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Estrella, Ruby Ann C.[1]
Dionisio, Kathleen T.[2]
Banes, Charlene A.[3]
Wagan, Karen C.[4]
Pascua, Mellanie B.[5]

Corresponding Author: *racestrella1995@gmail.com*

[1-5]*College of Management, Bulacan Agricultural State College, Pinaod, San Ildefonso, Bulacan, Philippines*

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Abstract

This study provides a localized value chain analysis of coffee production in the municipality of Doña Remedios Trinidad (DRT), Bulacan, focusing on the roles of coffee farmers, the Talbak Fruits and Coffee Growers Inc. (TFCGI), and consumers. Using a mixed-methods approach with surveys and interviews of coffee farmers, the study highlights the challenges and opportunities within the coffee value chain. Key findings reveal that despite the reliance of farmers on traditional methods and self-financing for inputs, TFCGI acts as an important value-adding intermediary by processing and marketing coffee through retail and social media. The analysis identifies significant challenges, including aging coffee trees, limited access to modern equipment and credit, low demand, fluctuating prices, and the impact of the COVID-19 pandemic, which impede farmers' profitability and productivity. This study also underscores that the role of TFCGI as an intermediary is vital to sustaining local coffee production. The findings offer action-oriented insights for stakeholders and policymakers to design effective strategies, such as providing enhanced access to inputs, modern equipment, and marketing support, all of which are essential for strengthening the coffee value chain and fostering sustainable development in the municipality.

Keywords: *coffee farmers, coffee production, Robusta production, value addition, value chain analysis*

Introduction

The global demand for coffee has seen a sustained upward trend, making it one of the most significant agricultural commodities worldwide. In the Philippines, the coffee industry is rapidly expanding, and it is recognized as a vital sector for economic growth and rural development (DTI, 2023). A study by Khatri et al. (2023) provides evidence that analyzing the coffee value chain is a valuable tool for understanding key factors affecting a coffee enterprise. The study found that factors such as the cost of production, value addition, and profit margins are critical for the competitiveness and success of coffee enterprises. The increasing focus on local and sustainable coffee sourcing further underscores the importance of detailed regional or local studies.

Despite the overall growth and acknowledged importance of coffee consumption in the Philippines, farmers still struggle with challenges in conjunction with limited access to modern equipment, high

production costs, and aging coffee trees. In the province of Bulacan, the municipality of Doña Remedios Trinidad (DRT) has been producing coffee for a long time, but comprehensive studies detailing the unique systems and resources needed from production to consumption are scarce. This gap in the literature hinders a full understanding of the specific stages of production, the actual value added at each step, and the difficulties faced by local stakeholders, farmers, pulp operators, and traders. Without the capacity to gain localized insights, the interventions aimed at improving competitiveness, enhancing income, and promoting sustainable practices within DRT's coffee industry may not be adequately targeted.

This study aimed to address the aforementioned issues by analyzing the coffee industry in DRT, Bulacan, and to further identify opportunities for farmers, evaluate each of the activities in the production process, and determine areas for improvement. All the activities that set the journey of fresh ripe coffee seeds from the point of production to the consumer cup are depicted through value chain analysis and mapping (Khanal et al., 2019). The critical analysis of the different processes done by the farmers and producers, from all points of production in the municipality, was therefore explored.

By providing a detailed and localized analysis, this study offered several contributions toward expanding the existing knowledge on the coffee industry in DRT, Bulacan. Hence, the findings aimed to provide action-oriented observations for the local government units (LGUs), policy makers, agricultural extension workers (AEWs), and coffee stakeholders, enabling the coffee industry to design more effective strategies for improving production efficiency, enhancing product quality, increasing farmers' income, and fostering sustainable development within the subject municipality.

Objectives of the Study

This study was conducted to assess the value chain of the coffee industry in Doña Remedios Trinidad, Bulacan. Specifically, it aimed to describe the respondents in terms of their socio-demographic characteristics; identify the coffee value chain and define each actor role in the value creation activities; analyze the prices, costs, and profit margin; and identify and understand the problems that hinder the effectiveness of the coffee value chain in the study area.

Materials and Methods

This study employed a mixed-methods approach where the researchers collected and analyzed quantitative and qualitative data using a structured survey questionnaire to gather information on the respondents' demographic profiles; coffee farm inputs and production; processing; and marketing practices. To ensure validity, the questionnaire underwent key informant interviews (KIIs) with an expert in the field, officers of the coffee association, and content validation by local coffee farmers and producers in the area. The respondents were selected through purposive sampling and comprised forty coffee farmers, including members and non-members of the Talbak Fruits and Coffee Growers Inc. (TFCGI) in DRT, Bulacan. The number of coffee farmers in the research area was limited, as many had incurred losses due to low prices and the onset of the pandemic. As a result, they shifted from coffee production to the cultivation of other crops. Purposive sampling, a non-probability technique, was chosen to generate a sample that would address the research questions and focus on in-depth information, including both narrative and numerical data. The faculty researchers used different techniques to distribute questionnaires and collect data. Farmers had to answer the questionnaire in person, with assistance from the researchers, while observing social distancing measures and health safety protocols due to the COVID-19 pandemic. Furthermore, some farmers completed the questionnaire via the social media platform Messenger, assisted by their younger siblings or children.

