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PRICE TRANSMISSION AND HOUSEHOLDS DEMAND ELASTICITY FOR FROZEN FISH UNDER FUEL SUBSIDY REFORM IN DELTA STATE, NIGERIA

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Abstract

Fuel subsidy removal is assumed to translate to general increase in the cost of operating business such as fish marketing. The response of price of fish and corresponding demand elasticity are welfare issues worthy of investigation in Nigeria. The present study evaluates price transmission in fish marketing system by analysing the response of fish market indices to fuel subsidy reform in Nigeria. Primary data collected with structured questionnaire from purposively selected 78 frozen fish marketers, were analysed with descriptive statistics and regression model. A test of hypothesis shows a significant price transmission of about 100% ($P < 0.05$). Marketing cost increased by 31.8% and profitability dropped by 24.20%, confirming negative effect of new price regime. The result further revealed a 0.05% drop in quantity of frozen fish demanded by households. It was recommended that economic measures should be introduced by the government to cushion the effect of fuel policy removal.

Keyword: *Fish Marketing, Policy Reform, Fuel Subsidy, Price Transmission, Elasticity*

1. Introduction

Marketing can be defined as the delivery of consumer's satisfaction at a profit. It is a set of business activities and processes that involve creating, communicating, and delivering of value to customers and for managing customer relationships in ways that benefits the organization and its stakeholders. Marketing chain is the link between the producers and the consumers (American Marketing Association, 2010).

Achoja (2005) observed in a separate study that the efficiency of marketing channel depends mainly on the distance covered and transport cost incurred by marketers. Marketing costs linearly correlates with transport cost. It is a linear function of the average market radius (average distance from procurement center to consumption center).

Price transmission is the process in which upstream prices affect downstream prices in a marketing chain. Upstream prices should be thought of in terms of main input prices or prices quoted on higher market levels (wholesale markets). Accordingly, downstream prices should be thought of in terms of output prices or prices quoted on lower market levels (Meyer, *et al.*, 2004). Price transmission involves the transfer of price from the producer to the consumer. Subsidy is a price intervention policy or an austerity measure whereby financial assistance are granted by a government for the purpose of promoting public welfare (Ebewore, 2012).

Fish is one of the major sources of protein. There is very great need for protein in the human diet. Because of increase in population growth, the need for the supply of fish protein in the diet of people particularly in the developing countries (Tobor, 1990), becomes very paramount and topical in hunger reduction debates in this millennium.

Due to the subsidy reform introduced in Nigeria, the cost of performing marketing function of frozen fish is assumed to have been affected through increase in transportation cost. Shimang (2005), related marketing cost to changes in the transfer cost of transportation, processing and preservation.

The stakeholders in the marketing of frozen fish in Delta State include the marketers and the consumers. Marketing chain of frozen fish involves a number of marketing agents such as wholesalers, retailers, (middlemen) and ultimate consumers. It is believed that as the product (frozen fish) flows through the marketing chain, there are value additions. Value additions could be influenced by a variety of factors. Inflationary trend caused by subsidy reduction is assumed to increase in the cost frozen fish marketing, profit earned by marketers and quantity of fish purchased and consumed by households. It is important to investigate the influence of fuel subsidy reform on the marketing chain of frozen fish in the study area.

Despite the significance of the fish industry in the economy of Nigeria, no research effort has been conducted to assess the impact of the current fuel subsidy scenario on the fish industry. This necessitates a comprehensive study of the performance of the frozen fish industry especially since subsidy reduction policy came on board in Nigeria. It is believed that the findings of the study would help policy makers to evaluate the effects of the subsidy reduction on frozen fish marketers and consuming households in Nigeria.

Investigating the effects of subsidy reduction on marketing cost, profitability and household demand elasticity in frozen fish marketing chain is therefore an important research puzzle that would call for parliative measures.

The broad objective of the study is to investigate the effects of the current fuel subsidy reform on price transmission and household demand elasticity for frozen fish in Nigeria. The specific objectives of the study were:

- to examine the effect of fuel subsidy reform on price transmission pattern in the marketing of frozen fish in the study area.
- to evaluate the response of marketing cost to subsidy reform in the study area.
- to assess the effect of subsidy removal on the profitability in frozen fish marketing.
- to ascertain households demand elasticity for frozen fish under the new subsidy regime .

The following null research hypotheses were formulated to guide the study:

H₀₁: Fuel subsidy reform has no significant effect on price transmission in the marketing of frozen fish.

