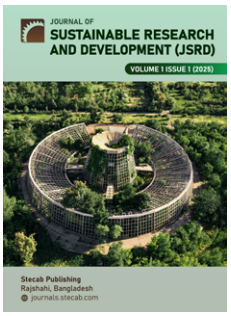

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Research Article

Value Chain Development and Stability in Market Price of Some Agroforestry Tree Products in Dandi Local Government Area, Kebbi State, Nigeria

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About Article

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ABSTRACT

This paper investigates the value chain development and market price stability of some agroforestry tree products in Dandi Local Government Area, Kebbi State, Nigeria. Purposive sampling was used to select three (3) villages within Dandi Local Government area, including Tunga maizuma, Mallenyero and Kamba, on the basis of availability of producers, marketers and consumers of some agroforestry tree products. Five markets were selected purposively on the basis of availability of marketers and consumers of the agroforestry tree products. The research determines sale values, analyzes market channels, and explores value addition through packaging. Key findings reveal that smallholder farmers face significant barriers in accessing markets, high transaction costs, limited capital access, and lack of market information. The paper identifies factors contributing to price instability, such as supply-demand imbalances and poor market information. Analysis of market channels demonstrates that farmers often receive only a fraction of the final retail price due to multiple intermediaries. Results show that value-added products can offer higher returns and extend the market season for agroforestry tree products. Based on these findings, the paper strongly recommends an interventions to strengthen targeted farmer organizations, improve access to market information, and promote value addition activities, which will contribute to poverty reduction and food security in rural communities.

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1. INTRODUCTION

The value chain describes the full range of activities which are required to bring a product or service from origination, through the different phases of production (involving a combination of physical transformation and the input of various producer service), delivery to final customers, and/or final end-users (Fernandez-stark *et al.*, 2011). Value chain development features prominently on development aimed at stimulating economic growth and increasing competitiveness of the agricultural sector (Humphery & Navas-Aleman, 2010). Value chain development has become a key approach in both research and policy fields, with an increasing number of bilateral and multilateral aid organizations adopting it to guide their development interventions (Donovan, 2013). The stability of market prices is a major determinant in the marketing of agroforestry tree products as it can vary due to several factors such as; supply and demand imbalances, poor market information, economic data and interest rate (Widiyanto, 2021).

Value Chain Development faces challenges, including limited access to finance, inadequate institutional support, and unequal power relations among value chain actors (Patil, 2016). For example, a study on the coffee value chain in Ethiopia found that smallholder farmers faced difficulties in accessing credit and markets due to unequal power relations with buyers (Bastin, 2007). Agroforestry tree products often face market constraints, including price volatility, lack of market access, and limited value addition (Russell, 2004). Value Chain Development can address these constraints by improving market information systems, enhancing product quality, and developing market linkages (Humphery & Navas-Aleman, 2010). For instance, a study on the Sheabutter value chain in West Africa found that Value Chain Development interventions increased farmers' incomes and improved product quality (Devaux, 2018). In addition, Value Chain Development can promote sustainable forest management and reduce deforestation by increasing the value of standing trees and promoting eco-friendly practices (Delabre, 2020). A study on the cocoa value chain in Indonesia found that Value Chain Development interventions improved farmers' knowledge of sustainable agroforestry practices and reduced deforestation (de Boer, 2019).

Farmers often do not obtain the full value of the products they produce because of rents paid to different stakeholders across the value chain. Although the constraints facing agroforestry tree products value chains are context-specific, high transaction costs are common in many developing countries. These transaction costs are associated with challenges in transporting crops as well as liquidity constraints. Farmers also face challenges when it comes to acquiring inputs due to limited access to capital and lack of information on where and how to access inputs. Other challenges along the agroforestry tree product value chain include poor quality storage facilities, which lead to high post-harvest losses, weak market linkages, poor safety standards and lack of consumer trust in the quality of agroforestry tree products. Smallholder farmers also face disadvantages due to small plots, low level of capital investments, a lack of bargaining power, and poor connection to the international market.

Value chain addition of agroforestry tree products is known for offering higher returns, and besides that it can open up fresh markets, recognize farms, expand the market season and contribute positively to the society. Agroforestry farmers could profit from expanding into a product-related business with value added products, when the product is defined not by fluctuating farm gate prices but comparatively constant retail price. Value chain addition of agroforestry tree products will enhance livelihood by improving short-term storage of fresh produce, preservation of seasonal surplus of crops that would otherwise be wasted. The objective of this research is value chain development and stability in market price of some agroforestry tree products in Dandi Local Government Area Kebbi State, Nigeria.