Descriptive statistics such as percentages and rankings were used to analyze the gathered data. All data were coded, tallied, analyzed, and presented in either tabular or graphical forms.

Results and Discussion

Socio-Demographic Profile of Respondents

The socio-demographic profile of the coffee farmers in DRT, Bulacan, as shown in Table 1, reveals that 66% of the respondents were male, and most belonged to the active working-age bracket of 41 to 50 years (32.5%). This indicates a significant proportion of experienced Filipino farmers engaged in coffee production, with an average age of 57 years old. As stated by Saliot (2013), Director of the Department of Agriculture-Agricultural Training Institute (DA-ATI), after 15 years—given that the average lifespan is 70 years—the country may face a critical shortage of farmers.

Table 1

Socio-Demographic Profile of Coffee Farmers

Socio-Demographic Profile		Frequency	Percentage (%)
Sex	Male	26	65
	Female	14	35
Age	21-30 yrs. Old	3	7.5
	31-40 yrs. Old	7	17.5
	41-50 yrs. Old	13	32.5
	51-60 yrs. Old	11	27.5
	61 yrs. old and above	6	15
Education level	College Graduate	1	2.5
	College Undergraduate	1	2.5
	High School Graduate	11	27.5
	High School Undergraduate	9	22.5
	Elementary Graduate	16	40
	Elementary Undergraduate	2	5
Number of years engaged in coffee production	11-15 yrs.	1	2.5
	16-20 yrs.	27	67.5
	20-25 yrs.	6	15
	26 yrs.- 30 yrs.	1	2.5
	31 yrs. and above	5	12.5
Other source of income aside from coffee production	Farming (crops/animals)	33	82.5
	Employment	5	12.5
	Business	2	5
Where did you learn coffee cultivation?	Family/Parents/Inherited	34	85
	Husband/Wife	4	10
	Association/Cooperatives	2	5
Member of Talbak Coffee Growers	Yes	38	95
	No	2	5
Have you received any training about coffee production?	Yes	40	100
Does a coffee technician visit your home and farm?	Yes	40	100

Meanwhile, the participation of women in coffee has been growing. A study by the International Coffee Organization (2018) showed that women generally have lower access to resources such as land, credit, and information compared to men. However, women contribute approximately 70% of the labor in coffee production. However, women provide 70% of labor in coffee production. In terms of educational

attainment, most of the coffee farmers were elementary graduates (40%). This may suggest that limited education among coffee farmers hinders their ability to adopt new farm technologies. As stated by Nurhapsa et al. (2020), low level of education may influence farmers' ability to respond to new information and innovations related to their coffee production.

The study also revealed that most of the farmers in DRT were involved in coffee production for 16 to 20 years (67.05%), which indicates a long-term engagement in the said endeavor. This extensive experience improves production technology adoption, such as improved land management, crop varieties, and agronomic practices, as highlighted by Kihoro et al. (2023). The majority of them (85%) learned coffee cultivation from their families and/or parents. As stated in an article entitled, "Coffee Farming: An Inheritance", the knowledge of coffee farming is acquired from previous generations. They traverse the length and breadth of the farm at their parents' and grandparents' feet. The study of Ye, J., et al. (2016) discusses how family farms function as spaces where agricultural skills and knowledge are passed across generations.

For most of the farmers in DRT, coffee farming is not their sole source of income. Specifically, 33 (82.50%) of the total respondents revealed that they are supplementing their income by farming crops or raising animals. This diversification is essential, as newly planted coffee trees typically take about four (4) years to bear fruit, leading to an initial period of insufficient profit. To improve this situation, small-scale coffee farmers are compelled to adopt different livelihood diversification strategies to meet their daily livelihood requirements. As a diversification strategy, some farmers engage in livestock raising, vegetable production, and small or medium-scale businesses, while others participate in formal and informal employment (Kimaro, 2020).

The study also showed that 95% of the respondents were members of the Talbak Fruits and Coffee Growers Inc. (TFCGI), while the remaining 5% were traders or non-members who still engaged in coffee farming and production. Pitts (2018) found out that being a member of cooperative/associations has more impact than demographic factors, and members report that cooperative/associations help increase coffee sales and income. The study also found that 100% of the respondents had received training in coffee production, which they considered sufficient. According to Otieno et al. (2019), poor extension services hinder farmers' ability to adopt effective soil management and crop production practices.

