Long and Short-run Analysis of Government Rural Infrastructural Spending on Cereals Enterprise income in Benue State Nigeria: 1990-2012

Chancha T.E[1], Ater P.I[1], Onuk, E.G[2]

[1]*Department of Agricultural Economics, College of Agricultural and Economics, Federal University of Agriculture Makurdi, Benue State Nigeria.*
[2]*Department of Agicultural Economics and Extention, Nasarawa State University, Keffi, Nigeria.*

Abstract: *This research analyzed empirically the effects of government rural infrastructural spending on income of cereals (maize, millet and sorghum) in Benue state, Nigeria. Secondary time series data for 23years were analyzed using Augmented Dickey-fuller unit root test which confirmed stationarity at first difference 1(1), Johansen's cointegration revealed a long-run relationship between effects of government rural infrastructural spending on income of cereals (maize, millet and sorghum) in Benue state Nigeria. The vector error correction model (VECM) was used to analyze the long and short-run effects of government rural infrastructural spending on cereals enterprise income in Benue State Nigeria and revealed that, the coefficient of government spending for educational and Road infrastructures were all negative (-1.5032 and -0.1095) for maize (-1.5032 and -1.1095) for millet and (-2.6237 and -0.7593) for sorghum respectively. This was contrary to a priori expectations. In contrast, the effect of government spending on health infrastructure in the previous year on income enterprise of maize, millet and sorghum were positive and significant at the 1% probability level with the coefficients of 2.66, 6.50 and 2.77 respectively in the long-run. Short-run analysis of government rural infrastructural spending on incomes of maize and millet enterprise income revealed no short-run relationship on their enterprise income. However analysis of rural infrastructure spending on income of sorghum enterprise showed a positive significant relationship with the coefficient of (0.5018) at 10% probability level, following government spending on education two years ago. Based on the findings of the research, it is recommended that; policy makers should pay closer attention to integrated rural infrastructure development as a whole rather than discrete component improvement of infrastructure by increasing budgetary allocation to rural development and promoting larger production of cereals and yearly budgetary allocation to benefit from ecologically disadvantaged area of cereal production for the state.*

INTRODUCTION:

Background to the study:

Government rural infrastructural spending is perhaps the single most important policy instrument available to Government of most developing economies like Nigeria, particularly in Benue state for promoting growth and equitable distribution of rural infrastructural facilities as it is essential for the income generation and development of any economy. Though, it is complex and its effects is multi-dimensional, cutting across all aspects of human development, the significance of government rural infrastructural spending cannot be overemphasized because it contributes to inclusive rural development in many different ways. First, rural infrastructure provides rural people with access to the markets and basic services that they need. Secondly, it influences rural economic growth and employment opportunities, thereby improving incomes, social development and likelihood of rural populace. For example, "good feeder roads can allow the supply of perishable foods to high-value urban markets, and incomes generated can be invested in health and education to improve the productivity of eventual migrants to the cities" (ADB, 2005). This was also supported by Blejer and Khan (1984); Greene and Villarueva (1999) and Solano (1983) all of the opinion that investment in infrastructure, stimulates or crowds in private investment, reduces cost and opens new markets thereby engendering profits and employment.

However, investment in rural infrastructure particularly in rural habitat of farmers in developing countries has been reported to be sub-optimal (Ater, P.I., Umeh, J.C., and Aye, G.C. 2014)] [(Haller and Diamond, 1990 and World Bank, 1994)]. This sub-optimal investment prevalence situation in Benue State has been established in the work of Ater et al. (2014), with low emphasis particularly on agricultural subsector. In the same vein, Oyewole and Oloko (2006) had remarked that adequate government rural infrastructural spending can reduce the cost of production, which affects productivity level of outputs and income, and employment. Perkins and Luiz, 2005; Akinola, (2007) had remarked that, where infrastructures are put in place, level of agricultural productivity will be increased and if otherwise, citizens will suffer particularly the rural poor, thus economic renewal and societal welfare become worse and halted. Adenikinji (2006) reported that, investment in infrastructure has a tremendous positive impact on a country's economic growth and development. The importance of the need for investment in infrastructure and other public goods as a way of increasing urban and rural productivity and national economic growth and development has become

an important subject of renewed attention in almost less developing countries.

As a result of this inadequacy of empirical studies on analysis of government Rural Infrastructural spending on income of some selected cereal crops in Benue state Nigeria, makes this study justifiable to be carried out, given the essential nature of government rural infrastructure spending on the overall development of agriculture, particularly in Benue state Nigeria which is the food basket of the nation. From the foregoing there is a need to undertake a study on the effects generated by rural government spending which is transmitted throughout Benue state which will validate the effect of government rural infrastructural spending on income of selected cereal crops as the backbone of the Benue rural economy. This is under-scored by the fact that, rural infrastructures, apart from serving as a direct input, can also be an intermediate input in the production process which in return fosters agricultural growth. This study was therefore designed to assess the effects of government rural infrastructural spending on cereals enterprise income in Benue state Nigeria.

