Assessment of profitability and efficiency analysis of watermelon (Citrullus lanatus) value chain in Yobe State, Nigeria

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Abstract
Purpose: An imperative step in enhancing investment returns for watermelon producers and marketers is to comprehensively analyze the watermelon value chain. This evaluation was recently conducted in Yobe State, Nigeria, during the period spanning from July to August 2023.

Research methodology: The data acquisition process involved the administration of a questionnaire that facilitated the gathering of information from 540 participants across various roles within the value chain, encompassing producers, wholesalers, and retailers operating within the study's geographic scope.

Results: The findings of this investigation illuminate the prevalent utilization of urban marketing channels by watermelon marketers, and it is noteworthy that approximately half of these marketers engage in their marketing endeavors within urban markets such as Kano, Kaduna, and Abuja. Notably, the study underscores the substantial impact of transportation costs on both the pricing and net marketing returns associated with watermelons. A significant proportion of these marketers were motivated primarily by the pursuit of sustainable livelihoods, while the allure of profitability drove others. However, a critical challenge encountered in the watermelon marketing domain pertains to the accessibility of credit facilities, which affects nearly 90% of the stakeholders involved in the value chain. Additionally, other constraints exerted relatively minor effects on marketers' activities and outcomes.

Limitations: This study was limited to data from 460 participants involved in various stages of the watermelon value chain in the study area from July to August 2023.

Contribution: This study can aid different actors in the watermelon value chain when making investment decisions.

Keywords: *Analysis, Profitability, Efficiency Value-chain, Marketers*

How to Cite: Olayinka, A. A., & Lawan, S. (2023). Assessment of profitability and efficiency analysis of watermelon (Citrullus lanatus) value chain in Yobe State, Nigeria, *Annals of Management and Organization Research,* 4(3), 225-237.

1. Introduction

Yobe State, situated in northeastern Nigeria, shares its borders with four Nigerian states and The Republic of Niger. Established in 1991, it encompasses an approximate land area of 45,502 square kilometres and houses a population of 2,231,339, according to national headcount data (Portal, 2006). The nomenclature "Yobe" is derived from the prominent geographical feature of River Yobe within the state. Yobe State comprises 17 Local Government Areas, which constitute our study area. The region has two primary vegetation zones: Sahel and Sudan Savannah. The duration of the rainy season diminishes as one moves from the southern to northern parts of the state. Hot and arid conditions characterize the prevailing climate for most of the year. The length of the wet season fluctuates across

different locales owing to the influence of diverse climatic factors such as rain-bearing wind patterns and topography. Generally, this rainy season lasts 120–140 days, declining in duration from south to north.

Yobe State boasts of considerable agricultural and mineral resources that remain largely untapped. Agriculture is the cornerstone of the state's economy, owing to its fertile soil, resulting in most of the active labor force engaging in farming activities. The principal agricultural products include food and cash crops, such as millet, sorghum, guinea corn, rice, wheat, onions, watermelon, tomatoes, red pepper, groundnuts, beans, cotton, sesame seeds, gum, Arabic, and livestock products. These items were cultivated by small-scale peasant farmers, herders, and fishermen. Notably, large-scale agricultural production processes are more frequent. Given the continually growing population in the state, the transformation of agricultural production processes and development of value chains can provide a steady source of income for fulfilling food requirements and supplying raw materials for industrial applications.

Despite its substantial resource endowment, the state is yet to fully harness the potential of processing agricultural commodities to enhance their market value. Munyawarara and Govender (2020) argue that Agricultural SMEs have remained the most important sector for reducing poverty and hunger; however, the traditional agricultural system in the state has reached its limits and is incapable of satisfying the escalating demand for food and agricultural products. It is imperative to transition from traditional production and marketing methods to more efficient cottages and large-scale value chains to attain self-sufficiency in food production and alleviate poverty. Effective utilization of the region's abundant resources, coupled with access to a sizable domestic market, can markedly improve the living standards of the rural population.

