

Analysis of profitability of shrimp value chain in Delta State, Nigeria

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Abstract: This study investigated the profitability of shrimp value chain. Primary data were obtained using well structured questionnaire from randomly selected 240 shrimp operators (harvesters, processors and marketers). Descriptive and inferential statistical tools were used to analyze collected data. The result revealed that the mean profit realized was N70,092 N36,255 and N26,097.30 by harvesters, processors and marketers respectively. Value added at was N500 and N1000 per basket by processors and marketers respectively. Test of hypothesis indicates that quantity sold (0.218), price (0.033), bargaining power (0.002) and union dues (0.099), showed positive and significant relationship with shrimp value chain profitability. While market levy and store rent showed negative relationship with profitability in shrimp value chain. It was recommended that there should be moderate store rent. Marketers should increase their bargaining power at the point of procurement and union dues should be reduced so that shrimp value chain profitability can be enhanced.

Keywords: Profitability, constraints, shrimps, value chain, Delta State

INTRODUCTION

The beginning of shrimp farming is unknown. Some say shrimp farming began in China while others say it began in Japan. There are 600,000 people employed in shrimp cultivation; and industry earns \$301 million per year, (GOB, 2002).

The aquaculture industry has grown significantly over the years, although its full potential has not yet been realized. More and speedy development is required to keep up with the growth in demand for shrimps in the world. Nigeria is among tropical countries endowed with rich shrimp resources. According to Dublin-Green and Tobor (1992), the coastal waters of Nigeria are characterized by abundance of important living resources including shrimps, predominantly members of the family penaeidae. With a production capacity of 12,000 metric tons (MT) per year, Nigeria's shrimps supply is presently from capture fisheries. Increasing human population and the soaring per capita demand for shrimp has created a demand-supply gap.

Nigeria is one of the countries with abundance natural supply of Shrimps with an annual production of 12,000 metric tons. However, with the decline in global wide capture there is a need to supplement production

with Shrimps aquaculture and Nigeria is regarded as a potential frontier in Shrimp farming because of its numerous coastal and mangrove areas. Fish including shrimp provide 22% of the protein intake in Sub-Saharan Africa, and has been dubbed "rich food for poor people" (Bene and Heck 2005).

Shrimp value chain has been recognized to perform critical role in economic development of nations, including Nigeria; consequently, many reforms are being carried out to develop agricultural value chain in Nigeria. Such reforms, as it relates to shrimp value chain would produce or generate very little or no outcome unless an extensive empirical study is conducted to described the shrimp value chain, by identifying the relevant socio-economic characteristics of actors and actions in the chain.

As it stands, efforts must be made to analyze the profitability in the shrimp value chain. This is because profit is the reward for business activities. There is the need to find out whether or not the profit earned by actors in shrimp value chain justified the efforts and cost invested in the business.

It is a common knowledge that the shrimp value chain is operated numerous economic agents

producers, processor, marketers etc and they earn different levels of profit in the process. Before now there is no study to the best of my knowledge that analyzed the profit differentials in the shrimp value chain in the study area. Analyzing the profit differentials in the chain will shed some light on the sustainability of the value chain over time and space. Profit is the motivation for doing business and where it is evenly distributed in a value chain system the operators, will be happy to continue to operate in their various lines of specialization.

Sustainable profit in the shrimp value chain could be subject to some exogenous factors. The assumptions underlying the relationship between profitability and the underlying factors are yet to be investigated and ascertain. The knowledge of these underlying factors could be used to predict the profitability in shrimp value chain with relative certainty.

Furthermore, the shrimp value chain like other value chain, could be impaired by some constraints. It is important to identify these constraints for the purpose of isolating the more serious ones for appropriate policy actions that can improve the shrimp value chain in the study area.

This is obvious from the fact that shrimp market holds daily in the area. The greater percentage of the local people depends on the shrimp industry for their livelihood (some as producers, marketers and transporters). The shrimp industry contributes to the quality and quantity of protein consumed by the citizenry.

Despite the significance of the shrimp industry, there is no study conducted to assess the level of profitability or otherwise of this venture. This necessitates a comprehensive study on the shrimp value chain in the study area. The empirical information on profitability and constraints is useful to investors in the shrimp value chain (shrimp harvesters, processors, marketers, credit administrators) by identifying problem areas, prospects and potential areas of improvements.

