



RESEARCH ARTICLE

Gross Margin Performance and Marketing Efficiency of Beef across Delta State Abattoir, Open Market, Meat Shop and Hotel Distribution Channels

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ABSTRACT

This study evaluated the gross margin performance and marketing efficiency of four beef distribution channels in Delta State, Nigeria: abattoirs, open markets, meat shops, and hotels. A proportional random sample of 320 respondents was drawn from four purposively selected Local Government Areas (LGAs). Gross margin analysis and Acharya's Modified Measure of Marketing Efficiency (MME) were employed to estimate profitability and marketing efficiency across the distribution channels. The findings revealed significant variations in average total revenue and gross margins among the channels. Abattoirs recorded the highest gross margin percentage (39.7%), while hotels exhibited the highest marketing efficiency index (1.56). The major constraints contributing to cost inefficiency and value loss included inadequate storage facilities, high operating costs, limited access to credit, and poor handling equipment. The study recommends policies and interventions aimed at reducing operational costs, improving storage and hygiene infrastructure, enhancing access to credit, and strengthening business management capacity among beef marketers. These measures are expected to improve competitiveness, increase profitability, and enhance overall value-chain efficiency in the beef marketing sector.

Keywords: Gross margin performance; Marketing efficiency; Abattoirs; Hotels; Meat shops; Open markets.

1.0 Introduction

Agriculture has long been recognized as a cornerstone of Nigeria's economy. However, decades of inadequate investment and policy neglect constrained the sector's productivity and limited its contribution to national food security. In response, the Federal Government introduced the Agricultural Transformation Agenda (ATA) in 2010 under President Goodluck Jonathan, repositioning agriculture as a business-driven sector and promoting greater private-sector participation. Although the ATA stimulated significant reforms, subsequent assessments revealed persistent challenges, including high food import dependence, limited access to finance, and weak agricultural value-chain integration (FMARD, 2018; Paul, 2018). To address these shortcomings, the Agricultural Promotion Policy (APP) was launched in 2016 with the objective of developing a sustainable agribusiness economy capable of ensuring food security, promoting exports, and generating employment opportunities (Premium Times, 2020).

Within this policy framework, the livestock subsector, particularly the beef industry, occupies a strategic position in Nigeria's agricultural economy. The industry provides livelihoods for millions of people, including pastoralists, processors, wholesalers, butchers, transporters, and retailers, while also contributing substantially to household nutrition and national economic growth (Odoemena, Walters, & Kleemann, 2020). Rising demand for animal protein further highlights the importance of the sector. Meat consumption in Africa is projected to increase significantly by 2050, with Nigeria remaining one of the continent's largest consumers of beef and poultry products (ILRI, 2017; NBS, 2016).

Despite its economic importance, the beef industry continues to face numerous marketing and distribution challenges. Previous studies have identified poor infrastructure, inadequate market information systems, limited access to credit facilities, and weak institutional support as major constraints affecting livestock marketing efficiency (Ouma et al., 2019; Alary et al., 2018). Similarly, Grace et al. (2020) emphasized the need for improved sanitary standards, cold-chain facilities, and meat handling practices to satisfy the quality requirements of urban and export markets. In Nigeria, studies by Adebayo (2017) and Yusuf and Abiola (2019) reported that high transaction costs, fragmented supply chains, inadequate storage facilities, and limited value-addition activities reduce profitability and competitiveness within the beef marketing system.

Marketing efficiency is widely recognized as an important indicator of market performance because it reflects the effectiveness with which resources are utilized in moving products from producers to consumers. According to Erie (2015), a highly efficient market minimizes marketing costs while maximizing value creation and returns to market participants. Conversely, low marketing efficiency often signals structural deficiencies, excessive transaction costs, resource wastage, and poor coordination among actors within the value chain. Consequently, assessing the efficiency of beef marketing channels is essential for improving both producer and consumer welfare and for supporting national agricultural development objectives.

