



## **Price Transmission and Integration of Rural and Urban Rice Markets in Nigeria**

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### **Abstract**

This study was designed to analyze the degree and determinants of market integration in rural and urban rice markets in Nigeria using evidence from Enugu State. Issues considered include: level of rice market integration via price movements, structural factors that affect the integration of rice markets and, the problems affecting rice traders in the state. Forty wholesalers and forty retailers were selected for the study. Primary and secondary data were collected and analyzed using co-integration analysis, market integration function and descriptive statistics. Unit Root Test showed that rural and urban prices were stationary at first differencing and were integrated of the order zero,  $I(0)$ . Rice markets in the study area were integrated but the level of integration was low. The Vector Error Correction Model had a coefficient of  $-0.0061872$  which was significant at 1% level and was negative. The Market Integration Function had Coefficient of Determination ( $R^2$ ) of 0.78 showing that the independent variables explained about 78% of the variations in the prices of rice in the rural and urban rice markets. Transportation cost, toll fee, processing cost and storage cost significantly affected the level of market integration. The greatest problems encountered by the rice

traders were inadequate finance, high transportation costs/bad roads and poor quality of local rice compared to foreign rice. To improve the level of market integration; transportation, processing, storage, communication and credits facilities should be provided.

Keywords: Law of one price; price transmission and co-integration; Rice Markets; Nigeria

## INTRODUCTION

Over the years, greater percentage of rice output in Nigeria has been from the rural small holder farmers. It has been observed that Nigeria was virtually self-sufficient in rice enterprise up to the 1970s (WARDA, 2004). The self-sufficiency ratio fluctuated between 96.3% and 99.8% between 1963 and 1975. However, since 1976, the ratio has dropped drastically to 41.46% in 1978 following sharp increase in the quantities of rice imported. The major reason for the decline in self-sufficiency is the dramatic increase in aggregate per capita income following the oil boom, urbanization and changes in consumption patterns and the effects of government food importation policies which aimed at increasing the availability of food at reasonable prices under the National Supply Company (WARDA, 1981).

Market integration refers to a situation in which prices of a commodity in separated markets move together, thereby offering smooth transmission of price signals and information (Reddy, 2006; Intodia, 2005). The study of market integration is important in determining the co-movements of prices and the transmission of price signals and information across spatially separated markets (Samuelson, 1952; Takayama and Judge, 1964). Baulch (1997) noted that the issue of market integration lies at the heart of many contemporary debates concerning market liberalization, price policy and parastatal reforms in developing countries. Without spatial price integration of market, price signals will not be transmitted from food deficit to food surplus areas; prices will be more volatile; agricultural producers will fail to specialize according to long-term comparative advantage, and the gains from trade will not be realized. However,

government's intervention in the pricing and marketing of food and poor marketing infrastructure may impair the role of market mechanism in price transmission between surplus and deficit areas.

Despite obviously abundant human and natural resources, Nigeria is still unable to feed her citizens. The projected national demand for rice in the country is put at 4.64 million metric tonnes annually, while the current rate of consumption is put at 2.3 million metric tonnes. Current local production of the commodity is a meager 525,000 metric tonnes per annum. It follows that the country will have to import the shortfall which is projected to cost \$267 million (Ashaka, 2008). Nigeria is the world's second largest rice importer after Singapore (Ola, 2008). The federal government spent about ₦80 billion for the importation of 500,000 metric tonnes of rice from Thailand and other parts of the world in 2008 (Ashaka, 2008). This situation which has continued to drain the country's foreign exchange, has also led to the decrease in the domestic production of rice and over-dependence on rice importation.

Central to the issue of inefficiency in the supply of rice is the problem of inefficiency of agricultural marketing system. Inadequate marketing of agricultural produce has been a major problem limiting agricultural expansion (Care, 2004). Rice farmers and domestic traders are constrained by a number of factors such as high transportation cost; poor market infrastructure and inefficient price information transmission channel. Problems associated with the commodity itself include quality differentials and low caliber of production techniques. Also, the wide gap between rural and urban prices weakens the farmers' morale thereby reducing productivity and in some cases leads to complete stoppage of production (Care, 2004).