Value Chain Analysis of Coffee in DRT, Bulacan

Figure 1

Value Chain Map of Coffee in Dona Remedios Trinidad

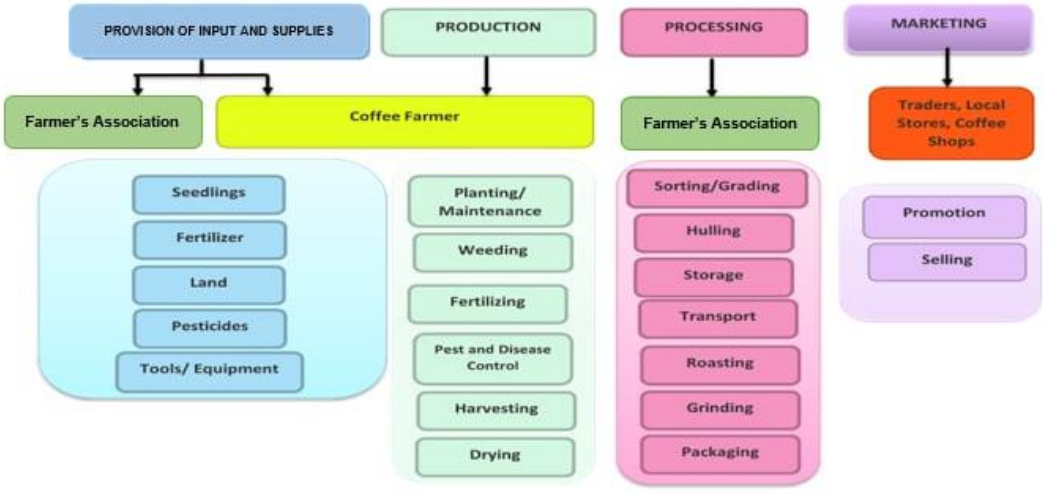


Figure 1 showed the value chain map of the coffee production in DRT, Bulacan. It involved the different processes and the roles of each actor within the chain. The main parts of the chain provided input and facilities, production, processing, and marketing.

Actors in the Value Chain. The actors in the value chain consist of farmers, the Talbak Fruits and Coffee Growers Inc. (TFCGI), and consumers. The significant roles of each actor along the chain are discussed in detail below.

Coffee Farmers

The primary actors in the chain are the coffee farmers. Among the roles they performed are planting, pruning, weeding, applying pesticides and fertilizer, and harvesting. All the respondents practice sustainable coffee production using their own money. However, inputs like seedlings and fertilizers were occasionally provided by the association.

Harvesting of coffee beans was done by individual farmers or hired labor. Coffee cherries were then dried before being sold to the association for processing and marketing. According to Hung Anh et al. (2019), the participation of farmers in sustainable coffee farming is influenced by economic benefits, while improvements in knowledge, education and training can enhance small-scale production.

Farmers' Association

The Talbak Fruits and Coffee Growers Inc. (TFCGI) is the sole association of coffee in Doña Remedios Trinidad. The association acts as a buyer and the major processor of harvested coffee cherries from the farmers. Coffee in Talbak is processed naturally, which involves drying the harvested coffee cherries under the sun. After drying, the coffee undergoes sorting, grading, hulling, roasting, grinding, and packaging. The members, mainly the officers, are responsible for processing coffee beans sold by the farmers.

Along with the processing of coffee, the TFCGI is also responsible for the marketing the processed coffee beans. They sell coffee in two different forms, roasted bean and ground coffee. As stated by. Djuwenda et al. (2019), cooperatives or associations play an important role in the coffee value chain by providing affordable input supplies, ensuring production volume, standardization, product quality, distribution, and marketing, all of which contribute to higher income for coffee farmers.

Consumers

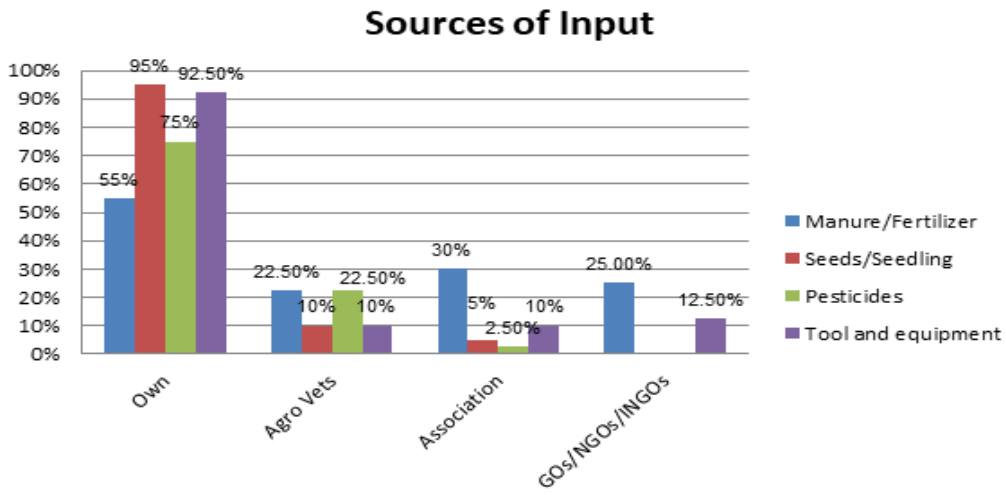
Consumers play a significant role in the value chain. The association struggled to sell its products as the Covid-19 pandemic impacted people, causing economic and social disturbances. As a result, almost no sales were made. As the town's stringent enforcement of health and safety regulations was loosened, the association took advantage of the growing number of tourists visiting its various attractions to promote and sell its coffee.