In addition to marketing efficiency, gross margin performance provides a useful measure of profitability among market participants. Gross margin analysis enables the comparison of returns across different distribution channels by examining the relationship between revenues earned and variable costs incurred. Differences in gross margins may reflect variations in marketing practices, operating costs, market access, consumer preferences, and value-addition activities across marketing outlets.

Although several studies have examined livestock marketing in Nigeria, limited empirical evidence exists on the comparative gross margin performance and marketing efficiency of specific beef distribution channels. Delta State presents an important case study because beef is distributed through multiple outlets, including abattoirs, open markets, meat shops, and hotels, each characterized by distinct operational structures, pricing mechanisms, customer segments, and cost profiles. Understanding the profitability and efficiency of these channels is essential for identifying areas of resource loss and opportunities for improving value-chain performance.

This study was therefore designed to evaluate the gross margin performance and marketing efficiency of major beef distribution channels in Delta State. Specifically, the study sought to:

- i. evaluate the gross margin performance of abattoirs, open markets, meat shops, and hotel distribution channels in Delta State;
- ii. assess the marketing efficiency of these distribution channels and identify sources of cost inefficiency and value loss; and
- iii. identify the operational constraints affecting profitability and marketing efficiency among beef marketers.

The findings of this study are expected to contribute to a better understanding of the performance of beef marketing channels in Nigeria. The study will provide useful information for policymakers, investors, development agencies, and other stakeholders seeking to enhance value-chain competitiveness, improve food security, increase employment opportunities, and promote sustainable agribusiness development within the livestock sector.

2.0 Materials and Methods

2.1 Study Area

The study was conducted in Delta State, Nigeria, which occupies a total land area of approximately 16,842 km². The average annual rainfall ranges from about 266.5 mm in some coastal areas to approximately 1,905 mm in the northern parts of the state. Rainfall is usually heaviest in July, while temperature generally increases from the southern to the northern region of the state.

Historically, Delta State was part of Nigeria's former Western Region. It became a separate state on 27 August 1991, having previously formed part of the former Midwestern State (1963-1976) and Bendel State (1976-1991). At its creation, the state consisted of twelve Local Government Areas (LGAs). This number increased to nineteen LGAs on 27 September 1991 and was further expanded to twenty-five LGAs in 1997.

Asaba, the state capital, is located at the northern end of Delta State. It occupies an estimated land area of 762 km² and lies within the western Niger Delta region along the Gulf of Guinea on the Atlantic coast. The state has a coastline of approximately 167 km. These geographical and climatic characteristics support diverse agricultural and livestock marketing activities within the state (Delta State Ministry of Agriculture and Natural Resources, 2011).

2.2 Population and Sampling Procedure

The population for the study comprised actors engaged in beef marketing through abattoirs, open markets, meat shops, and hotels in Delta State. Information obtained from the Delta State Beef Marketing Association indicated that there were approximately 1,595 beef marketers operating within the state at the time of the study.

A multistage sampling procedure was adopted for the study. First, four Local Government Areas (LGAs) were selected from the twenty-five LGAs in Delta State using a simple random sampling technique. Second, a purposive sampling technique was employed to select one abattoir, one open market, one meat shop, and one hotel from each selected LGA. The selection was based on the prominence of beef marketing activities within the areas.

The sample size was determined using the Taro Yamane formula. Thereafter, a proportional random sampling technique was employed to select a total of 320 respondents across the four marketing channels: abattoirs, open markets, meat shops, and hotels. Table 1 presents the distribution of respondents across the selected marketing channels.

Taro Yamane Formula of Sample Size Determination:

$$n = \frac{N}{1+N(e)^2} \quad (\text{Puszczak et al, 2013}).$$

Where: n = Sample size

N = Population size (1595)

e = Limit of tolerance error

With a significance level of 95% degree of tolerance level (i.e. 0.05).