It therefore appears that rice farmers are not getting maximum return from the resources committed to the enterprise; thus the need for this study. Rice farmers do not receive a fair price for their product. This discourages them from producing and expanding their rice enterprise. Rice is cheap in food-surplus areas (rural areas) where rice is produced; and it is expensive in food-deficit areas

(urban areas) where the middlemen enjoy the profit at the expense of farmers (Okon and Egbon, 2005).

Production and marketing constitute a continuum; and lack of development in one retards progress in the other. To increase food production, there is need to develop a more efficient marketing system with information so that prices in one market can be transmitted to other markets thus synchronizing price.

Studies on market integration in agricultural commodities include those conducted by Chirwa (2000), Jha, et al (2005), and Reddy (2006). By far the most important study relevant to this research is the one by Chirwa (2000). Apart from estimating the spatial integration of maize and rice markets in Malawi using Johansen's trade statistics via the speed of price transmission among markets, the author went further to identify the structural determinants of market integration such as distance between markets, access to telephone, etc., and found that the level of market integration in Malawi is low, while distance between spatial markets, and access to telephone are important determinants of market integration behaviour. The study called for provision of improved infrastructural facilities such as transportation and communication network. This study objectives are to (a) investigate price transmission situation in the Nigerian rice markets (b) identify the socio economic circumstances and problems of rice traders in the area.

The null hypothesis guiding the study is that that there is no co- integration between urban and rural rice markets.

## **2.0 Theoretical Framework and Empirical Methodologies**

Markets can be defined with respect to locations, seasons and products. The most common factor with which markets can be integrated is price of the product. Thus, the principle of market integration is hinged on the "Law of One Price" (LOP) which is the hallmark of the model or theory of perfect competition. Perfect competition is a market situation wherein there are so many firms (sellers) and buyers that no single one of them has a significant influence on price. Other

prevailing conditions are homogenous product, ease of new firm's entry into the market, and perfect market information, also termed pure competition or atomistic competition (Kohl and Uhl, 1985). A central prediction of the theory of perfect competition is that the price of all transactions will tend to uniformity, allowing for difference in transportation cost between different spatial markets.

Law of One Price (LOP) is a market principle which holds that under perfectly competitive condition, all prices within markets will be uniform after the costs of adding place, time and form utility are taken into consideration. According to Chirwa (2000), Law of One Price assumes that if markets are integrated, price changes in one market will be transmitted in a one-for-one basis to other markets instantaneously. LOP is a special relationship among prices in space, time and form markets; it can implicitly be expressed as

$$Y_{1t} = K + Y_{2t} \quad (1)$$

Where  $Y_{1t}$  and  $Y_{2t}$  are equal prices of a commodity in two spatially different markets, rural and urban respectively, and  $K$  is the intercept

If  $K = 0$  then the two prices are equal. This is the strict version of the LOP. If, on the other hand,  $K$  is not equal to 0, then the prices have a proportional relationship, but their levels would differ owing to factors such as transportation costs, interest rates, market fees, quality differences, etc. This is the weak version of the LOP (Asche, Bremnes & Wessells, 1999).

The most common expression of the LOP is

$$P_t^i = \alpha + \beta P_t^j \quad \dots\dots\dots (2)$$

Where:

$P_t^i$  and  $P_t^j$  are the natural logarithm of prices of homogenous goods in markets  $i$  and  $j$ , respectively.

The LOP in its strict form requires that  $\beta = 1$  and  $\alpha = 0$ . Empirically, only  $\beta = 1$  is tested and the constant term is assumed to account for transport and transfer costs which are assumed to be proportional to prices (or constant when prices are

in levels) during period of analysis (Chirwa, 2000).

In empirical work, the LOP is tested by running the following regression

$$P_i^i = \alpha + \beta P_i^j + \varepsilon_i \dots\dots\dots(3)$$

Where:  $\varepsilon_i$  is the error term.