2. LITERATURE REVIEW

Value chain development is a critical approach to improving the competitiveness and sustainability of agroforestry tree products (Kaplinsky & Morris, 2000). Value Chain Development involves analyzing and upgrading the entire value chain, from production to consumption, to increase the value of agroforestry tree products and reduce poverty among smallholder farmers (Fernandez-stark *et al.*, 2011). Agroforestry tree products, such as timber, fuel wood, and non-timber forest products (NTFPs), play a significant role in rural livelihoods and national economies (Patricia Shanley *et al.*, 2015). Agroforestry tree products often face market constraints, including price volatility, lack of market access, and limited value addition (Russell, 2004) .

Market dynamics play a significant role in determining the price stability of agroforestry tree products (AFTPs), with factors such as supply and demand imbalances, seasonality, market information access (Humphery & Navas-Aleman, 2010), market power concentration (Fernandez-stark *et al.*, 2011), and external factors like global market trends, trade policies, and climate change, influencing price volatility. Price stability is critical for smallholder farmers, as it ensures predictable income and incentivizes sustainable forest management (Abokyi, 2020), and can be promoted through strategies like market diversification, value addition, market information systems, and collective marketing (Fernandez-stark *et al.*, 2011).

Agroforestry is a farming practice that integrates trees into agricultural landscapes to promote ecological interactions and synergies between trees and crops (Pleininger *et al.*, 2020). It is an ancient practice that has been used for centuries in various parts of the world, particularly in tropical regions (Dagar & Tewari, 2017). Agroforestry is a farming system that involves the integration of arable crops with forest trees and/or livestock (Alao & Shuaibu, 2013). This system has many advantages; it promotes multiple benefits with increased biological production. Trees serve as feeds to livestock, the animal droppings serve as manure to forest trees. It also ensure reduction of hazards that are entwined with continued usage of fertilizers and other chemicals which might be harmful to the soil biomass as well as human being.

A major subset of value chain development work is concerned with ways of linking producers to companies, and hence into the value chains (Bamber *et al.*, 2014). While there are examples of fully integrated value chains that do not involve smallholders (e.g. Unilever operates tea estates and tea processing facilities in

Kenya and then blends and packs the tea in Europe before selling it as Lipton, Brooke Bond or PG Tips brands), the great bulk of agroforestry value chains involve sales to companies from independent farmers. Such arrangements frequently involve contract farming in which the farmer undertakes to supply agreed quantities of a crop or livestock product, based on the quality standards and delivery requirements of the purchaser, often at a price that is established in advance. Companies often also agree to support the farmer through input supply, land preparation, extension advice and transporting produce to their premises (Davis *et al.*, 2010).

3. METHODOLOGY

3.1. Study Area

The study area is Dandi, situated in Kamba Local Government Area of Kebbi State, Nigeria. It is located approximately on latitude 11.8442 N and longitude 3.8086 E. It shares a boundary with the Republic of Niger in the northern side and Benin Republic from its western side. It has a total landmass of about 2,003 Km square and a population of 144,273 (National Population Census, 2006). Agriculture and trade are the main economic activities of the inhabitant (Kebbi State statistical year book, 2007). Agriculture plays a vital role in the livelihoods of people in Dandi Local Government Area, encompassing the cultivation of diverse crops, including grains and onions. Other economic activities are fishing, animal husbandry, agroforestry, and trade, facilitated by numerous markets within the Local Government Area where the wide array of goods and services are exchanged between buyers and sellers (Dandi Local Government Area, 2023). The Local Government Area consists of 22 villages, and predominantly belonging to the Dandi ethnic sub-division of the Zarm-Songhai people. The population is made up of Hausa, Fulani and Zabarma, while Islam is the widely practiced religion in the area. Dandi Local Government Area experiences two well-defined seasons: the rainy season and the dry season. The dry season, in particular, is marked by scorching temperature of approximately 34℃ (Climate Change Dandi, 2023). The area maintains an average humidity level of around 15 percent. Its terrain is predominantly composed of dry and arid plains, accentuated by scattered hills and other elevations (Dandi Local Government Area, 2023).