H₀₂: Fuel subsidy reform has no significant effect on the marketing cost of frozen fish.

H₀₃: Subsidy reduction has no significant effect on households demand elasticity for frozen fish in the study area.

2. Theoretical Framework

This study was predicated on two theories. They are:

- The price theory
- The price transmission theory

Price theory deals with the allocation of resources among different uses, the price of one item in relation to another. It shows the value of an item relative to another in an economic system. One of the functions of price in an economic system is that it transmits information, it provides incentives to consumers of resources to be guided by this information, and it also

provides incentive to owners of resources to follow this information. Price theory is concerned with the transfer of value in an economic system. Thus theory underpinning price transfer under various fuel subsidy reform, could be explained from the stand point of the transfer of value for rendering economic services under different price regimes. Change in the price of energy is assumed to affect the goods and services produced by the energy (fuel). The transfer of this cost through the marketing chain gives rise to price transmission.

Price transmission refers to the effect of prices at one end of a market on prices at other ends of a market. It is generally measured in terms of the transmission elasticity, defined as the percentage change in the price at one end of a market given a 1% change in the price at the other ends of the market (Minot, 2010). Fuel subsidy reform has led to an Asymmetric price transmission. Thus price transmission is important from the welfare point of view (Meyer & Von Cramon–Taubadel, 2004). The adjustment of price shocks along the chain from producer to wholesaler and to retail levels, and vice-versa is an important characteristic of the functioning of markets. As such, the process of price transmission through the supply chain has long attracted the attention of agricultural economists as well as policy makers. An implication of this asymmetry in price transmission, if it exists, is that price policy reform, because the reduction in farm prices might not be immediately or fully transmitted to final consumers (Aguero, 2004)

It should be noted that market power might be an important explanation for any evidence of asymmetries in price transmission, but it may not be the only casual factor that is incomplete or asymmetric price transmission may take place for a number of reasons such as market structures and it cannot simply be concluded that presence of asymmetric price transmission implies market power (Pavel Vavra, 2005).

3. Materials and Methods

3.1. Study Area, Sampling Procedure and Data Collection Techniques

The study was carried out in Delta state Nigeria in 2012. The area was chosen for the study because it has a very large number of frozen fish marketers. The population of the study includes all frozen fish marketers in Delta state, Nigeria. Purposive sampling technique was used to select sample for the study because there was no list of fish marketers available at the time of the study. Only the marketers that met the objectives of the study were selected for the study. Seventy-eighty respondents were used for the study. Primary data were obtained using structured questionnaire.

3.2 Methods of Data Analysis

3.2.1 Price Transmission Pattern in the Marketing of Frozen Fish

This study provides empirical evidence on the nature of farm-retail price. Short interval (monthly) data was used. The markup pricing model of Heien was deemed most appropriate to analyze price transmission. Assuming competitive conditions, fixed proportions technology, and constant returns to scale (CRTS) in the frozen fish marketing system, a pricing rule of the following general form is obtained:

$$R_p = \beta_p + e_i \quad (1)$$

Where;

R_p = Retail price/unit

β_1 = Price coefficients

F_p = Farm gate price/unit

3.2.2 Response of Marketing Costs to Fuel Subsidy Policy Reform

Response of frozen fish marketing costs to fuel subsidy policy reform was evaluated by comparing the percentage change in marketing costs with percentage change in fuel price due to policy reform as follows:

$$\frac{\text{Percentage change in fuel price} = \text{change in fuel price}}{\text{fuel price before policy reform}} \times \frac{100}{1} \quad (2)$$

$$\frac{\text{Percentage change in marketing costs} = \text{change in marketing costs}}{\text{marketing costs before policy reform}} \times \frac{100}{1} \quad (3)$$

3.2.3. Effect of Fuel Subsidy Reform on the Profitability of Frozen Fish Marketing

Equations 5 and 6 show the causality of price regimes occasioned by fuel subsidy reform on the profitability in frozen fish marketing in Nigeria.

$$\pi = F (P_B, P_A) \quad (4)$$

$$\pi = \beta_0 + \beta_1 P_B + \beta_2 P_A + ei \quad (5)$$

Where:

π = Change in profit

P_B = Frozen fish price before subsidy reform

P_A = Frozen fish price after subsidy reform

β_0 = Constant

$\beta_1 - \beta_2$ = Coefficient of price regimes before and after fuel subsidy reform.