This tests whether equation (3) reduces to equation (2) by testing the null hypothesis that  $\beta = 1$ . New developments in time-series econometrics suggest that if the price series are non-stationary, normal influence is not valid on the parameters and results from equation (3) are spurious. However, if the price series are integrated of the same order, then equation (3) can be used to test for co-integration using the Johansen vector auto-regression (VAR) method.

Prices of products in different markets can be expected to tend to uniformity in a competitive market structure, since they are influenced by the cost of transfer of the four main types of utility. But price disparity occurs between and among markets due to non-satisfaction of the conditions for perfect homogeneity and perfect knowledge of market conditions (Maiyaki, 1998). These lapses can be associated with market inefficiency and efficiency in pure competition. Market efficiency is said to be high in competitive markets than in less competitive markets.

The law of one price can be very useful in determining the size of a market, predicting price changes within a market and evaluating the pricing efficiency of a market. Price efficiency is maximized when there is a tendency for prices to maintain the relationship suggested by the law of one price. Under these conditions, resources will be allocated correctly between their alternative uses, prices will serve as accurate guide for food industry decisions, and total industry output will be maximized.

Several methods for measuring price integration have been used beginning with simple bivariate correlation coefficients (Cumming, 1967). This is the simplest and most common methodology for measuring the spatial price relationship between two markets. This was followed by the use of static

regression to evaluate the simplest/ basic law of one-price (Adekanye, 1988). These methods are beset with problems of overwhelming seasonal and secular trends, spurious correlation and regression as a result of autocorrelation from a static model run with non-stationary time series data.

The third method is the Ravallion (1986) model/approach which uses autoregressive distributed lag model for testing short-run and long-run integration and correlation of price series of reference to other markets and non-price determinants of demands and supply. Its basic flaws are the problem of simultaneity, failure to measure level of integration and problems associated with non-stationary time series data (Okoh and Egbon, 2005). To avoid the problems, Error Correction Model (ECM) is used in co-integration analysis.

One method for measuring the degree of price integration that takes the above critique into account is the co-integration procedure. It provides more information. It is a useful tool to give an answer about the existence of relation between two econometric time-series. To test for co-integration, one can apply the Granger (1969) as well as the Johansen Procedure (1988). The Granger Procedure is easily implemented but it has flaws. For example, it has no systematic procedure for separate estimation of the multiple co-integration vectors, and it relies in a two step estimator (Enders, 1998). Johansen method has been developed to avoid these problems. There appears to be a gradual development from simple to complex and more robust methods. Johansen's procedure was adopted in this study.

### **3.0 Methodology**

#### **3.1 Study Area**

The study area is Enugu State of Nigeria. Enugu state comprises seventeen local government areas. It is divided into three agricultural zones namely: Enugu zone comprising Enugu East, Enugu North, Ezeagu, Igbo-Etiti and Udi local government areas; Awgu zone comprising Awgu, Aninri, Enugu South, Nkanu East, Nkanu West and Oji River local government areas; and

Nsukka zone comprising Igbo-Eze North, Igbo-Eze South, Isi Uzo, Nsukka, Udenu and Uzo-Uwani local government areas (ADP, 1997). Rice is among the major crop cultivated and consumed in the area.

### **3.2 Sampling Procedure**

The study covered a period of four years (48 months). Enugu State was purposively chosen for the study because it is one of the major rice producing and consuming states in the South-East of Nigeria.

The study involved all the seventeen local government areas and the three agricultural zones in the state. Awgu and Nsukka zones were selected as major producing areas and Enugu zone as a major consuming area. Adani and Nsukka in Nsukka zone, Awgu in Awgu zone and Enugu metropolis in Enugu zone were purposively selected because of the volume of production and consumption of the commodity in the areas, respectively. Nsukka and Enugu were chosen as urban areas while Adani and Awgu represented the rural areas. Finally, ten (10) wholesalers and ten (10) retailers were randomly selected from the markets in each of the four communities. This gave a total of 40 wholesalers and 40 retailers. In all, a total of 80 respondents were used for the study.