Tourists visiting local establishments selling Talbak Coffee in DRT, Bulacan became the TFCGI's main customers at the time. According to the study of Samoggia, Del Prete, and Argenti (2020), consumers are interested in new coffee products, and product development and commercialization of coffee can contribute to increasing coffee consumption.

Main Activities in the Value Chain. The Value Chain of Coffee is composed of several activities that transform inputs into output with value addition as it moves from one process to another. Each activity along the chain is discussed in detail below.

Figure 2

Sources and Types of Input Used in Coffee Production



The figure above shows the different sources and types of inputs used in coffee production. Manure/fertilizer, seeds/seedlings, insecticides, and tools and equipment are the most common inputs. The farmers paid for the majority of the input supplies themselves. Seeds/seedlings were self-financed by 95% of the respondents, while tools and equipment were self-financed by 92.50%. Pesticides were also self-financed by 75% of the respondents, and 55% of the farmers prepared their own manure/fertilizer for coffee production and cultivation.

Several inputs play a crucial role in the coffee production process, each of which significantly impacts the quality and amount of coffee produced by each grower. Based on Andrew and Philip's (2014) study, availability, input level, and prices affect coffee production and revenue. The majority of the coffee producers in the study region grew coffee on land ranging from 300 square meters to two hectares. Though the land areas varied, ranging from 500 square meters to 13 hectares, one thing they all had in common was that they allocated a portion of their entire land area for coffee cultivation. All the coffee farmers interviewed by the researchers cultivated the Robusta variety. As stated by the Department of Trade and Industry and Department of Agriculture (2018), Robusta was the most dominant variety in the Philippines in 2015-2016 and was primarily grown in the island of Mindanao and the Southern Tagalog region particularly in the province of Cavite. Robusta is commonly produced for lower-value market segments, such as instant coffee. According to the respondents, it has been the variety they had been planting since they began producing coffee.

On the other hand, two (2) respondents said they had tried growing two different varieties, Excelsa and Liberica. "There is a standard of 1,100 trees per hectare planting density or three meters by three meters planting distance for Robusta," according to the Philippine Coffee Industry Roadmap 2017-2022. Meanwhile, farmers in the study area planted an average of 1,200 trees per hectare of land. Coffee trees in DRT, Bulacan, ranged in age from ten (10) to thirty-five (35) years. The majority of coffee trees were old, which participants cited as one major reason for decreasing coffee yields per year. In contrast, "While coffee plants can live up to 100 years, they are most productive between the ages of 7 and 20 as a general rule; appropriate pruning and fertilization can sustain and even improve their output over the years, depending on the variety," according to the journal The Lifespan of a Coffee Plant (2018).

In terms of technology and equipment, the Chairman of TFCGI cited a shortage of equipment as the most significant issue they faced in the coffee processing. The roasting machine, grinding machine,

weighing scale, and sealer were among the machines and equipment used and owned by the association. The majority of farmers applied a variety of fertilizers, including 14-14-14, urea, and ammonium. Magnum 5 was the most popular insecticide, while some preferred Symbus and Clear Out to control pests in their coffee trees. Coffee cultivation demands both human and financial resources. In terms of funding, all respondents said they used their own money to keep and support coffee production. However, in the study by Wambua, Gichimu, and Ndirangu (2021), access to credit positively impacts coffee productivity. Embracing credit financing could provide opportunities for coffee farmers to boost their production.

On the other hand, labor expenditures accounted for the biggest percentage of farmers' production costs, ranging from ₱300.00 to ₱600.00 per day per person. The number of days varied depending on the method. Similar to the study of Gaitán-Cremaschi (2018), the highest cost in coffee farming was labor, since coffee production required different activities such as weeding, pruning, applying fertilizer and pesticide and harvesting, which were mostly done by manual labor.

Production

Table 2

Production of Coffee

Variable		Frequency	Percentage (%)
Land used for agricultural production (in h.a.)	.5 ha	6	15
	1 - 3 ha.	28	70
	4 - 6 ha.	4	10
	7 - 9 ha.	3	7.5
	10 ha. and above	1	2.5
Area of land used for coffee production (in h.a.)	.5 ha.	19	47.5
	1 ha.	14	35
	2 ha.	6	15
	3 ha.	1	2.5
Number of coffee bushes planted	500 below	11	27.5
	1000-2000	23	57.5
	2000-3000	4	10
	3000-4000	1	2.5
	5000 and above	1	2.5
Average age of coffee planted	10 and below	4	10
	11-20	15	37.5
	21-30	13	32.5
	31-40	8	20
Current no. of bearing coffee bushes	500 below	22	55
	501-1000	17	42.5
	1501-2000	1	2.5

According to the Philippine Coffee Industry Roadmap 2017-2022, local coffee output declined by 3.5% each year over the last 10 years, while coffee consumption rose by 8.8% from 2014 to 2015. In this regard, coffee production and cultivation in the country should be enabled to address the supply and demand gap, which Talbak Fruits and Coffee Growers Inc. in DRT, Bulacan is already doing.