This research endeavors focused on assessing the profitability and efficiency of the watermelon value chain in Yobe State, providing valuable insights into the technical, marketing, and financial feasibility of investing in watermelon cultivation and trade, both at small and medium scales. The report conducts a comprehensive analysis of the marketing performance of watermelons, encompassing aspects such as the market structure, marketing margins, marketing efficiency, and overall profitability.

1.1. Problem Statement
Numerous studies have been conducted in Africa regarding watermelon production, with some focusing on the economic analysis of its production system (Adeoye, Odeleye, Babalola, & Afolayan, 2009), multi-peril insurance in its production (Nwankwo, 1999), and traditional knowledge concerning watermelon cultivation and usage in Mozambique (Munisse, Andersen, Jensen, & Christiansen, 2011). However, despite the existing body of research on watermelons, there is a conspicuous gap in our understanding of their marketing, profitability, and efficiency.

While Onyemauwa (2010) investigated the marketing margin and efficiency of watermelon in the Niger Delta, Nigeria, it is essential to note that his approach differed in terms of formula and sample group (marketers) and did not encompass the aspect of profit margins. This underscores the need for further research in Nigeria and Africa.

In Nigeria, watermelon production remains relatively low compared to that of the country's population (Santosh, 2017). However, the importance and challenges of watermelon production, its marketing margins, profitability, and economic viability are yet to be comprehensively examined. Additionally, there is a need for more knowledge regarding the marketing efficiency of various stakeholders in the watermelon value chain.

A feasibility study was conducted in Yobe State, Nigeria, which is renowned for its watermelon production, to address these gaps. This study aimed to evaluate the state's watermelon marketing value chain by considering key parameters, such as marketing margins, profit margins, and overall efficiency.

It is worth noting that there needs to be more awareness regarding the processing, storage, and marketing of agricultural commodities in the state, leading to exploitative practices by producers in producing agricultural produce. Moreover, the quantity and quality of research on the profitability and efficiency of agricultural commodities could be much better owing to inadequate funding, with the situation verging on collapse in the state. This research endeavor was undertaken to bridge these knowledge gaps and provide comprehensive insights into the technical, marketing, and financial viability of the watermelon industry in the country.

1.2. The objectives of the study
The general objective of this study was to understand how watermelons can be efficiently distributed to maximize economic returns to farmers and marketers.
1. To determine the cost and return of the watermelon value chain,
2. To determine marketing margins and marketing efficiency of watermelon value chain
3. Identifying constraints militating against the marketing of watermelons.

1.3. Research questions
The research questions were as follows.
1. How can the cost and returns of the watermelon value chain be determine
2. How can marketing margins and marketing efficiency of the watermelon value chain be determine
3. What are the constraints militating against the marketing of watermelon

1.4. Significance of the study
This study evaluated the profitability and operational effectiveness of participants within the watermelon supply chain in Yobe State, Nigeria. It successfully illustrated the financial sustainability, economic feasibility, and return on investment of both watermelon producers and intermediaries engaged in marketing. Additionally, the research provided insights into the marketing efficiency of various actors in the value chain and valuable recommendations for informed decision-making in the marketplace and policymakers.

2. Literature review
2.1. Watermelon value-chain as a sustainable livelihood strategy
Watermelon (Citrullus lanatus) belongs to the cucurbit family, Cucurbitaceae (Huh, Solmaz, Sari, & Pitrat, 2008). It is classified as a warm-season crop that shares botanical kinship with cantaloupe, squash, cucumber, and pumpkin (George et al., 2000). Watermelon is a significant horticultural crop, renowned for its sweet and juicy fruit, and cultivated commercially in regions with prolonged, frost-free warm climates worldwide (Jeffrey, 2001; Pitrat, Prohens, & Nuez, 2008). Baba, Yelwa, Yakubu, and Sanchi (2014) have highlighted that global watermelon consumption surpasses other cucurbit varieties. It is cherished as a fresh fruit in diverse regions, primarily for its refreshing qualities and numerous recognized nutritional benefits (Ajewole, 2015). Recently, there has been a substantial surge in the consumption of watermelon, transcending various socioeconomic strata.

Nigeria is a prominent watermelon producer in Africa, with most of the crops originating from the northern regions, notably Yobe State, owing to its favorable agroecological conditions. Nevertheless, with meticulous management, watermelon cultivation remains economically viable in other agroecological zones (Bosede, Olubunmi, & Balogun, 2012).