Objectives of the study:

The broad objectives for the study is to analyze the long and short-run government rural infrastructural spending on cereals enterprises income in Benue state, Nigeria from 1990-2012. The Specific objectives are to;

i. Assess the effects of government spending on Roads, Health, and Education on income of maize enterprise in Benue state Nigeria.

ii. Assess the effects of government spending on Roads, Health, and Education on income of millets enterprise in Benue state Nigeria.

iii. Assess the effects of government spending on Roads, Health, and Education on income of sorghum enterprise in Benue state Nigeria.

It was hypothesized that government rural infrastructural spending has no significant effects on enterprise income of maize, millets and sorghum.

The study area:

The study was conducted in Benue state, Nigeria. The State is popularly known as "food baskets of the nation". It has a geographical coordinates of latitudes 6° 25' and 8° 08' N, and between longitudes 7° 47' and 10° 00' E in the central part of Nigeria called 'Middle belt' (Nyagba, 1995). The State has a population of 4,253,641 people according to 2006 Census (NPC, 2006) and has a land mass of 32,518sqkm and is made up of 23 LGAs. Benue State lies within the lower river Benue in the middle belt region of Nigeria and shares boundaries with five other states namely; Nasarawa to the north, Taraba to the east, Cross-River to the south, Enugu to the south-west and

Kogi State to the west. The state also shares a common boundary with the Republic of Cameroon on the south-east.

Agriculture is the mainstay of the inhabitants engaging over 75% of the population. The State is the nation's acclaimed food basket because of its rich agricultural produce, which includes yam, rice, beans, cassava, sweet-potato, maize, soybean, sorghum, millet, sesame, cocoyam, etc.

The state accounts for over 70% of Nigeria's soybean production. Tree crops such as mangoes and oranges of various species are also produced in commercial quantities. They also rear a wide range of livestock such as pigs, goats, sheep and chickens. Many of the inhabitants also engage in trading, while a reasonable number of them are civil servants.

In terms of infrastructural development, Benue state is still in its development process but has some appreciable good number of roads networks cutting across rural areas and urban centers. The state has a good number of schools ranging from private and government in all the rural area down to council wards in the local government areas. Health infrastructure cut across LGAs in Benue State at different spatial perspectives. There are basically 3 levels of healthcare provision in the State (primary, secondary and tertiary) distributed among the LGAs. A total of 1,408 health facilities exist in the state among the 23 LGAs out of which two are of tertiary levels (Federal Medical Centre, Makurdi and Benue State University Teaching Hospital, Makurdi). A total of 117 are of secondary levels while 1,289 are primary health care facilities. Their ownership comprises both public and private.

Data collection techniques:

The technique of data collection were through Secondary sources such as journals, technical documents, government gazettes, CBN Annual Reports, and published materials from National Bureau of Statistics, BNARDA, and Ministry of Finance: Budget Office and Benue state house of assembly.

Scope of the study:

The study was carried out in Benue state Nigeria, its covered 3 rural infrastructures and 3 cereals crops namely; Maize, Millet, Sorghum prices using time data from 1990-2012.

Data analysis techniques

Vector error correction models (VECM), Johansen cointegration test, unit-root test (ADF) were the techniques used for data analysis and F-statistics was used for the testing of the relevant hypotheses

Model specification:

i. *Model Specification for the long run analysis of government infrastructural spending effects on output of maize, millet and sorghum*

$InIncMAZt = \alpha + b_1InGOVSHLTH_{t-1} + b_2 InGOVSEDU_{t-1} + b_3InGOVSRDS_{t-1} + e_i$ -- (1)

$InIncMillt = \alpha + b_1InGOVSHLTH_{t-1} + b_2 InGOVSEDU_{t-1} + b_3InGOVSRDS_{t-1} + e_i$ --- (2)

$InIncSorgt = \alpha + b_1InGOVSHLTH_{t-1} + b_2 InGOVSEDU_{t-1} + b_3InGOVSRDS_{t-1} + e_i$ --- (3)

Equation for Short-run Relationship:

ii. *short-run analysis of government infrastructural spending effects on output of Maize, Millets and Sorghum*

$InIncMAZt = \alpha_0 + b_1Maz_{t-1} + b_2Maz_{t-2} + b_3GOVSEdu_{t-1} + b4GOVSEdu_{t-2} + b_5GOVSHlth_{t-1} + b_5GOVSHlth_{t-1} + b_6GOVSHlth_{t-2} + b_7 GOVSRd_{t-1} + b_8 GOVSRd_{t-2} + e_t$ ---- (4)