### **3.3 Data Collection**

Data for the study were collected from both primary and secondary sources. Primary data were collected by the use of structured questionnaire, interviews and direct observations. Data for rice traders (wholesalers and retailers) include cost and selling prices, sources of products, problems they encounter, etc.

For the secondary data, monthly price series of rice for the rural and urban markets from 2006 to 2009 were collected from Enugu State Agricultural Development Programme (ENADEP).

### **3.4 Data Analysis**

Data collected were analyzed using co-integration analysis, Johansen's



market integration model, and descriptive statistics.

### Model Specification

Time series properties of the data were examined in order to avoid spurious results emanating from the non-stationarity of the price data series and to analyze the price transmission of rice market in Enugu State. Co-integration analysis was carried out in three steps. It began with a unit root test to confirm the stationarity status of the variables that entered the model, and this was done using the Augmented Dickey Fuller (ADF) statistic. The co-integrating regression was obtained from the normalized coefficients of the model generated from the co-integration vector. With the existence of co-integration, the ECM model was estimated. Diagnostic tests of the stochastic properties of the models were carried out.

The frequency of the data used for the study was 2006<sub>m1</sub> - 2009<sub>m12</sub>. This means that the data collected were from January 2006 to December 2009.

### Unit Root Test

The unit root test was carried out under the null hypothesis  $\mu = 0$  against the alternative hypothesis of  $\mu \neq 0$ . Once a value for the test statistic

$$ADF_t = \frac{U}{SE(\mu)} \dots\dots\dots (4)$$

was computed, it was compared with the relevant critical value for the Dickey Fuller Test. If the test statistics is greater (in absolute value) than the critical value at 5% or 1% level of significance, then the null hypothesis of  $\mu = 0$  is rejected and no unit root is present. Once this was established, we proceed to test for co-integration.

### Co – Integration Equation

This is stated as follows:

$$(\eta_m \log RUP_t) = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_{t-i} - \left( \eta_m \log RUP_t - \sum_{i=1} \beta X_{t-i} \right) + V_{2t} \dots\dots\dots (5)$$

Where:

$\left( \eta_m \log RUP_t - \sum_{i=1} \beta X_{t-i} \right)$  is the linear combination of the co integration vectors,

X is a vector of the co integrated variables.

Because equation 5 is true, the individual influence of the co integrated variables cannot be separated unless with a correction mechanism through an error correction model (ECM)

**The Error Correction Model equation**

This is stated as follows:

$$(\eta_m \log RUP_t) = \alpha_1 + \sum_{i=2}^p \alpha_i \eta_m Z_{t-i} - (\lambda ECM_{t-i}) + V_{2t} \dots\dots\dots (6)$$

Where ECM is the error correction mechanism, λ is the magnitude of error corrected each period specified in its “a priori” form so as to restore  $\eta_m \log RUP_t$  to equilibrium.

**Market Integration Model:**

The implicit form of the model is

$$RUP = (X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8) + e$$

The model can be written explicitly as

$$Y = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 X_5 + a_6 X_6 + a_7 X_7 + a_8 X_8 + e_t \dots\dots\dots (7)$$

Where:

RUP = Johansen trace statistics: a measure of integration of rural and urban rice market prices

- X<sub>1</sub> = Transport cost (₦)
- X<sub>2</sub> = Processing cost (₦)
- X<sub>3</sub> = Storage cost (₦)
- X<sub>4</sub> = Toll fees (₦)

$X_5$  = Cost per unit phone call (₦)

$X_6$  = Supply shock e.g. diseases and pests (Frequency of occurrence)

$X_7$  = Fuel cost per liter (₦)

$X_8$  = Possession of cell phones (Number of traders)

$E$  = Stochastic error term with OLS Properties.

### Apriori Expectations

It is expected that level of market integration will have inverse relationship with transportation cost, processing cost, storage cost, toll fees, cost per unit phone call, supply shock, and fuel cost per liter, but will have direct relationship number of traders possessing cell phones.