Meanwhile, most farmers said that the average age of their coffee bushes was between 11 and 20 years old (37.5%) and between 21 and 30 years old (21.5%). Based on the *Philippine Coffee Industry Roadmap 2021–2025* (Department of Agriculture–High Value Crops Development Program [DA–HVCDP], 2021), most coffee farmers cultivate small-scale farms with limited numbers of productive bushes. The data show that the majority of coffee farmers maintain 500 or fewer bearing coffee bushes, representing 55% of respondents. Meanwhile, 42.5% reported having between 501 and 1,000 productive bushes, while only

2.5% owned between 1,501 and 2,000 bearing coffee plants. This suggests that the area's low coffee productivity is caused by a number of reasons, including lack of plants per unit of planting space and the presence of old, less productive coffee plants (Rahmanta et al., 2019).

Activities in Coffee Production

There were five main coffee cultivation processes: pruning, weeding, pesticide application, fertilization, and harvesting. Pruning coffee trees took 1 to 5 days (85%), depending on the number of coffee trees. It required 1 to 3 laborers (82.5%) who were paid ₱300.00 a day (55%). Pruning is a strategy used in various regions to rejuvenate coffee plants and increase berry production. However, depending on the technique utilized, it might have different impacts on infestations (Dufour et al., 2019). The second cultivation process undertaken by coffee farmers was weeding. According to Deribe (2018), weeds compete with coffee for water and nutrients, and some perennial grasses and sedges produce toxic root exudates that harm the plant. Water stress during dry spells, nutrient deficiencies, and declines in production and quality are all effects of weeds on coffee. The weeding process took 1 to 5 days for 70% of framers and required 1 to 3 laborers (87.5%), costing ₱300.00 (52.5%) to ₱350.00 (40%) per day.

Table 3

Activities in Coffee Production

Activities	No. of Laborers	F	%	No. of Days	F	%	Labor cost per head/day	F	%
Pruning	1-3	33	82.5	1-5 days	34	85	₱300.00	22	55
	4-6	6	15	6-10 days	5	12.5	₱350.00	15	37.5
	7-9	1	2.5	11 and above	1	2.5	₱400.00	1	2.5
							₱500.00	1	2.5
							₱650.00	1	2.5
Weeding	1-3	35	87.5	1-5 days	28	70	₱300.00	21	52.5
	4-6	5	12.5	6-10 days	12	30	₱350.00	16	40
	7-9			11 and above			₱400.00	2	5
							₱600.00	1	2.5
Pesticide	None	4	10	1-5 days	37	75	No Answer	10	25
Application	Own	6	15	6-10 days	3	7.5	₱300.00	13	32.5
	1-3	26	65	11 and above	4	10	₱350.00	14	35
	4-6	3	7.5				₱400.00	2	5
	7-9	1	2.5				₱500.00	1	2.5
Fertilizer	Own	4	10	1-5 days	37	92.5	No Answer	4	10
Application	1-3	33	82.5	6-10 days	3	7.5	Own	1	2.5
	4-6	3	7.5	11 and above			₱300.00	18	45
	7-9						₱350.00	15	37.5
							₱400.00	2	5
Harvesting	1-3	20	50	1-5 days	13	32.5	Own expense	1	2.5
	4-6	13	32.5	6-10 days	25	62.5	₱200.00	4	10
	7-9	7	17.5	11 and above	2	5	₱300.00	17	42.5
							₱350.00	17	42.5
							₱400.00	1	2.5

On the other hand, pesticide applications was not practiced by all farmers. Four farmers (10%) preferred not to use pesticides on their coffee trees meanwhile, 6 farmers (15%) applied pesticides themselves. Those who applied pesticides used Magnum 5, Symbus, and Clear Out to control or eliminate pests. Among the major factors limiting coffee production are pests (insects, diseases, nematodes, and

weeds), both local and exotic, which cause losses worldwide. Coffee pests are thought to be responsible for 13% of global losses (Deribe, 2018). Pesticide application took 1 to 5 days for 75% of farmers, requiring 1 to 3 laborers (65%) at a daily rate of ₱300.00 (32.5%) to ₱350.00 (35%). In terms of fertilizer application, Urea, 14-14-14 and Ammonium were the most commonly used fertilizers by the farmers in the study area. It is known that fertilizers play a significant role in giving the plants and trees the nutrients they need to develop, grow and be harvested as nutritious food. Fertilizer application took 1 to 5 days for 92.5% of farmers, depending on the land area and number of trees. The majority of farmers hired 1 to 3 laborers (82.5%), a few applied fertilizers themselves (10%), while others paid ₱300.00 (45%) to ₱350.00 (37.5%) per day to laborers.

Finally, the farmers considered harvesting the longest process of coffee cultivation, as it requires time, effort, and patience. Harvesting lasted from 6 to 10 days for 62.5% of the farmers, depending on how many productive coffee trees the farmer has. The cherries are stripped off the branches by hand, making harvesting labor-intensive. Picking cherries requires 1 to 3 laborers (50%) to do the process, and the labor cost amounts from ₱300.00 to ₱350.00 (42.5%) per day. It is evident that the number of days, laborers and labor costs largely depended on the land area and the number of coffee trees cultivated.