Mathematically, the sample size is calculated as follows:

Sample size for beef marketers = $1 + 1595 (0.05)^2$ = approximately 320

2.3 Data Collection and Analysis

Recognizing that not all actors involved in beef marketing in Delta State were literate, the study adopted a mixed data collection approach. Structured questionnaires were administered to literate respondents, while oral interviews were conducted for respondents who could not read or write. This approach ensured inclusiveness and facilitated comprehensive coverage of all categories of participants across the various beef marketing channels.

Data collected from the respondents were analyzed using descriptive statistics, gross margin analysis (GMA), and Acharya's Modified Measure of Marketing Efficiency (MME). Descriptive statistics, including frequencies, percentages, means, and ranking scales, were used to summarize respondents' socioeconomic characteristics and identify operational constraints affecting beef marketing. Gross margin analysis was employed to estimate profitability across the marketing channels, while the Modified Measure of Marketing Efficiency was used to assess the efficiency of the various distribution channels.

2.4 Model Specifications

(a) Gross Margin Analysis

Gross Margin Analysis (GMA) was used to determine the profitability of beef marketing across the selected distribution channels. Gross margin was estimated as the difference between total revenue and total variable costs incurred by marketers. The gross margin model is specified as follows:

$$GM = TR - TVC$$

Where:

GM = Gross Margin (₦)

TR = Total Revenue (₦)

TVC = Total Variable Cost (₦)

A positive gross margin indicates profitability, while a negative gross margin suggests that variable costs exceeded revenue during the marketing period.

(b) Archarya MME

$$MME = \frac{RP}{MC + MM} \quad (\text{Archarya, 1988})$$

Where:

(b) Acharya's Modified Measure of Marketing Efficiency (MME)

Marketing efficiency was assessed using Acharya's Modified Measure of Marketing Efficiency (MME), expressed as:

Where:

MME = Modified Measure of Marketing Efficiency

RP = Retailer's selling price (consumer price) (₦)

MC = Total marketing cost (₦), including transportation, storage, handling, processing, and other related marketing expenses

MM = Marketing margin (₦), representing the profits earned by intermediaries in the marketing channel

The Modified Measure of Marketing Efficiency compares the value paid by consumers with the combined marketing costs and margins incurred along the distribution channel. The efficiency of the marketing system was interpreted as follows:

$MME > 1$: Efficient marketing system, indicating that the consumer price exceeds the combined marketing costs and margins.

$MME = 1$: Break-even efficiency, indicating that the consumer price is just sufficient to cover marketing costs and margins.

$MME < 1$: Inefficient marketing system, indicating that marketing costs and margins are disproportionately high relative to the consumer price.

This model was employed to evaluate and compare the relative efficiency of beef marketing across the selected distribution channels in Delta State.

3.0 Results and Discussion

Objective I: Evaluation of Gross Margin Performance Across Abattoir, Open Market, Meat Shop, and Hotel Distribution Channels in Delta State

Table 2 presents the major gross margin indicators for the four distribution channels. The results reveal notable variations in revenue, cost structure, and profitability across the channels. Purchase costs and transportation expenses constituted the largest components of marketing costs across all channels. Although abattoirs recorded the highest average sales volume, they did not generate the highest revenue per transaction. In contrast, hotels generated the highest average revenue despite handling relatively lower sales volumes.

Volume and Gross Margin Performance

Abattoirs handled the highest average quantity of beef (350.6 kg) and recorded the highest absolute gross margin (₦176,041.50). However, hotels and meat shops achieved higher revenue per unit and stronger gross margin ratios than open markets. This finding suggests that value addition through processing, preparation, improved presentation, and premium pricing strategies enables hotels and meat shops to generate higher returns despite operating at lower sales volumes.

Cost Structure

Purchase costs represented the largest expense across all marketing channels. Hotels incurred the highest purchase costs, possibly due to the procurement of higher-quality beef or reliance on relatively more expensive supply sources. Transportation costs also constituted a significant component of total

marketing costs and had a greater effect on channels with relatively lower profit margins, particularly open markets.