## 4.0 Results and Discussion

### 4.1 Unit Root Test Result

The result of the unit root test carried out using the Augmented Dickey Fuller (ADF) Test is presented in table 1

**Table 1: Unit Root Test Result**

variable	t- adf	a	Lag
DLRP	-6.8911	0.13323	1(0)
DLUP	-5.4704	0.16242	1(0)
DLX <sub>1</sub>	-6.3214	0.33484	1(0)
DLX <sub>2</sub>	-6.5540	0.063122	1(0)
DLX <sub>3</sub>	-6.5520	0.017159	1(0)
DLX <sub>4</sub>	-11.105	0.32182	1(0)
DLX <sub>5</sub>	-11.037	0.093469	1(0)
DLX <sub>6</sub>	-6.5304	0.18454	1(0)
DLX <sub>7</sub>	-6.4807	0.042179	1(0)
DLX <sub>8</sub>	-6.6332	0.10570	1(0)

Critical values: 5% = -2.929, 1% = -3.585

Note: DL means differential logarithm

Source: Computed from Field Survey Data, 2010

The unit root test was carried out under the null hypothesis  $Y = 0$  against the alternative of  $Y < 0$ . The result shows that the variables were stationary at first differencing and are integrated of the order zero,  $1(0)$ . This was deduced from the fact that the ADF test statistic of each variable is greater than the critical value of ADF statistic in absolute values at 5% level, so the null hypothesis of  $Y = 0$  is rejected and no unit root is present. The Augmented Dickey Fuller (ADF) statistic used in the test is a negative number. The more negative it is, the stronger the rejection of the hypothesis that, there is a unit root at some level of confidence (Wikipedia, 2009).

The result of the unit root tests on the OLS residuals shows that the ADF test statistic is -5.4303,  $1(1)$ . The absolute value of this statistic is greater than the absolute value of -2.929 at the 5% critical value for the Dickey Fuller statistic.

## 4.2 Co-integration Result

The result of the co-integration analysis is presented in table 2 below.

**Table 2: Johansen's Co-integration Test Result**

Eigenvalue	Likelihood Ratio	5 Percent	1 Percent	Hypothesized No. of CE(s)
0.926717	394.9956	233.13	247.18	None**
0.792130	277.3916	192.89	204.95	At most 1**
0.731849	206.7037	156.00	168.36	At most 2**
0.624818	147.4744	124.24	133.57	At most 3**
0.557600	103.3589	94.15	103.18	At most 4**

\*\* = rejection of the hypothesis at 5% (1%) significance level

Note: CE means co-integrating equation

Source: Computed from Field Survey Data, 2010.

Under the Johansen's Co-integration Test, it could be said that there is a co-integrated vector (Table 2). In Johansen's method, the eigenvalue test is used to determine whether co-integrated variables exist. Co-integration is said to exist if the values of computed statistics are significantly different from zero. The Likelihood Ratio is higher than 5% critical value and indicates that there are 5 co-integrating equations and the eigenvalues are found as presented in table 2.

However, in Johansen's trace statistics test, the likelihood ratio indicated 4 co-integrating equations at 5% significant level. This also denotes rejection of the null hypothesis at that level of significance. The prices in the various rice markets affect each other and the extent is further determined by the variables like transport cost, storage cost, toll fee, processing cost, etc.

Thus, we can postulate that since these markets are co-integrated, there exist some level of market integration, but the level of integration is low. There is a tendency for the prices in the markets to converge in the long run according to a linear relationship, and that in the short run the prices may drift apart, as shocks in one market may not be instantaneously transmitted to other markets or due to delays in transport.

For the Johansen's Trace Statistic test the values range between 10 and 22 while the Likelihood Ratio Test indicates 4 co-integrated equation at 5% significance level. These denote the rejection of the null hypothesis at 5% level.

### **4.3 Vector Error Correction Model**

The coefficient of Vector Error Correction Model (VECM) is -0.0061872 which is significant at 1% level of significance and it is negative. Thus, it will rightly act to correct any deviations from long run equilibrium. The significant Error Correction Mechanism showed that the speed of adjustment of rice prices to long run equilibrium is 0.6%. This means that the speed of adjustment of rice prices to transportation cost and other explanatory variables is too low. There is no serial auto correlation given that the Durbin Watson Statistic (1.70) is within the acceptable bound. In addition, the probability of the F-statistics (0.0000) suggests that the model has a very good fit.