The broad objective of the study is to analyze the profitability and constraints of shrimp value chain in Delta State, Nigeria. The specific objectives of the study are to: ascertain the level of profitability in shrimp value chain

- i. compare the level of profit earned by the actors in the shrimp value chain in study area
- ii. Assess the value added in shrimp value chain in the study area.
- iii. determine the factors that influenced profitability in shrimp value chain

The following hypotheses were formulated and tested to guide the study:

Ho₁: There is no significant difference in the profitability among actors in shrimp value chain.

Ho₂: The selected market indicators do not have significant effect on profitability in the shrimp value chain

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

Concept of value chain

The value chain analysis involves breaking an industry business chain into its constituent parts for better understanding of its structure and functioning. "The analysis consists of identifying chain actors at each stage, their functions and relationships; determining the chain governance, to facilitate chain formation and strengthening; and identifying value adding activities in the chain and assigning costs and value added to each of those activities" (UNIDO, 2009). According to [Kaplinsky and Morris \(2001\)](#), "The value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use".

Value chains provide the framework for designing and implementing many development programs and projects. Given a multitude of different arenas of application, geographical locations, commodity types, target groups and desired outcomes, a variety of closely related conceptualizations of value chains has emerged (Stamm and Von Drachenfels 2011). For the purpose of this study, we define a value chain as "the full range of activities and services required to bring shrimp from its farmers for sale to its final markets" (Microlinks 2012). A value chain, thus, encompasses the entire network of actor's involved input supply, production, processing, marketing and consumption.

Analytical Framework

Value chains analytical framework provides a valuable visual framework for understanding the structural connective tissue linking small scale shrimp farmers with input suppliers, processors, traders and final consumers.

MATERIALS AND METHODS

Study Area

The study was conducted in Delta State, Nigeria. This study area was chosen for the study because there is a good number of people who base their

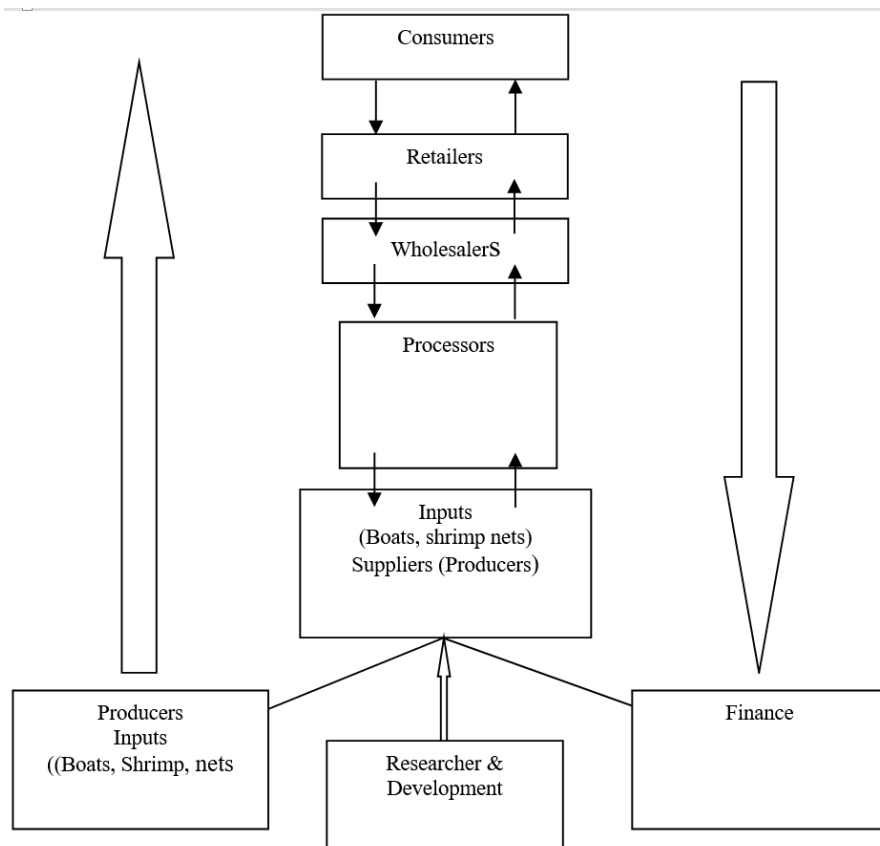


Figure 1. A value chain marketing system (Source: Research in US (RIU) undated)