3.2. Sampling Procedure

Purposive sampling was used to select three (3) villages within Dandi Local Government area, including Tunga maizuma, Mallenyero and Kamba, on the basis of availability of producers, marketers and consumers of some agroforestry tree products. Snowball sampling was used to identify 20 agroforestry farms across the villages for data collection. Five markets were selected purposively on the basis of availability marketers and consumers of the agroforestry tree products, the urban market is located approximately at latitude 11.847881 N longitude 3.668067 E known as new market, peri-urban markets (old market at latitude 11.848300N and longitude 3.651173E, Birni market at latitude 11.843052 N and longitude 3.641670 and Illela market at latitude 11.851889 N and longitiude 3.648614) and rural market (Tunga maizuma market) at latitude 11.851069N and longitude 3.651692E. Materials such as rubber, container, and airtight bag were used in the packaging of the products.

3.3. Data collection

The data for the research were collected from two sources; primary and secondary.

The primary data were obtained through face to face interview, where respondents were asked relevant questions that are consistent with the aim and objectives of the research. The data collected include agroforestry tree products, farm gate price, market channels price, local method of packaging, prices of improved/developed packaging and geographic locations of the markets. Transports cost, market fee, labor and equipment data were also collected to calculate the sale value of the products.

The secondary information was gathered from journals, internet, textbooks, and relevant past projects.

3.4. Data analysis

Data collected from this paper were subjected to descriptive statistics in form of tables, frequency, distribution, percentage and, gross margin analysis was also carried out on the sales value of the undeveloped and developed products.

4. RESULTS AND DISCUSSION

4.1. Sales value of agroforestry tree products

Table 1 reveals that a total of seven agroforestry tree products were used for the purpose of this research. Farm gate prices were used to calculate the sale value of the products, where the market fees, transport cost, labor and equipment fee were deducted from the total revenue earned by a farmer annually. The table shows that the farmer obtained little outcome from Vernonia amygdalina and more outcome from Phoenix dactilifera as it can be transform into different products including: date syrup, date drink and packaged date. Products like African fan palm, are heavy for transportation from the farm to markets, the cost of fuel for vehicle, the loading, unloading and handling products during transportation add to the expenses on the product.

According to Food and Agricultural organization (2017), longer transportation distances and times increase costs due to factors like fuel consumption, labor hours and potential spoilage. Indian jujube as observed in this research did not attract much profits for the farmers, due to picking of injured and spoilt ones which consumes time and energy, which lead to the increase of cost due to labor. This align with the study conducted by Food and Agricultural organization (2017) that labor costs can range from 30% to 60% of the final price of agroforestry products.

Table 1. Sales value of some agroforestry tree products using gross margin analysis

Products	Unit price (farm gate)	Quantity sold annually (revenue)	Variable cost	Sales value (revenue-variable cost)
Hyphaene thebaica	N6,000/bag	5 bags (30,000 Naira)	N12000	N18,000
Phoenix dactylifera	N2,500/mudu	56 mudu (140,000 naira)	N60,000	N80,000
Ziziphus mauritiana	N2,000/mudu	30 mudu (60,000 naira)	N45,000	N15,000
Moringa oliefera	N3,000/bag	25 bags (75000 naira)	N25,000	N50,000
Vernonia amygdalina	N1,500/bag	3 bags (4500 naira)	N500	N4,000
Adnasonia digitata	N700/pod	150 pods (105,000 naira)	N50,000	N55,000
Borassus aethopium	N4,500/bag	5 bags (22,500 naira)	N14,000	N8,500

Source: Field survey 2024

4.2. Market channel and price changes along the channels

Table 2 highlights the price changes along the channels due to development of the area, transport cost, the method of packaging employed by the farmers and marketers as well as labor input in the management of the products. Price increases as the products move from the farm gate to distant markets, which lead to the prices of the urban market being higher and also due to the development of the area. Intermediaries such as traders and wholesalers add their margins to the products price thereby increasing the final price. Study was conducted in Madhupur Sal forests area of Bangladesh in 2014, the study found that both agroforestry trees and crops have regulated a number of intermediaries which enhance value addition and created high marketing margins of product.