According to Anoke, Ngozi, Uchechukwu, and Joyce (2022), today's marketing is just the ability to satisfy customers' needs and wants irrespective of their location, and the distribution of watermelon to consumers is facilitated through marketing channels encompassing all operational stages involved in moving the produce from farms to end consumers. Marketing confers economic value by enhancing a product's form, time, and place utility, as noted by Asogwa and Okwoche (2012). Consequently, intensifying marketing activities for watermelons could offer more abundant and superior quality products at competitive prices to a broader consumer base. In turn, this empowers marketers to augment their income and enhance societal welfare.

Figure 1. Watermelon

Watermelon marketing possesses significant potential for bolstering agribusiness development and facilitating income and employment opportunities within the rural sector, particularly in producing states such as Yobe. The proficient execution of watermelon marketing is paramount in Nigeria as it contributes to self-sufficiency and ensures the consistent availability of watermelons throughout the year. Furthermore, watermelon marketing in Yobe State serves as an intervention strategy, enabling low-income individuals to supplement their earnings and secure sustainable livelihoods. Consequently, this report aims to provide watermelon marketers with invaluable insights into optimizing their marketing endeavors within the study area.

The marketing of crops in Nigeria grapples with issues of inefficiency and ineffectiveness, primarily attributable to deficiencies in market infrastructure, transportation, and pricing mechanisms (B Adakaren, Ahmadu, & Chidebelu, 2012; Onyemauwa, 2010). It is disconcerting that up to 30% of produce is lost during transportation from the point of origin to the final consumer (Gessesse 2009). Additionally, Ubani, Okonkwo, and Ade (2010) documented a pronounced surge in watermelon prices during off-seasons, which rarely translate into commensurate benefits for marketers, owing to the prevailing marketing structure characterized by intermediary collectors selling to retailers. A similar economic predicament plagues vegetable marketers due to the perishable nature of their products along the food supply chain, accentuated by inadequate storage facilities and suboptimal transportation to markets (Okonkwo, Ubani, Nwaubani, Otitodun, & Omoju, 2009). This phenomenon tends to transpire when an excess supply of products floods local and urban markets, thereby exerting downward pressure on product prices, marketer income, and overall profitability.

Notably, watermelon marketing in Nigeria holds the promise of profitability, provided that an efficacious distribution strategy is delineated to harness farmers' and marketers' full economic potential (Kassali, Aremu, & BA, 2015). Consequently, this study endeavors to provide a comprehensive financial analysis of watermelon marketing, shedding light on how stakeholders can optimize their returns within this sector.

Figure 2. Storage and transportation of Watermelon in Yobe State

3. Methodology

The profitability and efficiency of investments are measured by profit margins, as they depict the operating costs and expenses involved (Olayinka, 2022). Therefore, this study aims to assess the profitability and efficiency of the watermelon value chain in Nigeria. To achieve this objective, we conducted a comprehensive cross-sectional survey gathering data from 460 participants involved in various stages of the watermelon value chain. These participants comprised 146 producers, 154 wholesalers, and 160 retailers, representing a diverse sample from all 17 local government areas in Yobe State.

Table 1 presents the data collected through the survey. Our analysis employed parametric statistical methods, cost and return analysis, and various profitability ratios including market margin, operating ratio, gross ratio, rate of capital, and a regression model. Specifically, the gross margin analysis was utilized to evaluate small-scale enterprises' profitability, as Olukosi, Isitor, and Moses advocated in their work from 2007 (Olukosi, Isitor, & Ode, 2006).

Furthermore, operating ratio is a critical indicator directly associated with the use of variable inputs in farming operations. It is important to note that a lower active percentage signifies higher profitability in the farm business context.