livelihood on shrimp related business in the area. It has an estimated land area of 1,722 km² and lies between latitudes 5°28'59.7" N and longitude 5°44'04.6" E population of one hundred and sixteen thousand six hundred and eighty-one (116,681) from the census of 2006 (NPC 2006) but this population has grown since then. Delta State is home to the Urhobos, Isoko Warri and Itsekiri entropic group in. The Ijaw inhabit Ogbeloh, Gbaramatu, Isaba and diebiri communities while the Itsekiris inhabit the Ugborodo and Madangho communities. The popular languages spoken by the people are English, Urhobo, Isoko, Ijaw and Itsekiri. It is located in the mangrove swamp forest of Delta State with rainfall ranging from about 2500mm – 2800mm per annual. The Economic activities in Area are growing of crops like maize, plantain and vegetables. However, fishing activities including shrimp production is the dominant economic activity of the people.

Population of the Study

The population for the study is all the operators or actors such as shrimp producers, processors and

marketers in the shrimp value chain in the study area.

Sampling Techniques and Sample Size

A multiple sampling techniques were used for study. First, snow ball technique was used to get the key informants. Key informants were interviewed such as the shrimp producers, processor and marketers. The essence is to obtain the list of registered shrimp marketers (sampling frame).

Secondly, sampling frame (a list of operators) were considered. From this list, systematic sampling technique was employed to draw the sample of 240 respondents. The respondents were sampled as follows. Six communities were involved in the study. In each community, 10shrimp producers, 10 processor and 20 marketers were sampled. This gave a total of 240 respondents.

Methods of Data Collection

Primary data were used for the study. Questionnaire was used to collect data. The questionnaire was made of

five parts; socio-economic characteristics of operators in the shrimp value chain. Level of profitability earned in the shrimp value chain, constraints by the actors in the shrimp value chain. Factor influencing the profitability in the shrimp value chain.

Methods of Data Analysis Techniques

The data for this study were analyzed using both descriptive and inferential statistics.

Objective I: Ascertain the level of profitability in shrimp value chain

This objectives was achieved using profit function as stated below

$$Ni = TR - TC \dots\dots\dots(1)$$

Where:

Ni = Net income (naira)

TR = Total revenue (naira)

TC = Total cost (total variable cost + total fixed cost)

Objective II: Compare the level of profit earned by the actors in the shrimp value chain in study area. This objective was achieved using Analysis of variance (ANOVA) of profit.

Objective III: Determine the factors that influenced profitability in shrimp value chain. This objective will be achieved using ordinary least square technique of multiple regression.

Model Specification

The implicitly form of multiple regression model takes the form

$$Y = f(X_1, X_2, \dots, X_n) + \mu \dots\dots\dots(2)$$

The explicit form of the linear function takes the form:

Linear Function

$$NP = \beta_0 + \beta_1 QTY + \beta_2 TRP + \beta_3 DIS + \beta_4 PRC + \beta_5 MKL + \beta_6 STR + \beta_7 WES + \beta_8 CMM + \beta_9 COP + \beta_{10} UND + \beta_{11} BGP + \mu \dots\dots\dots (3)$$

Semi – log Function

$$NP = \log \beta_0 + \beta_1 \log QTY + \beta_2 \log TRP + \beta_3 \log DIS + \beta_4 \log PRC + \beta_5 \log MKL + \beta_6 \log STR + \beta_7 \log WES + \beta_8 \log CMM + \beta_9 \log COP + \beta_{10} \log UND + \beta_{11} \log BGP + \mu \dots\dots\dots (4)$$

Double log Function

$$\log NP = \log \beta_0 + \beta_1 \log QTY + \beta_2 \log TRP + \beta_3 \log DIS + \beta_4 \log PRC + \beta_5 \log MKL + \beta_6 \log STR + \beta_7 \log WES + \beta_8 \log CMM + \beta_9 \log COP + \beta_{10} \log UND + \beta_{11} \log BGP + \mu \dots\dots\dots (5)$$

Where:

NP = Net profit (₦)

QTY = Quantity of shrimp produced, processed, and traded (basket)

TRP = Transportation cost (₦)

DIS = Distance to the nearest buyer (km)

PRC = price of shrimp/basket (₦)

MKL = Market Levy (₦)

STR = Store rent (₦)

WGS = Wages (₦)

CMM = Communication (₦)

COP = Cost of Packaging (₦)

UND = Union Dues (₦)

BGP = Bargaining power (rating from strong to weak)

μ = Stochastic Error term

β_0 = Constant or Intercept term

$\beta_1 - \beta_{11}$ = Regression co-efficient of respective variables

RESULTS AND DISCUSSION

The result showed the profitability among shrimp value chain operators . The different profit earned by the (producers, processors, marketers). The highest profit earned by the actors in the shrimp value chain is the production in Table 1.