3.2.4 Households Demand Elasticity for Frozen Fish under Fuel Subsidy Reform

The change in consumer demand for frozen fish was used as a measure of households welfare response to fuel subsidy reform. This was captured using price elasticity of demand for frozen fish. The relevant equation is given as:

$$D_{EP} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} \quad (6)$$

Where:

ΔQ = Mean change in quantity of frozen fish demanded per unit price per period (i.e. difference in quantity demanded before and after zero subsidy).

ΔP = Change in unit price of frozen fish before and after subsidy removal.

Q = Quantity demanded before subsidy removal.

P = Unit Price before subsidy removal.

3.25. Hypothesis Testing

H_{01} : There is no significant difference between marketing cost before and after subsidy reform

The above hypothesis was tested using T-test as stated below:

$$t = \frac{MC_B - MC_A}{\sqrt{\frac{V_{MCA}}{n_A} + \frac{V_{MCB}}{n_B}}} \quad (7)$$

Where:

MC_B = Marketing cost before subsidy reform

MC_A = Marketing cost after subsidy reform

V_{MCB} and V_{MCA} = Variance of Marketing cost before and after fuel subsidy policy reform

Ho₂: There is no significant difference between profit before and after fuel subsidy policy reform

The above hypothesis was tested using T-test .

4. Results and Discussion

4.1. Price Transmission Pattern in Frozen Fish Marketing.

The price transmission pattern in frozen fish marketing is shown in equations 8 and 9. Equation 9 shows the causality of price transmission in fish marketing channel.

$$R_p = \beta_0 + \beta_1 F_p + e_i \quad (8)$$

$$R_p = 490.065 + 1.010 F_p + e_i \quad (9)$$

(4.672) (60.546)

Where:

R_p = retail price

β₀ = constant

β₁ = coefficient of farm gate price

F_p = Farm gate

e_i = error term.

The result of the study shows that retail price (R_p) has a positive and significant response (co-integration) with the farm gate price (F_p) of frozen fish. This implies that wholesale price is a response to price signals from farm gate price and retail price depends on wholesale price signals. This result implies that transaction costs are transferred in the frozen fish marketing chain. This means that there is increase in marketing cost due to fuel subsidy reduction at every stage of the market. But the costs are completely transferred to the ultimate consumer of frozen fish. The coefficient of farm gate price of .01 indicates an approximate speed of price transmission of 100%. This result is in line with normal economic theory that is applied to the operation of marketing system.

4.2. Response of Marketing Costs to Fuel Subsidy Policy Reform

The result of the response of marketing costs to fuel subsidy policy reform is represented below;

Ho₁: *There is no significant difference in marketing cost before and after subsidy reform.*

Table 1. T. test difference in marketing cost before and after subsidy reform

Price Regime	No	Medan	Standard Deviation	T-Valu e	Profitability level	Remark
Before subsidy reform	78	19095.13	29593.647	-0.983	0.327	significant
After subsidy reform	78	25086.67	44959.571			

Source: Field survey, 2012

This hypothesis was tested using T-statistics as shown in Table 1. The result shows that there is a negative and significant relationship between mean marketing costs before and after subsidy reform. The result shows that the mean cost of 1 carton of frozen fish was ₦19,095 before subsidy reform and after subsidy reduction, the price rose to ₦25,086. The percentage effect of fuel subsidy reform on the marketing cost of frozen fish was evaluated to be:

$$\frac{\text{₦}5991.54}{\text{₦}19095.13} \times \frac{100}{1}$$

$$= 31.38\%$$

Percentage increase in fuel price/litre is:

$$\frac{\text{₦}97 - \text{₦}65}{\text{₦}65} \times \frac{100}{1}$$

$$= 49\%$$

Table 2. T-test showing difference in profit

Price Regime	No	Mean profit	Standard deviation	E-value	Profitability level	Remark
Before subsidy reform	78	145071.54	65272.678	3.048	0.003	Significant
After subsidy reform	78	109964.62	78026.177			

Source: Field Survey, 2012.

The percentage increase in fuel price/litre is 49%, and this did not translate to a proportionate increase in frozen fish marketing cost. In other words, the percentage increase in marketing costs is less than percentage increase in fuel price. The difference or short fall of 16.22% is evident in the study. This implies that an increase in price of fuel due to policy reform does not automatically translates to proportionate increase in the cost of rendering

marketing services. In other words, the percentage increase in marketing costs is less than percentage increase in fuel price. To that extent, it is obvious in the study that transportation cost is the marketing cost item that responded to fuel price policy reform. There are marketing cost items that were not directly affected by the fuel policy reform.