### **4.4 Market Integration Function Result**

The multiple regression result which shows the relationship between the dependent and independent variables is presented in table 3 below.

**Table 3: Regression results of eight independent variables related to level of market integration**

Variables	Coefficients	Standard error	t-values	probability
X <sub>1</sub>	-9.766	1.4439	-6.425	0.0000***
X <sub>2</sub>	1.7858	0.66676	2.603	0.0135***
X <sub>3</sub>	26.793	4.3682	6.134	0.0000***
X <sub>4</sub>	-0.11045	0.043389	-2.546	0.0155**
X <sub>5</sub>	-0.16985	0.12656	-1.423	0.1629
X <sub>6</sub>	0.075993	0.082308	0.923	0.3622
X <sub>7</sub>	0.70331	0.49341	1.425	0.1629
X <sub>8</sub>	-0.031603	0.15151	-0.209	0.8860
VECM <sub>1</sub>	-0.0061872	0.0015309	-4.042	0.0003***

Note: (\*\*) indicates statistical significant at 5% level

(\*\*\*) indicates statistical significant at 1% level

$F_{cal} = 12.216$ ,  $Prob > f = 0.0000$ ,  $R^2 = 0.777303$

Source: Computed from Field Survey Data, 2010

From the result in table 3, the  $R^2$  is 0.78, showing that the independent variables explained about 78% of the variables in the prices of rice in the rural and urban rice markets.

Transportation Cost ( $X_1$ ) has a marginal contribution of -9.766. The t-value is -6.425 which is significant at 1% level. The result also shows that transportation cost has an inverse relationship with rural-urban price which is a measure of integration of rural and urban rice market prices. Thus, transportation cost is a strong determinant of market integration. That is, the higher the transportation cost, the lower the level of market integration because the increase in transportation cost will result to increase in the cost of rice which will discourage the traders. Also, the farther the distance, the higher the transportation cost and

the lower the level of integration in the markets. The above is in line with Chirwa (2000) that market integration increases with lower transport cost and shorter distance. This agrees with the apriori expectation.

Processing cost ( $X_2$ ): The marginal contribution of processing cost is 1.7858. The t-value is 2.603 which is highly significant at 1% level of probability. Thus, processing cost is directly related to level of market integration. Processing adds value to rice, and production of milled rice is not complete without processing. The more it is processed, the better. This is the reason why consumers prefer foreign rice to local rice. So, traders are willing to pay higher prices as a result of increased processing cost and this leads to increase in the level of market integration. Thus, processing cost is a strong determinant of market integration.

Storage cost ( $X_3$ ): This variable has a marginal contribution of 26.793 and a t-value of 6.134 which is significant at 1% level of probability. It has a positive relationship with the level of market integration. This implies that when traders store enough quantity of rice, they make more profit not minding the storage cost since the profit will offset the storage cost, especially when they sell during the periods of scarcity. Thus, the more they store, the more the profit and the more the markets are integrated.

Toll fee ( $X_4$ ) has a marginal contribution of -0.11045 and a t-value of -2.546 which is significant at 5% level of probability. The result also shows that toll fee has an inverse relationship with the level of market integration, that is, as toll fee increases, market integration decreases because toll fee has no added advantage but instead incurs extra cost. Thus, toll fee is important determinant of market integration. This agrees with the aprior expectation.

Cost per unit phone call ( $X_5$ ): This has a marginal contribution of -0.16985 and a t-value of -1.423, which is not significant at any levels of probability.

Supply shock ( $X_6$ ) has a marginal contribution of 0.075993 and a t-value of 0.923 which is not significant at any of the set levels of significance. There was a major supply shock in 2008 as a result of the world food crisis. Supply shock has never been a frequent phenomenon in the state.

Fuel cost ( $X_7$ ): This variable has a marginal contribution of 0.70331 and a t-value of 1.425, this is not significant at any set levels of significance.