Processing

The purpose of coffee processing for farmers is to separate the bean from the coffee cherry while maintaining the quality and profitability of the crop. Even if the coffee is harvested ripe and the harvest goes well, improper post-harvest processing can lead to defects that reduce the coffee's value, including off-flavors, microbial contamination, and poor cup quality (Das, 2022). There are three types of coffee processing methods: natural or dry, washed or wet, and honey process. Talbak Fruits and Coffee Growers Inc. (TFCGI) uses the natural or dry technique to process their harvested coffee. The natural or dry process is the most ancient and traditional method of coffee preparation. In this process, the farmers' cherries are spread out in thin layers under the sun to dry. The TFCGI Association was the principal processor of the coffee harvested in DRT, Bulacan. They began processing their coffee in 2013 and have continued to do so to the present. The machines and equipment are stored in their warehouse, where processing is carried out. The farmers' harvested coffee cherries are sold to the association. The association's members, mostly the officers, act as coffee processors.

The researchers interviewed four association officers and outlined the entire processing methods used for the coffee sold to them by growers, both members and non-members. Since they began, they have processed around 2,000 kg of green beans. The processors claim to have processed 150 kg of fresh/dry cherries for ₱95.00/kg in 2018, 200 kg for ₱110.00/kg in 2019, and 200 kg for ₱115.00/kg in 2020. TFCGI's coffee processing involves five steps: harvesting by individual farmers, grading, hulling, roasting, and grinding. This is also backed up by the study of Girma and Sualeh (2022) that the quality of coffee is strongly determined by the post-harvest processing method, including the steps of fermentation, drying, hulling, and grading, which are critical to aroma and flavor development.

Coffee beans will be hulled after they have been successfully graded. Before the dried cherry is hulled, the pericarp is removed. A pestle and mortar or a huller can be used to do this manually or mechanically. Mechanical hullers use a steel screw with an increasing pitch toward the outlet, removing the pericarp. The hulling process carried out by the association took two (2) days and required three (3) laborers who were paid ₱6.00/kg. The next process was roasting. According to a coffee research organization, coffee roasting is a chemical process in where aromatics, acids, and other flavor components are either formed, adjusted, or altered to improve the flavor, acidity, aftertaste, and body of the coffee as desired by the roaster.

The coffee beans were roasted by the association's roasting machine. Dark, medium, and light were the three basic types of coffee roasts. The association sold customers medium-roast coffee beans. The roasting procedure took only two (2) days to complete, and two (2) to three (3) laborers were paid ₱60.00–₱70.00/kg. After the roasting process, the association had two (2) alternatives: to sell the roasted beans directly to customers or to let them go through the grinding process. The grinding procedure was the final step in the TFCGI association's coffee processing. Pulverizing coffee beans into fine ground coffee was the process involved. The goal of a good grind is to get the greatest flavor from a cup of coffee. The market could subsequently be able to purchase ground coffee. The grinding procedure took two days (2) to complete, requiring two (2) to three (3) laborers who were paid ₱60.00–₱70.00/kg. The association gave sales figures for the previous three years. According to the data, they supplied 8 tons of green beans to Nestlé Company in 2018 at ₱110.00/kg and 4 tons at ₱120.00 in 2019. Unfortunately, they no longer supplied green beans to Nestle in 2020. For roasted beans, they sold 1000 kgs at ₱400.00/kg in 2018 and 900 kgs at ₱450.00 in 2019. They did not sell roasted beans in 2020 due to the COVID-19 pandemic.

Marketing

Marketing plays an important role in the profitability of the coffee industry. It raises product awareness, establishes brand credibility, fosters buyer trust, and adds value to the audience. In Table 4, the data collected were based on multiple responses. When the respondents were asked what type or variety of coffee they processed, the majority reported Robusta (97.5%), while a few indicated Liberica (5%). In terms of where they sell their coffee, all the farmers sold it to associations/cooperatives (100%) and two farmers among the 40 who chose associations/cooperatives also sold their produce to local traders (5%). Farmers sold their harvest directly to the association because it was the only organization that owned machines and equipment necessary for the processing of coffee.

Table 4

Marketing

Variable		Frequency	Percentage (%)
Among the choices below, which type or variety of coffee do you process?	Robusta	39	97.5
	Liberica	2	5
	Excelsa		
Where do you sell your coffee?	Local Trader	2	5
	Company		
	Retailer		
	Wholesaler		
	Cooperatives/ Association	40	100
Among the following, where do you get reliable information about the coffee market and price?	Farmers		
	Processors		
	Internet		
	Cooperatives/Association	40	100
	Local Government Unit		
	Consumers		
In the current situation, do you find it easy to sell your processed coffee?	Yes	32	80
	No	8	20
What are the major problems you are experiencing in marketing of coffee?	COVID-19 Pandemic	15	37.5
	Low Demand	22	55
	Low in Supplies	1	2.5
	Low Prices	20	50
	Transportation/ Distribution	2	5

The market and price information were also provided by the association since they were looking for competitive prices and target consumers to sell their processed products. Most of the farmers (80%) found it hard to sell their processed coffee in the current situation, and the major reasons were low demand (55%), low prices (50%) and Covid-19 pandemic (37.5%), while other reasons included low supply (2.5%) and transportation or distribution challenges (5%).