Table 1. Questionnaire distributions and responses

	Zone A LGA: Gulani, Gujba Damaturu, Taramuwa, Bursari Geidam and Yunusari	Zone B LGA: Fika, Fune, Potiskum, Nangere	Zone C LGA: Machina, Nguru, Karasuwa, Bade, Yusufari and Jakusko
Questionnaire distributed (540)			
Producers	100	40	40
Wholesalers	100	40	40
Retailers	100	40	40
Total	300	120	120
Responses received (460)			
Producers	88	28	30
Wholesalers	90	30	34
Retailers	92	32	36
Total	270	90	100

Source: Author (August 2023)

The report revealed the presence of various participants in the watermelon value chain, each of whom played a distinct role within their respective channels. It has mainly focused on the producer-wholesaler-

retailer-consumer channel and analyzed marketing margins, shedding light on the profitability of this venture for all actors involved in the value chain.

Furthermore, this study has investigated the substantial impact of watermelon marketing margins on several critical aspects, notably access to credit, access to information regarding marketing channels, and labor costs. In doing so, it unearthed essential insights that can inform policy interventions to facilitate access to cost-effective credit facilities for participants in the watermelon value chain.

This research also serves to disseminate valuable information regarding watermelon marketing, ensuring that all actors within the value chain are well informed and equipped to make informed decisions regarding their marketing strategies.

Figure 3. Watermelon Market in Yobe State

4. Result and discussion
The socioeconomic characteristics of watermelon marketers displayed diversity, as shown in Table 1. Notably, most of these watermelon marketers were youthful, suggesting that they fell within the economically active age group.

Table 2. Socio-economic characteristics of the watermelon marketers

Age	Frequency	Percent
20–30	82	17.9
31–40	140	30.4
41–50	189	41.1
51–60	33	7.1
>60	16	3.6
Total	460	100.0
Mean = 40.6, SD = 9.1		
Min = 7.1, Max = 41.1		
Sex		
Male	394	85.7
Female	66	14.3
Total	460	100.0
Marital status		
Married	263	57.1
Single	197	42.9
Total	460	100.0

Household size			
1–4	205	44.6	
5–8	230	50.0	
>8	25	5.4	
Total	460	100.0	
Mean =	4.6,	SD = 2.6	
Min =	5.4,	max = 50	
Educational level			
No formal	115	25.0	
Primary	117	25.5	
Secondary	140	30.4	
Tertiary (diplomas, university degree)	66	7.1	
Total	460	100.0	
Association membership			
Yes	132	28.6	
No	328	71.4	
Total	460	100.0	

Source: Processed data (August 2023)

Marketing bulk commodities, such as watermelons, requires marketers to maintain physical fitness and exhibit a degree of assertiveness to achieve success. The majority of individuals engaged in marketing activities in this domain were male. This gender disparity arises from the physical demands inherent in watermelon marketing, which may present challenges for female marketers owing to potential differences in physical strength.

The demographic characteristics of these marketers revealed several noteworthy characteristics. Most were married and had moderately sized families, typically including young adults who could contribute to labor resources. Additionally, most marketers had educational backgrounds beyond primary school, indicating a reasonable level of literacy. This educational attainment can enhance their business acumen and positively impact profitability. Moreover, it may facilitate the adoption of innovation, new technologies, and technical skills to enhance crop yield.

Surprisingly, over half of the watermelon marketers were not affiliated with any marketing associations. This lack of association membership can adversely affect marketing performance. In terms of marketing channels, urban markets, including Kano, Kaduna, and Abuja, played a predominant role in the marketing activities of watermelon marketers, as shown in Table 3. Half of the marketers conducting marketing operations in the study area hailed from urban centers, while the remaining operated in towns within the state or local markets.

Table 3. Marketing channels available to watermelon marketers

Channel	Frequency	Percent	Mean	SE	T-statistic
Within the State	70	23.2	0.0893***	0.0384	2.32
Local market	80	26.8	0.5357***	0.0672	7.96
Urban market	150	50.0	0.8393***	0.0495	16.94
Total	56				100.0

***Significant at 1%.
Source: Processed data (August 2023)

The distribution of respondents based on the frequency of watermelon acquisition exhibited variability, as shown in Table 3. A noteworthy observation is that most marketers reported receiving watermelon

every week, with the timing dependent on the prevailing season and demand dynamics. This observation underscores the substantial and consistent demand for watermelons within the market.