Access to ICT (possession of cell phones) ( $X_8$ ): This variable has a marginal contribution of -0.031603. It has a t-value of -0.209 which is not significant at any level.

It can be deduced from the above findings that among the independent variables hypothesized as having significant effects on market integration, the following are to be accepted and considered as strong determinants of market integration: transportation cost, processing cost, storage cost and toll fees.

#### **4.5 Test of Hypotheses**

Pairwise Granger Causality Test of Hypothesis shows that urban price drives rural price with an F-statistic of 4.57538 and is significant at 5% level. This is in line with Okoh and Akintola (1999) and Okoh and Egbon, (2005) findings.

Hypothesis 1: The first hypothesis, spatial markets for rice are not integrated, was tested using co-integration analysis results to find out whether the rice markets are integrated. The null hypothesis was rejected, since some level of integration was found in the rice markets.

Hypothesis 2: The second hypothesis, the structural factors do not influence market integration was tested using the result of the regression analysis. The results show that transportation cost, processing cost, storage cost and toll fee significantly influence the level of market integration. Thus, the null hypothesis was rejected since the structural factors influence market integration.

#### **4.6 Problems Encountered by the Rice Traders**

The traders encountered many problems. The most serious among others is financial problem (100%). This was followed by poor quality of local rice compared to foreign rice (57.5%). High transportation cost/bad road contributed 55% of the problems. For the retailers, apart from financial problem which affected all the traders, high transportation cost/bad roads contributed 50% while poor market



infrastructure (like credit) contributed 45%. The problems encountered by rice traders are shown in Table 4 below.

**Table 4: Distribution of traders according to the problems encountered**

Problems encountered	Frequency of wholesalers	Percentage of wholesalers	Frequency of retailers	Percentage of retailers
High transportation cost/ bad roads	22	55	20	50
Lack of Storage facilities	7	17.5	5	12.5
Lack of processing facilities	-	-	-	-
-	-	-	-	-
Packaging cost	-	-	-	-
-	-	-	-	-
Grading and standardization	-	-	-	-
Poor market infrastructure	5	12.5	18	45
Financial Problems	40	100	40	100
Low price of rice	-	-	16	40
Problems of pests/diseases	6	15	13	32.5
Poor quality compared to foreign rice	23	57.5	10	25
Illiteracy	3	7.5	1	2.5
Others (Membership of trade union)	2	5	-	-
Maximum responding unit	40	100	40	100

Multiple responses recorded

Source: Calculated from Field Survey, 2010

It can be deduced from the results above that lack of fund/inadequate fund is a very serious problem limiting the traders from expansion. This was aggravated by the inability of financial institutions to give loans to traders because of the difficulties associated with collaterals. Bad roads which result to high transportation cost constitute serious problems because they lead to increase in cost of product haulage and price of the produce. In addition, poor quality of local rice compared to foreign rice is also a problem because it creates market for the foreign rice at the detriment of the local rice.

## 5.0 Conclusion and Recommendations for Policy

It is concluded that rice markets in the study area are integrated but the integration level is low. However, there is still room for improvement.

Based on the implied conclusion that development of more efficient marketing system with market information will make it possible for prices in one market to be transmitted to other markets thus synchronizing prices and making markets more integrated, important policy recommendations emerged for domestic rice markets to be perfectly integrated in due course. They include:

1. Provision of infrastructure: Better infrastructural facilities in terms of transportation, processing, storage and communication network are imperative. Early flow of information regarding demand, supply and prices to and from various markets will help increase market integration level through increased speed of price transmission.
2. Provision of loan/credit: To expand rice marketing business, government should give loan/credit to the traders and encourage/mandate private financial institutions to do the same. This calls for appropriate financial/interest rate policy that will accommodate the volatile nature of rice marketing business.
3. Appropriate government actions to improve the quality and price of local rice so as to compete favourably with imported rice sales should be put in place. This also calls for improved but low cost rice processing technologies for the processors/marketers while sustaining the current trade liberalization policy.

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