The Marketing Mix

The Marketing Mix, commonly known as the “4Ps”, is one of the most widely used marketing tools. It assists firms in determining which marketing plan to implement in order to become viable and lucrative.

Product

The product is the first component of the marketing mix. Talbak Fruit and Coffee Growers Inc. is a coffee farmers’ association in DRT, Bulacan, responsible for selling processed coffee beans. Ground coffee and roasted beans are the two types of coffee products offered by the association in the market. The organization chose a foil and plastic pouch with their emblem as the product's label for packaging. It also includes information about the roast level, type of process, and coffee varietal. The coffee products come in three sizes: 250g, 500g, and 1000g respectively.

Figure 3

Packaged Coffee Products of Talbak Fruit and Coffee Growers Inc.

Price

The prices of coffee products vary depending on the type of packaging. For plain packaging, prices are ₱150.00, ₱250.00 and ₱500.00, for 250g, 500g, and 1000g. For foil packaging, prices are ₱180.00, ₱300.00 and ₱550.00, for 250g, 500g, and 1000g respectively. The coffee products were sold both wholesale and retail by the association.

Promotion

Social media channels, such as Facebook are used to promote and advertise the coffee products. The organization has its own Facebook page where it promotes its products and shares essential information with customers.

Place/Distribution

They used to sell their products to Nestle in bulk. However, when Nestle relocated to Batangas, the transportation expenses doubled, so they decided to stop supplying the company because the costs had accumulated. They are currently concentrating on selling retail to tourists visiting the many attractions in DRT, Bulacan. According to Padovan et al. (2015), using customer-oriented marketing in coffee products

may help to improve sales, revenue, and profit.

Profit Margin and Value Addition

In assessing the profitability of smallholder coffee farming, most farmers were found to cultivate coffee on 1-hectare plots. The study of Munizu et al. (2024) on the coffee value chain, reinforces that smallholders—particularly those growing Robusta coffee—are economically vulnerable. Their limited output size makes them susceptible to higher transaction costs and market price volatility, making it difficult to achieve significant and sustainable profitability. According to the findings, 42.5% of farmers own 501 to 1,000 bearing coffee bushes. Taking the midpoint of this range, it can be assumed that a typical farmer has 750 productive bushes per hectare.

Productivity in coffee farming varies significantly depending on plant age, maintenance practices, and environmental conditions. While well-managed coffee bushes can yield between 0.5 to 1.0 kg of green beans per year, many of the farmers reported that their coffee bushes were between 11 to 30 years old—an age range generally associated with declining productivity unless rejuvenation practices (such as pruning and fertilization) are regularly performed. Teodoro, et.al (2025) emphasized that rejuvenation pruning and targeted management interventions are essential in restoring yield potential in older coffee stands, particularly those beyond 15 years old.

Table 5

Gross Margin for Green Coffee Beans

Item	Amount (₱)
Total Yield (750 Bushes X 0.6 Kg)	450 kg
Price	120/kg
Gross Revenue	**54,000.00**
Cost of Goods Sold (Labor Cost)	
Pruning (3 laborer x 3 days x 350/day)	3,150.00
Weeding (3 laborer x 4 days x 350/day)	3,900.00
Pesticide application (3 laborer x 4 days x 350/day)	3,900.00
Fertilizer application (3 laborer x 4 days x 350/day)	3,900.00
Harvesting (5 laborer x 6 days x 325/day)	9,750.00
Total Labor Cost	**24,600.00**
Cost of Goods Sold (Non-Labor Cost)	
Fertilizer (organic/inorganic)	6,000.00
Pesticides/Herbicides	2,000.00
Equipment/tools depreciation	1,500.00
Transport & hauling	2,000.00
Misc. (bags, drying mats, etc.)	1,500.00
Total Non-Labor Cost	**13,000.00**
Total Cost of Goods Sold (COGS)	**37,600.00**
Gross Margin (Revenue – COGS)	**16,400.00**
Gross Margin (COGS/Revenue *100)	**30.40%**

Note. Number of labors, day and cost based on the average answer of respondent for 1 hectare

At a prevailing farm gate price of ₱120.0/kg, the gross revenue generated from this yield amounts to ₱54,000.00.

The cost of goods sold (COGS) includes both labor and non-labor expenses. Labor costs, totaling ₱24,600.00, were computed based on key farming activities throughout the production cycle. These include pruning (₱3,150.00), weeding (₱3,900.00), pesticide application (₱3,900.00), fertilizer application (₱3,900.00), and harvesting (₱9,750.00). These figures were calculated using an average of three laborers

working multiple days per task at rates between ₱325.00 to ₱350.00 per day. Harvesting required more labor—five workers over six days—highlighting its intensity and cost.