4.3. Response of Profitability in Frozen Fish Marketing to Fuel Subsidy Reform.

The effect of fuel price reform on the profitability of frozen fish marketing was determined by T-test of statistical difference of mean profit before and after fuel subsidy reform. The difference in the mean profit arising from fuel subsidy reform is ₦145, 071.54 minus ₦109, 964.62. (i.e. ₦35, 106.92) The percentage fall in mean net profit is 24.20%. The decrease in profitability is attributable to increase in operational cost of marketing frozen fish in the study area. This is however, less than 48% increase in the fuel price due to subsidy reform. This result implies that although subsidy reform increased fuel price by 48%, this translates to less than proportionate decrease (24.20%) in average net return to frozen fish marketing in the study area.

4.4. Effect of Fuel Price Reform on the Profitability of Frozen Fish Marketing.

$$\pi = \beta_0 + \beta_1 P_B + \beta_2 P_A + U \tag{10}$$

$$\pi = 106.399.027 + 23.8888499 P_B + 18.190 P_A + U \tag{11}$$

(4.341635) (0.884036) (-0.77307)

The output of regression model in equation 11, shows the effect of counter factual price regimes i.e. price before and after subsidy reform on profitability in frozen fish marketing business. The price coefficients in the model implies that the price regime after subsidy reduction has negative effect on profitability of frozen fish marketers while the price regime before the subsidy reduction contributed positively to profitability in frozen fish business. The overall implication of this result is that fuel subsidy reform could negatively influence the price regime in frozen fish marketing. When fuel subsidy is reduced, fish marketing cost (transaction cost) will increase accordingly, thus creating an adverse effect on profit earned by marketers. Profit is the incentive for operating marketing business. The fall in profit is not statistically significant (P>0.05) to discourage fish marketing business in the study area.

4.5. Households Demand Elasticity for Frozen Fish under Fuel Subsidy Reform.

Consumer demand elasticity for frozen fish under fuel subsidy reform is presented in equation 13.

$$Q_d = \beta_0 + R_p + \mu \tag{12}$$

$$Q_d = 73.00 - 0.005 + \mu \tag{13}$$

(3.25) (-1.54)

Where:

- Q_d = Quantity demanded
- R_p = retail price
- μ = error term

The result of the study indicates that a 1% increase in the price of frozen fish due to subsidy reform leads to 0.05% fall in quantity demanded. Price elasticity of demand for frozen fish is relatively elastic under fuel subsidy policy reform. This implies that with increase in price of frozen fish due to subsidy reform, quantity of frozen fish demanded by consumers responded negatively to increasing price, thereby creating negative effect on households welfare with respect to fish consumption. This goes a long way to confirm that consumers have adjusted to frozen fish consumption as a result of new price regime (higher price regime) occasioned by fuel subsidy reform in the study area. This finding is in agreement with existing economic theory indicating that frozen fish consumers are rational in their consumption decision. According to Geoff (2012), price elasticity of demand measures the responsiveness of demand after a change in price.

5. Conclusion

In the early part of 2012, the Government of Nigeria reviewed the fuel subsidy policy. Nigerians reacted against the policy in fear of the negative welfare on the people. To evaluate the impact of the subsidy reform, empirical data were collected, analysed and interpreted. Subsidy is a price policy and its assessment requires price parameters. This study demonstrates the existence of price transmission in the marketing chain of fish as a result of fuel subsidy removal in Nigeria. Asymmetric price transmission does not only respond to market power and market structure as reported by (Pavel vavra, 2005), but it also linearly correlates with government price policies. Price policy makers must be cautious with subsidy reforms due to its inflationary implications. Household demand response to increased fish price is negative, indicating a decrease in fish protein consumption. This has implication for household welfare. Subsidy policy reform has led to a negative and significant effect on profitability in fish marketing. Subsidy reduction affected the welfare of both fish marketers and fish consumers.

Based on the findings of the study, the following recommendations were made:

- Government should consider economic measures to cushion the adverse effect of fuel subsidy reform so as to improve living standard of the people
- There should be a similar study in comparing the effect of subsidy policy reform on the marketing of other products in Nigeria.

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