Value added in shrimp value chain in the study area

The result showed the value addition at the different levels of the value chain the Table.2.

The analysis of variance (Anova) (ANOVA) indicates that there is significant different at the level of profit earned by the operators in the shrimp value chain (producers, processors and marketers). The null hypothesis which states that there is no significant difference in the level of profit, in the shrimp value chain is reject and the alternative hypotheses which states that there is significant difference in the level of profitability among operators in the shrimp value chain is accepted. This finding implies that different operators perform different functions and as a result profit earned vary significantly in the value chain.

Table 5 shows the result of the relationship between dependent variables. Shrimp value chain and the independent variable. Shrimp value chain. The shrimp

value chain (quality sold, price, market levy, store rent and bargaining power). The Linear model was chosen as the best model because it has highest R² value of 0.513 (51%). This implies that 51% of variation in profit earned by operators in shrimp value chain was explained by the joint effect of the exogenous variables in the model.

Testing of Hypothesis

H₀: *The selected social-economic variables do not have significant effect on the profitability in the shrimp value chain.*

The null hypothesis which states that the selected socio- economic variables do not have significant effect on the profitability in shrimp value chain in Delta state was rejected and the alternative accepted. It indicates that five (5) selected shrimp operators; quantity sold (.027) *** (-68992.465), price (033)*** (23439.717), store rent (015)*** (-015.931), bargaining power (002)*** (68036.162) and union dues (009)*** (42272.222) showed positive and significant relationship with profit earned by operators in the shrimp value chain in Delta state. While market levy paid by operator in the shrimp value chain showed a negative relationship with the profit earned by operators in shrimp value chain.

At this point, the results of the statistical significance of the individual explanatory variables in the model are discussed as follows.

Quantity Sold

The result of the study showed that quantity sold. (0.027)*** has a positive and a significant relationship with profitability of the shrimp value chain in Delta state. The Beta weight as seen in the Table 5 showed that quantity sold (with B = 68992.456:P < 0.001) is a positive predictor of profitability in the value chain. The positive value of beta coefficient indicates that an increase in the quality sold will also lead an increase in profitability in the value chain.

Price

The result of the study showed that price (0.033)*** has a positive and a significant relationship with the profitability of shrimp value chain in Delta state. The Beta Weight as seen in the Table 5 showed that price (with B = 23439.717:P< 0.001) is a positive predictor of profitability of the value chain. The positive value of Beta coefficient, indicate that an increase in the price, price will also lead an increase in the profit earned by operators in the value chain. Price is an important

Table 1. Distribution of Descriptive statistics of profit among shrimp value operation

| Operators | Total | Mean | Min | Maximum |
|------------|------------|------------|---------|----------|
| Producers | ₦2,803,700 | ₦70,092.50 | ₦22,400 | ₦108,100 |
| Processors | ₦1,450,200 | ₦36,255. | ₦22,800 | ₦65,700 |
| Marketers | ₦107,892 | ₦36,97.30 | ₦10,800 | ₦59,300 |

Table 2. Distribution of value Addition per basket in shrimp value chain in the study aria

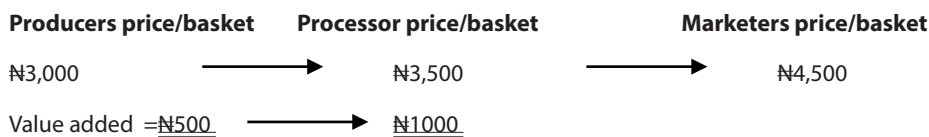


Table 3: ANOVA Test of Significant Difference in Profit among actors in shrimp value chain

| Source of Variation | SS | df | Ms | F | P-value | F crit |
|---------------------|----------|-----|----------|----------|-------------|----------|
| Between Groups | 4.42E+10 | 2 | 2.21E+10 | 71.10319 | 6.174E-21** | 3.073763 |
| Within Groups | 3.64E+10 | 117 | 3.11E+08 | | | |
| Total | 8.06E+10 | 119 | | | | |