Non-labor costs totaled to ₱13,000.00 and covered essential inputs and operational needs such as fertilizer (₱6,000.00), pesticides and herbicides (₱2,000.00), equipment depreciation (₱1,500.00), transport and hauling (₱2,000.00), and miscellaneous expenses like drying mats and sacks (₱1,500.00). Combined, the total production cost amounted to ₱37,600.00.

After deducting the total cost of production from the gross revenue, the resulting gross margin was ₱16,400. This represents a gross margin rate of 30.4%, indicating that for every ₱100 earned, ₱30.40 was retained as gross profit. This analysis shows that while coffee farming on one (1) hectare remains modestly profitable under current conditions, profitability is highly influenced by labor costs and input efficiency. Improving yield through enhanced farm management and exploring value-adding processes could further enhance returns.

Table 6

Value Addition: Green Beans to Roasted Bean

Item	Cost (₱/kg)
Selling Price (Roasted)	**550.00**
Green bean cost	120.00
Hulling cost	6.00
Roasting cost	65.00
Total Input Cost	**191.00**
Value Added	**550.00 – 191.00 = 359.00/kg**

Table 7

Value Addition: Green Beans to Ground Coffee

Item	Cost (₱/kg)
Selling Price (Ground Coffee)	**550.00**
Green bean cost	120.00
Hulling cost	6.00
Roasting cost	65.00
Grinding	65.00
Total Input Cost	**256.00**
Value Added	**550.00 – 256.00 = 294.00/kg**

Table 8

Summary of Value Addition

Product Type	Selling Price (₱)	Total Cost (₱)	Value Added (₱/kg)
Roasted Beans	550.00	191.00	**359.00**
Ground Coffee	550.00	256.00	**294.00**

The concept of value addition in coffee processing refers to the increase in market value when raw coffee beans undergo various stages of transformation. The progression from green beans to roasted or ground coffee demonstrates how processing significantly enhances profitability. Similarly, scholars have noted that coffee farmers typically receive a relatively small share of the final retail price when they sell only green beans, while value is added and captured further downstream through processes such as roasting, blending, and marketing, which increases profitability for buyers and brands relative to raw producers (Utrilla-Catalan et al., 2022).

For roasted beans, the selling price reached ₱550.00/kg. Considering the input costs—₱120.00 for green beans, ₱6.00 for hulling, and ₱65.00 for roasting—the total cost was ₱191.00/kg. This results in a value added of ₱359.00/kg, indicating a substantial gain through roasting alone. When the beans were further processed into ground coffee, an additional cost of ₱65.00/kg was incurred for the grinding process. This brings the total input cost to ₱256.00/kg, while the selling price remained at ₱550.00, leading to a value added of ₱294.00/kg. These results highlight the economic advantage of engaging in value-adding activities, with both roasting and grinding contributing significantly to higher returns compared to selling green beans alone.

Conclusion

This study evaluated the coffee industry's value chain in Doña Remedios Trinidad (DRT), Bulacan, with the following objectives: to describe the socio-demographic characteristics of respondents, to identify the coffee value chain and the roles of each actor, to analyze prices, costs, and profit margins, and to identify issues impacting the effectiveness of the value chain.

The findings revealed that most coffee farmers cultivate Robusta coffee on small plots using traditional farming methods. The Talbak Fruits and Coffee Growers, Inc. (TFCGI) serves as the primary buyer and processor, performing essential value-adding activities such as grading, roasting, and grinding. Unfortunately, challenges such as limited access to inputs and machinery, aging coffee trees, high production costs, and low, unstable market prices hinder productivity.

The results showed that the majority of coffee farmers cultivated Robusta coffee on small areas, employing traditional techniques. The COVID-19 pandemic further disrupted the coffee supply chain. , TFCGI helped sustain the industry through social media marketing and direct distribution.

To improve the efficiency of the coffee value chain, strategic solutions should focus on enhancing access to modern inputs and equipment, providing financial support, reviewing marketing strategies, and facilitating seminars. If addressed, the coffee industry in DRT, Bulacan could achieve sustainability and competitiveness in both local and national markets.

Recommendations

1. The association should provide incentives such as free membership, use of machinery, financial aid, or non-cash recognition to encourage farmer productivity. At the same time, it may facilitate access to low-cost agricultural inputs to boost immediate coffee production.
2. Based on the findings, most of the respondents were middle-aged to older farmers with limited access to formal agricultural training and modest income levels. Considering these socio-demographic characteristics, the farmers should be provided with continuous capacity-building programs that focus on rejuvenation pruning, fertilization, and sustainable farm management practices suited to their resources.
3. It is recommended that value chain enhancement strategies be explored and gradually implemented to help address the existing gaps in coffee production, processing, and marketing. Farmers may also be encouraged to take part not only in cultivation but also in post-harvest and processing activities—such as sorting, drying, roasting, and packaging—to potentially increase product value and profitability.
4. Government and private partners should provide modern processing machines to improve efficiency and value addition. The association may also organize skills training and certification programs for farmers to enhance coffee quality and production knowledge.

5. Establish partnerships with government and private organizations or sector entities to promote sustainable agricultural practices, rejuvenate aging coffee plantations, and create a detailed strategic plan for the local coffee industry to enhance competitiveness in the national market.

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