Channel Heterogeneity

The variation in gross margin percentages, ranging from 30.1% to 39.7%, indicates differences in pricing power, service quality, operational efficiency, and cost absorption capacity across the channels. Although abattoirs recorded the highest absolute gross margin, their comparatively lower revenue per unit suggests that they benefit primarily from economies of scale rather than downstream value addition. Hotels, on the other hand, appear to achieve greater value capture through service differentiation and premium pricing.

These findings demonstrate that profitability within the beef marketing system is influenced not only by sales volume but also by the ability of marketers to create and capture additional value.

Objective II: Assessment of Marketing Efficiency

Table 3 presents the marketing efficiency indices for the selected beef distribution channels using Acharya's Modified Measure of Marketing Efficiency (MME). The results indicate that hotels (1.56) and meat shops (1.35) were the most efficient marketing channels, whereas abattoirs (1.24) and open markets (1.20) exhibited relatively lower efficiency levels.

The hotel channel recorded the highest efficiency index, suggesting that it was most effective in converting marketing costs and intermediary margins into consumer value. This superior performance may be attributed to better coordination, higher-quality services, stronger price realization, and greater value addition. Similarly, meat shops demonstrated relatively high efficiency despite not recording the highest consumer prices.

Although the abattoir channel recorded the highest consumer price, its efficiency level was lower due to relatively high marketing costs and operating expenses. Open markets were the least efficient channels, indicating that traditional retail outlets may incur higher relative costs compared with the value generated through their marketing activities.

Overall, the findings suggest that hotels and meat shops operate more efficiently because they combine value-added services with effective cost management. In contrast, abattoirs and open markets face higher transaction costs and operational inefficiencies, which reduce their overall marketing efficiency.

The results further indicate that marketing efficiency tends to decline as marketing costs and intermediary margins increase. Channels that effectively coordinate logistics, improve product quality, and add value to products are more likely to achieve higher efficiency levels even when operating costs are relatively high.

Objective III: Identification of Operational Constraints Driving Cost Inefficiency and Value Loss

Table 4 presents the key operational constraints identified in the study, which include: inadequate storage facilities, high marketing and operating costs, limited access to credit, inadequate equipment and infrastructure, poor market information systems, weak business management skills, and poor hygiene and handling practices

The results show that inadequate storage and cold-chain facilities (mean = 6.19) constituted the most severe constraint. Poor storage facilities increase spoilage, accelerate quality deterioration, force distress sales, and ultimately raise the effective cost per unit of beef marketed.

High operational costs and limited access to finance were also identified as major constraints. These factors restrict marketers' ability to invest in modern equipment, storage facilities, and hygiene improvements, thereby perpetuating inefficiencies, particularly among open-market traders and abattoir operators.

Information and managerial skill deficiencies were equally important constraints (3.84). Limited access to market information reduces marketers' ability to optimize procurement decisions, negotiate favorable prices, and adopt efficient business practices. Similarly, inadequate managerial capacity may result in poor record-keeping, inefficient resource allocation, and weak cost control mechanisms.

Furthermore, high purchase costs directly reduce profitability, particularly when marketers are unable to transfer increased costs to consumers through higher selling prices. Transportation and handling costs also erode gross margins, especially in channels characterized by relatively low per-unit revenues. Fragmented supply chains and weak market coordination increase transaction costs and contribute to price inefficiencies that disadvantage both producers and consumers. Poor handling and storage practices further exacerbate post-harvest losses, reducing the quantity and quality of beef available for sale and lowering realized revenues. These constraints represent the major sources of inefficiency and value loss within the beef marketing channels.

The mean scores were computed for each constraint across all respondents and were rated using a seven-point Likert scale ranging from 1 to 7. The magnitude of the mean score reflected the perceived severity of the constraint.

Higher mean scores indicate more severe constraints, greater inefficiency, and a higher likelihood of value loss.

Lower mean scores indicate less severe constraints and relatively lower impacts on marketing performance.

Taken together, the findings provide a strong basis for targeted interventions aimed at improving profitability, reducing marketing costs, and enhancing value-chain performance in Delta State's beef marketing sector.