Table 4. Respondent distribution by frequency of obtaining watermelons

Source	Frequency	Percent	Mean	SE	T-statistic
Biweekly	128	42.9	0.4289***	0.0667	6.42
Weekly	172	57.1	0.5714***	0.0667	8.56
Total	56				100.0

***Significant at 1%
Source: Processed data (August 2023)

Most marketers were driven to engage in watermelon marketing primarily as a means of securing their livelihoods. However, some individuals were motivated by the prospects of profitability, desire to diversify their income sources, and objective of fulfilling the community's nutritional needs, as indicated in Table 5. The economic benefits and opportunities to sustain their livelihoods are pivotal in motivating individuals to participate in watermelon marketing.

Table 5. Respondent motives for marketing watermelon

Reasons for marketing	Frequency	Percent	Mean	SE	T-statistic
Income diversification	16	5.4	0.0536*	0.0303	1.76
It is profitable	80	26.7	0.2679***	0.0597	4.49
Means of livelihood	204	67.9	0.6786***	0.0629	10.78
Total	300				100.0

* / *** significant at 10% / 1%, respectively
Source: Processed data (August 2023)

The expenditure related to watermelon represented nearly 50% of the overall marketing outlays. The remaining portions of the total marketing costs, transport expenses, handling charges, government daily market fees, and storage expenditures are detailed in Table 5.

Table 6. Cost and returns for an average watermelon marketer per month in the study area

Variable input	Total cost (Naira)	Average cost (Naira)	Percent
Fixed cost (FC)			
Cost of stall/shed	9,071,970.0	30,239.9	100
Total Fixed Cost (TFC)	9,071,970.0	30,239.9	
Variable cost			
Cost of watermelon	9,934,770.0	33,115.9	48.9
Handling cost	4,459,530.0	14,865.1	22.0
Market fee	1,431,120.0	4770.4	7.1
Storage cost	1,547,010.0	5156.7	7.6
Transport cost	2,915,670.0	9718.9	14.4
Total variable cost	3,242,851.0	67,627.0	
Total cost (TC)	26,659,470.0		
Total revenue (TR)			
Sales	59,744,460.0	199,148.20	
Marketing margin (TR-TC)	33,084,990.0	101,281.3	
Profitability ratios			
Operating ratio[a]	0.34		
Gross ratio[b]	0.49		
Rate of capital invested[c]	1.49		

[a]Operating ratio = total operating cost/net income.
[b]Gross Ratio = Total Expenses/Net Income.
[c] Rate of capital invested = gross margin/total variable cost.
Source: Processed data (August 2023)

Profitability ratios are the degree of income and earning capacity of an investment (Olayinka and Mustapha, 2022). Additionally, Eton, Fabian, and Eliab (2023) argued that profitability always serves as a barometer of business performance, and without it, no enterprise can stay in operation. Watermelon marketing demonstrates profitability, as evidenced by the substantial gross marketing margin of ₦101,281.30. This indicates that for every ₦1.00 invested in watermelon marketing, there is a return of ₦1.49. Moreover, the profitability ratios, specifically the gross and operating ratios, fall below one, signifying the profitability of the watermelon value chain business. This outcome contrasts with findings by Onyemauwa (2010), who highlighted the overall inefficiency of Nigeria's marketing system in the Niger Delta region. In our study, we observed a more favorable scenario in the profitability of watermelon marketing, underscoring regional variations in agricultural marketing efficiency within Nigeria.

