No	46	57.5		
Total	80	100.0	20.00	5.33

Source: Field survey, 2022

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Table 5 Age: The table shows the socio-economic characteristics of sugarcane processors in the study area. The results revealed that the majority of sugarcane processors, as shown (62.5%), fall within the ranges of 21-40 years old. This implies that the majority of the respondents in the study area fall below 50 years of age, suggesting that the average age of sugarcane processors was estimated to be 30 years and 6 months, which shows they are relatively young sugarcane value chain actors.

Table 5: Gender: The table presents the distribution of sugarcane processors according to their gender. The result revealed that 100% of males are engaged in sugarcane processing in the study area. This indicated that participation by females in the sugarcane value chain is very low compared to their male counterparts, and this may be due to the fact that males control decision-making in the household. Conversely, the high level of male involvement may also be due to the high demand of labour in terms of feeding and medication, which females may not be able to combine with household activities.

Table 5 Household Size: The table presents the distribution of the sugarcane processors according to their household size. The result revealed that the majority of sugarcane processors, as shown (57.5%), have a household size between 6 and 10 members. This result indicated that sugarcane processors have an average household size of 8 members.

Table 5 Educational Status: The table shows the distribution of the sugarcane processors based on their educational status. The result indicated that the majority of sugarcane processors, as shown by 50%, have a Qur'anic educational level in the study area. The implication is that sugarcane value chain actors are engaged in one form of educational knowledge that allowed them to adopt and appreciate new technology that would improve their efficiency with increasing outputs.

The table 5 Years of Experience in the Sugarcane Value Chain: The table shows the distribution of the sugarcane processors according to their years of experience. It revealed that 53.8% of the sugarcane processors have been in the value chain for about 11-20 years. This indicated that sugarcane processors have an average of 15 years and 6 months of experience that helps them to use their resources efficiently, which increased output.

Table 5 Income Level: The table presents the distribution of sugarcane processors according to their income. The result indicated that the majority (80%) of the sugarcane processors obtained between two and four hundred thousand naira (₦200,000-400,000) as their income level. This implies that the sugarcane value chain actors obtained low incomes, so they had to secure another source of income. Income diversification is the norm among rural households, and different income-generating activities offer alternative pathways out of poverty for households as well as a mechanism for managing risk in an uncertain environment.

Table 5 Membership of Cooperative Society: The table shows the distribution of sugarcane processors on the basis of their cooperative society. The result revealed that the majority (57.5%) of the sugarcane processors have not belonged to any cooperative society. The implication is that only sugarcane wholesalers belong to cooperative societies in the sugarcane value chain. This means that the lack of concentration of government policy on sugarcane value chain actors, which assists sugarcane processors, can boost the marketing chain and is neglected.

Table 6: Actors in Sugarcane Value Chain and Their Functions

Value Chain Actors	Stage of the Value Chain	Functions	Agents
Input Suppliers	-Input Supply	Provision of production inputs such as seed, fertilizer, agrochemical	-Farmers -Seed Producers
Producers/Farmers	-Production	Production of sugarcane	Farmers
Processors	-Processing	Processing of raw sugarcane	Processors
Traders	-Marketing	Selling of processed sugarcane	Wholesalers, and Retailers
Indirect Actors	Provision of Services	Provide services to the farmers	Extension Agent, Research Institute, NGO, Financial Institutions, Transporters, MDAs

Source: Field survey, 2022

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Table 6 shows the actors in the sugarcane value chain and their functions. The sugarcane value chain involves several key actors with distinct functions. Farmers cultivate and harvest sugarcane. Traders facilitate the movement of sugarcane from farms to processors. Processors convert sugarcane into various products like raw sugar, refined sugar, molasses, and ethanol. Finally, distributors and retailers sell these products to consumers. Additionally, there are indirect actors like input suppliers (e.g., seeds, fertilisers), transporters, financial institutions, and extension services that support the entire chain. Below is the detailed breakdown of the value chain actors that support the entire chain:

Input suppliers: Input suppliers were responsible for supplying inputs such as stem cuttings, fertilisers, herbicides, insecticides and implements used in the production of sugarcane in the study area.

Producers: The producers (farmers) are the major actors that perform most of the value-adding functions. The functions include land preparation, tillage, planting, fertiliser/manure applications, weeding, pest/disease control, harvesting and post-harvest handling.

Collectors/assemblers: collectors are part-time producers or non-licensed traders who collect sugarcane from producers at village markets for the purpose of reselling to wholesalers. They are the first link between producers and other traders with capital limitations. They use their local knowledge to bulk sugarcane from the surrounding area. They play an important role due to their knowledge of areas of surplus and cheaper prices. The trading activities include buying and assembling, repacking, sorting transportation and selling to wholesalers.