Table 4: Constraints in shrimp value chain in Delta state, Nigeria

| | Variables | Total | Mid point | Remark |
|---|---|-------|-----------|-------------|
| A | Inadequate finance | 55.7 | 4.64 | Serious |
| B | Inadequate access to market | 339 | 2.82 | Not serious |
| C | Low price of shrimp | 328 | 2.73 | Not serious |
| D | Lack of fishing inputs | 346 | 2.88 | Not serious |
| E | Lack of storage processing facilities | 409 | 3.40 | Serious |
| F | Availability of working capital | 419 | 3.49 | Serious |
| G | Dictate price based on local market | 429 | 3.59 | Serious |
| H | Adulteration | 296 | 2.46 | Not serious |
| I | Inadequate government regulatory measure in the value chain | 196 | 1.63 | Not serious |
| J | Quality of shrimp supplied in terms of size | 313 | 2.60 | Not serious |
| k | Variation and adulteration | 355 | 2.96 | Not serious |
| i | Inadequate technology and knowledge transfer also operation | 232 | 1.93 | Not serious |
| m | Lack of co-ordination in the value chain | 288 | 2.40 | Not serious |

- a. Inadequate Facilities:** The result indicates that inadequate facility is a serious constraint in the study area in shrimp business. This is so because mid-point (4.64) and is greater than the cut-off (3.00).
- b. Inadequate access to Market:** The finding indicates that inadequate access to market is not a serious constraint in the study area in the shrimp business. This is so because the mid-point is (2.82) and is lesser than the cut-off (3.00).
- c. Low Price of Shrimp:** The finding indicates that low price of shrimp is not a serious constraint in the study area in the shrimp business. This is so because the mid-point is (2.73) and is lesser than the cut-off (3.00).
- d. Lack of Fishing Inputs:** The result indicate that lack of fishing inputs is not a serious constraint in the study area in the mid-point is (2.88) and is less than the cut-off (3.00).
- e. Lack of Storage Processing Facilities:** The result shows that lack of storage processing facilities is a serious constraint in the study area in the shrimp business. This is so because the mid-point (3.40) and is greater than the cut-off (3.00).
- f. Availability of Working Capital:** The result indicate that availability of working capital is a serious constraint in the shrimp business. This is so because the mid-point is (3.49) and is less than the cut-off (3.00)
- g. Dictate Price based on local Market:** The result indicate that dictate price based on local market is a serious constraint in the shrimp business because the mid-point is (3.57) and is greater than (3.00).
- h. Adulteration:** The result indicates that Adulteration is not a serious constraint in the shrimp business in the study area, because the mid-point is (2.46) and less than (3.000).
- i. Inadequate government regulatory Measure in the Value Chain:** The finding indicates that inadequate government regulatory measures in the value chain is not serious constraint in the study area because the mid-point is (1.63) and is less than (3.00).
- j. Quality of Shrimp Supplied in term of size:** The result indicates that quality of shrimp supplied in terms of size is not a serious constraint because the mid-point (2.60) and is less than (3.00).
- k. Variation and Adulteration:** The finding shows that variation and adulteration is not a serious constraint because the mid-point (2.96) and is less than (3.00).
- l. Inadequate Technology and Knowledge Transfer among Operators:** The finding indicates that this constraint is not serious in the shrimp business because the mid-point is (1.93) and less than (3.00).
- m. Lack of Co-ordination in the Value Chain:** The finding indicates that lack of co-ordination is not a serious constraint in the shrimp business in the study area because the mid-point (2.40) and is less than (3.00).