Additionally, trade policies, taxes, and subsidies also impact price changes along the market channel, changes in exchange rates also influence prices as Dandi is bordering Niger Republic and traders come in and out of the area especially on Sundays' where wide arrays of goods and services were bought and sold. Research by Malan (2015) examines the effect of export taxes on crop yields in Africa, finding that a decrease in taxation leads to an increase in productivity. A Study analyzes the impact of price distortions, including taxes and subsidies, on agricultural productivity in Africa, emphasizing the need for policy reform (Ezra, 2016).

Table 2. Comparison of prices along the market channels

Probability						
S/N	Source	Products	Average Farm gate price (Naira)	Market channel 1 (urban) price (Naira)	Market channel 2 (peri-urban) price (Naira)	Market channel 3 (rural) price (Naira)
1	Hyphaene tabaica	Doum palm (Bag)	6000	9000	8000	7000
2	Phoenix dactylifera	Date palm (Mudu)	2500	4000	3500	3000
3	Ziziphus mauritiana	Indian jujube (Mudu)	2000	3000	2700	2500
4	Moringa oleifera	Moringa (Bag)	3000	4000	3500	3300
5	Vernonia amygdalina	Bitter leaf (Bag)	1500	2000	1700	1600
6	Adansonia digitata	Baobab (Pod)	700	1000	800	750
7	Borassus aethiopum	African fan palm (Bag)	4500	6000	5500	5000

Source: Field survey 2024

4.3. Developing of value addition through packaging

Table 3 highlights that value was added to seven agroforestry tree products in the study area, where one drupe of doum palm was purchased at farm gate price at the price of N10 and three drupes were processed and packaged in an airtight bag and the price is 150 naira where each processed drupe of doum palm is N50, and one mudu of date palm purchased at the farm gate price of N2,500, was processed into 3 different products (date syrup, fresh date in airtight bag and rubber), a total of N9,000 was realized from the three products. Moringa purchased at the farm gate price of N1, 000/0.25bag, when processed (cooked) and packaged in a rubber attracted a revenue of N5, 000. Impliedly one bag of Moringa will produce a revenue of N20, 000. One pod of baobab was processed into baobab oil, tsami gaye (local way of processing baobab powder), and fresh baobab in rubber. A total of N3, 000 was realized. Indian jujube as observed in

Table 3 producers and marketers often do not get the expected profit due to the amount of labor, and consumption of time and energy. Farmers complain the price they received for the product is too low, making it difficult to cover production costs and generate decent income. Value was added to the product through drying the fruit making it a healthy snack, and the product was packaged following proper food safety guidelines to prevent contamination and ensure consumer safety, which attract a better price for the products. Studies have shown that packaging can significantly impacts the pricing of agroforestry tree products. For example, research on the marketing of agroforestry products highlights the importance of packaging in determining product prices, as it improved shelf life as well as enhancing appearance and marketability (Kurna & Shivakoti, 2017).

Table 3. Value addition of agroforestry tree products through packaging

S/N	Products	Quantity	Farm gate prices (Naira)	Developed/ packaged	New price (Naira)
1	Doum palm	1 Drupe	10	3 Drupes	150
2	Date palm	1 Mudu	2,500	1 Mudu	9000
3	Indian jujube	1 Mudu	2000	1 Mudu	3,500
4	Moringa	¼ Bag	1000	¼ Bag	5000
5	Bitter leaf	1 Bag	1,500	¼ Bag	2,500
6	Baobab	1 Pod	700	1 Pod	3000
7	African fan palm	1 Drupe	150	1 Drupe	200

Source: Field survey 2024

5. CONCLUSION

A well-developed value chain and stable market prices can contribute to the long term sustainable benefits of agroforestry tree products, benefiting both producers and consumers. Women who are the principal stakeholders can improve their socio-economic status through the value chain. It is also a way of ensuring the ecosystem balance. Value addition of agroforestry tree products in the area would help generate income, create employment opportunity, and alleviate hunger, poverty in the area while promoting sustainable agroforestry practices.

RECOMMENDATION

1. Local businesses and entrepreneurships should be encouraged to invest in the production and marketing of value-added agroforestry tree products by providing support and access to markets.

2. Value addition such as processing, packaging, and branding of agroforestry tree products like date syrup, packaged doum palm, packaged baobab should be promoted.

3. Provision should be made of infrastructure such as storage facilities, processing products and good transportation road that can facilitate the production and marketing of the value-added agroforestry tree products.

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