Wholesalers: These are market participants who buy large quantities of sugarcane and resell to other traders. They purchase sugarcane from farm gates, collectors and producers in a larger volume than any other marketing actors do. They relatively spend their full time in wholesale buying throughout the year in and out of the state. Each wholesaler uses a vehicle as a means of transportation when the amount of sugarcane supplied to the market is large.

Retailers: They are businesses that sell the sugarcane to end users according to their requirements and the purchasing power of the buyers. They often trade sugarcane purchased from wholesalers, collectors and producers, and mostly they operate in markets near producers. As the last link between producers and consumers, retailers were key actors in the sugarcane value chain in the study area.

Processors: They entail the transformation of sugarcane into a variety of value-added products such as sugar, ethanol, bio-fertiliser, etc. The locally processed sugarcane, such as Mazankwaila (locally processed sugar), which is a sweetener locally made from sugarcane, is very popular in Hausa communities in northern Nigeria.

Categorization of Actors in Sugarcane Value Chain and Their Functions

Direct Actors:

Farmers/Producers: Grow and harvest sugarcane, responsible for initial production and land management.
Traders: Buy sugarcane from farmers and sell it to processors or other buyers, often involved in transportation and logistics.

Processors: Convert sugarcane into various products, including raw sugar, refined sugar, molasses, and ethanol.

Distributors/Wholesalers: Acquire products from processors and supply them to retailers or other businesses.

Retailers: Sell the final products (sugar, etc.) to consumers.

Consumers: The end-users of the products derived from sugarcane.
Indirect Actors:

Input Suppliers: Provide farmers with essential inputs like seeds, fertilizers, pesticides, and machinery.

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Transporters: Move sugarcane from farms to processing facilities and finished products to distributors and retailers.

Financial Institutions: Provide loans and financial services to support farmers, processors, and other businesses in the chain.

Extension Services: Offer technical advice and training to farmers on sugarcane cultivation, pest management, and other relevant practices.

Research and Development: Organizations involved in developing new technologies, varieties, and practices to improve sugarcane production and processing.

Government Agencies: Provide policy support, infrastructure development, and regulatory frameworks to ensure the smooth functioning of the value chain.

Non-Governmental Organizations (NGOs): May be involved in various aspects of the value chain, such as providing support to farmers, promoting sustainable practices, or advocating for policy changes.

Research Institutions: Conduct research on sugarcane cultivation, processing, and product development, contributing to innovation and efficiency.

CONCLUSION

Based on the findings of this study, the study concludes that most sugarcane value chain actors are male. Sugarcane retailers are an exception, with mostly male actors in the value chain. The main sugarcane value chain actors are input suppliers, producers, wholesalers, retailers and processors. The sugarcane farmland was obtained only by sugarcane input suppliers and producers. Both sugarcane stem cutting producers, sugarcane producers, sugarcane wholesalers, sugarcane retailers and sugarcane processors are making profits, yet sugarcane producers realised more profit based on the return per naira invested. Sugarcane wholesalers are the only value chain actors that participated in cooperative societies, which benefited from access to marketing information, fixation of price, reduction of taxes, bulky sales of their products and access to credit. Marketing channels of sugarcane value chain actors are the sugarcane producers performed the function of retailers as their products are sold directly to the consumer or end users which mean that sugarcane are sold in pieces or per kilogram this type of transaction is carried out at farm gate or sugarcane market; sugarcane farmers to sold their products to locally sugarcane processors which after processing of locally processed sugar (mazankwaila) the sold the mazankwaila to consumer who are end users; sugarcane producers sold their products to collectors/assemblers that are responsible to purchase the whole of the farm before or after harvesting of the sugarcane this transaction carried out at the farm and they transported sugarcane to market where they sold to retailers in the market that are responsible to hawks in order to find the end user of the product; sugarcane farmers sold sugarcane to collectors/assemblers which they transfer ownership to locally sugarcane processors which after transformation they sold mazankwaila to end users and The sugarcane producers sold sugarcane to collectors/assemblers at the farm, which was transported to the market and sold to wholesalers that always stayed at the marketplace. The wholesalers are responsible for selling sugarcane to retailers or hawkers that later sell to consumers or end users.

Recommendations

Based on the findings of the study, the following recommendations are made with a view to boost sugarcane value chain activities in the state:

(1) The government should design policies that can attract investors towards sugarcane value chain activities, most especially in the area of processing industries.

(2) The study also recommended that the sugarcane stem cutting suppliers and sugarcane farmers should expand their farmland so as to increase their output of sugarcane products.

(3) The government should subsidise sugarcane input supply, and financial institutions should be encouraged to give out credit facilities to all small- and medium-scale sugarcane value chain actors.

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