Table 5. Factors that influenced profitability in shrimp value chain

Model Summary

| Model | R | R ² | Adjusted R ² | Standard error | |
|-------------------|-----------------------------|----------------|--------------------------|----------------|--------|
| Linear | .716a | .513 | .342 | 12.33936 | |
| Semi log | .696a | .484 | .329 | 26741.82096 | |
| Double log | .677a | .458 | .296 | .62505 | |
| Linear Regression | Sum of square | Df | Mean of square | F | Sig |
| | 142740452102 | 7 | 2039149315.74 | 3.007 | .025 |
| Residual | 13563461575.5 | 20 | 678173078.775 | | |
| | 27837506788.7 | 27 | | | |
| Model | Unstandardized coefficients | | Standardized coefficient | t-cal | Sig |
| | B | Std.Error | Beta | | |
| (Constant) | -165067.824 | 129847.812 | | -1.271 | .218 |
| Quantity sold | -68992.456 | 28846.330 | -.840 | -2.392 | .027** |
| Price | 23439.717 | 10208.634 | .560 | 2.296 | .033** |
| Market levy | -10191.801 | 41301.807 | -.058 | -2.47 | .808 |
| Store rent | -53015.931 | 19994.711 | -.802 | -2.651 | .015** |
| Bargaining power | 68036.162 | 19047.043 | 1.311 | 3.572 | .002** |
| Union dues | 42272.222 | 14489.949 | .610 | 2.913 | .009** |

- a. dependent variable: Net profit
- b. predictors: quantity sold, price, market level

store rent, bargaining power

*** = significant at 1%.

component of a marketing plan as it determines firm's profit and survival. Consumers tend to buy more from marketers whose products are cheap. And so, if the price of the shrimp is too high, consumers tends to buy less which will turn affect the sales return of the business. The more flexible, proper and better the shrimp marketers uses pricing strategy, the higher their sales revenue.

Store Rent

The result of the study showed that store rent (0.015)*** has a negative and significant relationship with the operator's profit in the shrimp value chain in Delta state. The beta weight as seen in the Table 5 showed that store rent (With B= -53015.931:P< 0.001) is a negative predictor of profitability of actors in the value chain. The negative value of the coefficient

indicates that an increase in the store rent will lead also a decrease in the profit of actors in shrimp value chain. Operators should not pay too much on store rent especially, considering the size of their businesses because high store rent tends to increase total cost of doing business thereby reducing net profit earned.

Bargaining Power

The result of the study shows that bargaining power (0.002)*** has a positive significant relationship with the profit earned by shrimp value chain operators in Delta state. The beta weight as seen in Table 5 shows that Bargaining power (With B = 36.162: P < 0.001) is a positive predictor of the profitability of actors in the value chain. The positive value of beta coefficient indicates that 36.162% increase in the bargaining power will lead also a 1% increase in the profitability in the

shrimp value chain. Bargaining power is an important economic concept that measures the ability of trading parties in negotiation to influence each other. It is an important profit predictor because trading parties with higher bargaining power enjoys better leverage.

Union Dues

The result of the study showed that union dues has a positive and significant relationship with the shrimp operators in the value chain in Delta state. The beta weight as seen in Table 5 showed that union dues (with $\beta = 72.222$, $P < 0.001$) is a positive predictor of profitability of operators in the value chain. It indicates that an increase in the union dues will also lead an increase in profit of operators in the shrimp value chain. Union dues are the cost of membership to belong to shrimp market union. The dues paid to the union by its membership help to pay for the cost of their activities, education or events engaged in by the union members. Being a member of shrimp market union protects the operator's operational existence. Human Resources Information, (2010) had earlier emphasized that union dues are unreimbursed employee expenses necessary for union membership maintenance.

CONCLUSION

This study analyzed shrimp value chain in the study

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- area Delta state. The study identified three major actors in the shrimp value. They are shrimp producers/farmers, shrimp processors and shrimp marketers. Shrimp value chain producers mean profit (N70,092.50), minimum (N22,400) and maximum (N708,100) for processor mean profit (N36,255) minimum (N22,800) and the maximum (N65,700) marketer (N26,97.30) minimum (N10,800) and maximum (N59,300). The profitability of shrimp value chain was influenced by quantity sold (0.027)*** price (0.003*** store rent (0.015)*** bargaining power (0.002)*** union dues (0.007)*** if these factors are taken care of, the shrimp value chain in Delta State Nigeria will improve. The study suggests that to ensure steady improvement and survival of shrimp value chain the industries the identified constraints such as inadequate finance, lack of storage facilities and inadequate working capital should be taken care of by the relevant stakeholder in shrimp value chain.
- On the basis of the findings, the following recommendations were made:
1. There should be moderate store rent, marketers should increase their bargaining power at the point of procurement and union dues should be reduced.
 2. Shrimp marketers should add processing activities to their operations, so as to enhance their profit level substantially.
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