4.0 Conclusion

The study demonstrated significant variations in gross margin performance and marketing efficiency across the major beef distribution channels in Delta State. Abattoirs achieved the highest gross margins in absolute terms due to their large sales volumes, while hotels and meat shops generated greater value per unit of beef marketed and exhibited higher levels of marketing efficiency.

The relatively lower efficiency observed among abattoirs and open markets reflects challenges associated with inadequate storage facilities, high transportation and handling costs, weak market information systems, and limited value addition. Conversely, hotels and meat shops were better positioned to capture value through improved product presentation, service delivery, and pricing strategies.

Addressing key constraints such as inadequate storage facilities, transportation costs, limited access to finance, poor handling equipment, and weak information systems would improve market performance substantially. Such interventions would reduce post-harvest losses, increase marketers' incomes, lower marketing costs, and improve consumers' access to safe, high-quality beef. Consequently, strengthening these areas is essential for enhancing gross margin performance, improving marketing efficiency, and promoting the sustainable development of the beef value chain in Delta State.

5.0 Recommendations

1. Develop cold-storage facilities in major abattoirs and open markets. The establishment of targeted cold-storage infrastructure will reduce spoilage, minimize post-harvest losses, extend product shelf life, and improve price realization.
2. Promote cooperative transportation systems among beef marketers. Encouraging marketers to form transportation cooperatives or syndicates will reduce per-unit transportation costs through cost sharing and route optimization.
3. Strengthen market information systems. Affordable mobile-based platforms such as SMS and WhatsApp information services should be established to disseminate real-time market prices, demand trends, and supply information, thereby reducing information asymmetry and transaction costs.
4. Improve access to affordable credit and equipment financing. Partnerships between marketers, microfinance institutions, and agribusiness lenders should be encouraged to facilitate investment in cold rooms, meat-processing equipment, and hygienic handling tools.
5. Implement training and capacity-building programmes. Regular training in meat handling, quality grading, hygiene management, record-keeping, cost control, and business management should be organized to improve operational efficiency and profitability among beef marketers.

Table 1: Sample Distribution

Channels	Population	Sample
Abattoir	420	106
Open Market	895	154
Meat Shop	145	36
Hotel	132	24
Total	1595	320

Table 2: Gross Margin Performance across Channels

Channel	Average quantity sold (kg)	Purchase cost (₦)	Total revenue (₦)	Gross margin (₦, %)
Abattoir	350.6	255,000	379,650	176,041.5; 39.7%
Open market	288.3	247,000	384,450	111,365.9; 30.1%
Meat shop	250.5	253,200	436,650	127,620.6; 32.5%
Hotel	230.7	264,150	459,210	150,149.1; 35.3%

Table 3: Marketing Efficiency

Channel	RP (₦)	MC (₦)	MM (₦)	Acharya Efficiency (MME)	Efficiency Rank
Abattoir	12,270.4	5,453.42	3,635.6	1.24	3
Open market	9,472.8	4,736.4	3,157.6	1.20	4
Meat shop	9,693.0	4,308.0	2,872.0	1.35	2
Hotel	10,800.7	4,154.1	2,769.4	1.56	1

Table 4: Operational Constraints that Drive Cost Inefficiency and Value Loss

Constraint	Mean	Scale
Inadequate storage facilities	6.19	7
High operational costs	5.21	6
Limited access to credit	4.83	5
Lack of handling/grading equipment	3.98	4
Inadequate market information	3.84	3
Weak business planning/management skills	3.77	2
Unhygienic market environment	3.62	1

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Competing interests

The author, Dr. Kentus N. Tibi contributed to the study conception and design. Material preparation, data collection and analysis were performed by all he authors, the draft of the manuscript was written by Dr. Kentus Tibi. All the authors, Dr. Kentus Tibi, Dr. Romanus Nwadiolu and Dr. Davina Okumpe read through and approve the manuscript.

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