Table 7. Market Conducts of Watermelon Marketers

Market Variables	Wholesalers Frequency	(%)	Retailers Frequency	(%)
Criteria for Purchase				
Absence of Spot	55	85.9	76	79.2
Absence of Harvest Wounds	62	96.9	93	94.8
Size of Watermelon	59	92.2	91	94.8
Colour of Watermelon	61	95.3	89	92.7
Strategies Used in Attracting Customers				
Sliced and Neatly Packaged	-	-	96	100
Attractively Displayed	56	87.5	96	100
Guaranteed Customers could Return	4	6.2	3	3.1
Different Sizes selected and Sorted	58	90.6	89	92.7
Strategies for Fixing Selling Price				
Arbitrary Price Fixing	4	6.2	7	7.3
Price based on the marketing costs	63	98.4	94	97.9
Price based on the Demand and Supply	49	76.6	80	83.3
Price Fixed by Trade Association	8	12.5	3	3.1
Means of Purchase from Producers				
Per Head / Watermelon Fruit	2	3.1	96	100
Heaps (100 Units of Watermelon)	63	98.4	7	7.3
Per Head and Heaps	59	92.2	13	13.5
Means of Selling to the Buyers				
Per watermelon Fruit	62	96.9	-	-
Heaps	2	1.6	96	100
Sliced and per watermelon Fruit	-	-	84	87.5
Sliced only	-	-	11	11.5

*Multiple responses were obtained.
Source: Processed data (August 2023)

Findings regarding customer attraction strategies revealed that most wholesalers (90.6%) diligently categorized watermelons based on their size. Conversely, all retailers (100%) adopted the approach of slicing watermelons into small cubes, carefully packaging them, and presenting them attractively in transparent containers to attract customers. Furthermore, it was observed that 87.5% of retailers combined selling watermelons per unit or whole fruits by slicing them into smaller cubes.

Table 6 presents the pricing techniques employed by the marketers. The results indicate that the predominant pricing strategy adopted by wholesalers (98.4%) and retailers (97.9%) involved setting prices after thoroughly considering watermelon's cost and associated marketing expenses. Additionally, watermelon prices were predominantly influenced by the market forces of supply and demand, often negotiated through bargaining. However, a minority of wholesalers (6.2%) and retailers (7.3%) resort to arbitrary price settings.

The choice of pricing strategies among marketers could be attributed to the availability of weighing scales or standardized measurement tools for various agricultural products. These findings align with those of previous studies conducted by Agbo and Usoroh (2015) and Adakaren (2017) in their examination of pricing strategies employed in marketing diverse agricultural products. Furthermore, the results indicate that most wholesalers (98.4%) acquired their products in bulk, typically purchasing hundreds of watermelons at once. This practice streamlined the pricing process for wholesalers and producers/local assemblers, as a standard price is typically applied to all watermelons within a heap. This trend can also be attributed to the substantial quantities of produce sold by producers to wholesalers.

However, all retailers (100%) procured watermelons on a per-unit basis, while only a small fraction (7.3%) made bulk purchases. The findings also revealed that, despite wholesalers buying in bulk, the majority (96.9%) sold watermelons per unit to retailers, with a mere 3.2% opting to sell in bulk to retailers. This pattern may be attributed to the fact that most retailers dealt with smaller quantities of watermelons, averaging approximately 60 watermelon balls per week. Additionally, a significant portion of watermelon retailers (87.5%) sold per unit further segmented their products by cutting watermelons into smaller pieces, offering them at more affordable prices. This practice accommodated a broader range of consumers as not all could afford an entire watermelon.

The constraints encountered in watermelon marketing vary, as shown in Table 8. The primary constraint identified was limited access to credit, affecting nearly 90% of the marketers. Other constraints had a marginal impact on marketers. These findings contrast with the observations of Santosh (2017), who emphasized the significant challenge of low prices offered by intermediary market players in watermelon marketing.

Table 8. Constraints of watermelon marketing

Constraint	Frequency (N = 460)	Percent
Access to information	21	7.14
Theft	38	12.50
Oversupply	48	16.07
Manpower	91	30.35
Storage	107	35.71
Spoilage	107	35.71
Transport	123	58.12
Credit access	267	89.28

[a]Values do not add up to 100% because of multiple responses.
Source: Processed data (August 2023)

Marketers require additional funding to support the distribution of watermelons in commodity markets. Over half of the sellers encountered difficulties in transporting their produce to the sales point, resulting in significant losses. However, the unwieldy size of watermelons has mitigated theft concerns. Roughly one-third of sellers faced challenges related to storage facilities, leaving their products continuously exposed to direct sunlight and elevated temperatures. This exposure poses the risk of accelerating physiological damage and diminishing the shelf-life of watermelons.

Furthermore, an interesting finding from our analysis is that watermelon marketers' years spent in school hurt the net marketing margin, as shown in Table 8. This phenomenon could be attributed to the low demand for specialized marketing skills in the watermelon trade. As individuals attain higher levels of education, their desire to engage in watermelon marketing appears to diminish. This observation contradicts the assertion made by Nwankwo in 1999, who suggested that higher educational attainment enhances one's business acumen and the ability to seize entrepreneurial opportunities and advantages.

Table 9. Determinants of net marketing margin of watermelon marketers

Variable	Coefficient	SE	T-statistic
Sex	0.0623165	0.2793333	0.22
The Year spent in school	-0.0318559***	0.0110206	-2.89
Household size	0.0470569 0.	0370989	1.27
Access to marketing information	0.0319542***	0.0102746	3.11
Experience in marketing	-0.0126762	0.0236017	-0.58
Constant	5.781211	0.5639611	10.25

F(5, 50)	= 2.59
Prob > F	= 0.0366
R-squared	= 0.2060
Adj R-squared	= 0.1266

***Significant at 1%.

With ample market information, watermelon marketers have successfully formulated effective marketing strategies to significantly bolster their economic gains. This outcome contradicts Adakaren's (2014) assertion that agricultural marketing information is scarce in Nigeria, hindering informed decision-making among producers, consumers, marketers, and other stakeholders. A deep understanding of market dynamics, encompassing demand and supply dynamics, and pricing structures across various markets, has emerged as a pivotal factor contributing to the observed enhancement in profitability.

5. Conclusion
This research endeavor, which assesses profitability and efficiency within the watermelon value chain in Yobe State, Nigeria, provides critical insights into the competitive, efficient, and profitable aspects of watermelon businesses within the region. Despite the acknowledged economic viability of this enterprise in the study area, discernible inefficiencies are observed.

The report highlights that the watermelon industry needs to exemplify competitive market behavior, characterized by a pronounced concentration of sales by a limited number of marketers, accompanied by unequal income distribution among these stakeholders. Notably, the market, particularly at the retail level, lacks significant restrictions, although certain constraints are identified in selected wholesale markets.

Notably, wholesalers enjoy a higher marketing margin and net marketing income than retailers. Nonetheless, all intermediaries within the value chain share a substantial portion of their marketing margin and net marketing income. This underscores the potential for watermelon marketing to meaningfully contribute to poverty alleviation, particularly within the context of Nigeria's prevailing economic challenges and restructuring. The study further reveals that net marketing income is influenced by factors such as production costs, transportation expenses, packaging outlays, storage costs, access to market information, and marketers' educational attainment.

The primary constraints impeding watermelon marketers in the study area include perishability of the product, transportation challenges, limited access to credit facilities, fluctuations in pricing, seasonality, and a deficiency in preservation facilities. Consequently, the government must formulate policies to mitigate and address these marketing constraints at various levels in conjunction with the engagement of Non-Governmental Organizations (NGOs).

In light of these findings, this report provides the following recommendations.
1. Banks and other financial institutions should enhance the accessibility of credit facilities to watermelon marketers at favorable interest rates. This measure alleviates financial constraints for marketers and offers employment opportunities to the unemployed.
2. Transportation costs, which significantly impact prices and net marketing returns, require governmental initiatives to improve infrastructure, particularly road networks. Additionally, the

government should consider the establishment of railways connecting the northern regions, known for their abundant supply of vegetables and fruits to the southeastern states, thereby relieving pressure on road transportation.

3. Encouraging the formation of cooperatives among watermelon marketers would ameliorate financial obstacles and reduce transportation expenses incurred in moving watermelons from production areas to the study location.

4. Government intervention in constructing modern ample market stalls is imperative to foster a conducive and hygienic environment for marketers. Accessibility to these stalls should be prioritized to facilitate the efficient transportation and evacuation of products.

5. Empowering market intermediaries with enhanced technical knowledge and marketing skills through training is essential for making the marketing system more responsive to consumer demands.

6. Urgent policy initiatives by government entities at all levels, in conjunction with NGOs, are indispensable for enhancing and bolstering the watermelon trading business, thereby uplifting rural livelihoods and alleviating poverty within the study area.

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