$InIncMilt = \alpha_0 + b_1Mil_{t-1} + b_2Mil_{t-2} + b_3GOVSEdu_{t-1} + b4GOVSEdu_{t-2} + b_5GOVSHlth_{t-1} + b_5GOVSHlth_{t-1} + b_6GOVSHlth_{t-2} + b_7 GOVSRd_{t-1} + b_8 GOVSRd_{t-2} + e_t$ ---- (5)

$InIncSorgt = \alpha_0 + b_1Sorg_{t-1} + b_2Sorg_{t-2} + b_3GOVSEdu_{t-1} + b4GOVSEdu_{t-2} + b_5GOVSHlth_{t-1} + b_5GOVSHlth_{t-1} + b_6GOVSHlth_{t-2} + b_7 GOVSRd_{t-1} + b_8 GOVSRd_{t-2} + e_t$ ---- (6)

Where;

IncMAZ, IncMIL, IncSORG = income of maize, millets and sorghum all in (₦)

$IncMaz_{t-1}$ and $IncMaz_{t-2}$ = income of maize in the previous year and two years ago.

$IncMil_{t-1}$ and $IncMil_{t-2}$ = income of millet in the previous year and two years ago.

$IncSorg_{t-1}$ and $IncSorg_{t-2}$ = income of sorghum in the previous year and two years ago.

$GOVSEdu_{t-1}$ and $GOVSEdu_{t-2}$ = government spending on educational infrastructure of the previous year and two year ago.

$GOVSHlth_{t-1}$ and $GOVSHlth_{t-2}$ = government spending on health care infrastructure in Naira (₦) of the previous year and two year ago.

$GOVSRd_{t-1}$ and $GOVSRd_{t-2}$ = government spending on road infrastructure in Naira (₦) of the previous year and two year ago.

e_t = time lag.

RESULTS AND DISCUSSION:

The augmented Dickey-fuller (ADF) test was employed to test for the stationarity or non-stationarity of the time series data. The result revealed that, all the variables were not stationary at level at 1%, 5% and 10% but became stationary at first difference in order of 1(1) as showed below.

Table 1: Result of Unit Root Test

Variables	ADF test statistics at Levels	ADF RESULTS				Order of integration
		Critical value		ADF at First difference	Critical value	
GOVSRDS	-0.6030	1%	-3.7856	-4.2134	1%	-3.8067	1(1)
		5%	-3.0114		5%	-3.0199	
		10%	-2.6457		10%	-2.6502	
GOVSHLTH	-2.2258	1%	-3.7856	-5.5287	1%	-3.8067	1(1)
		5%	-3.0114		5%	-3.0199	
		10%	-2.6457		10%	-2.6502	
GOVSEDU	-2.3865	1%	-3.7856	-3.9765	1%	-3.8067	1(1)
		5%	-3.0114		5%	-3.0199	
		10%	-2.6457		10%	-2.6502	
INCMAZ	-2.5915	1%	-3.7856	-5.6513	1%	-3.8067	1(1)
		5%	-3.0114		5%	-3.0199	
		10%	-2.6457		10%	-2.6502	
INCMIL	-2.6164	1%	-3.7856	-3.9651	1%	-3.8067	1(1)
		5%	-3.0114		5%	-3.0199	
		10%	-2.6457		10%	-2.6502	
INCSORG	-1.8484	1%	-3.7856	-3.9098	1%	-3.8067	1(1)
		5%	-3.0114		5%	-3.0199	
		10%	-2.6457		10%	-2.6502	

*, **, *** indicate Stationarity at 10%, 5% and 1%

Johansen Cointegration Test of Long-Run:

Johansen cointegration test for government rural infrastructural spending on income of maize in Benue state:

The Johansen cointegration test of long-run relationship between government rural infrastructural spending on income of maize is summarized in Table 2. One cointegration equation was found indicating that the trace statistic (97.83317) was greater than critical value of (47.85613) at 5% critical value. These results confirm the presence of long run relationship between GOVSRDS, GOVSHLTH & GOVSEDU on INCMAZ in Benue state Nigeria.

Table 2: Johansen cointegration test for government rural infrastructural spending on income of maize in Benue state

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.973860	97.83317	47.85613	0.0000
At most 1	0.444823	21.30335	29.79707	0.3390
At most 2	0.340469	8.945501	15.49471	0.3704
At most 3	0.009703	0.204752	3.841466	0.6509

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

Johansen cointegration test for government rural infrastructural spending on income of millets in Benue state:

The Johansen cointegration test of long-run relationship between governments rural infrastructural spending on income of millet is summarized in Table 3. One co-integration equation was found indicating that the trace statistic (107.0811) was greater than critical value of (47.85613) at 5%. These results confirm the presence of long run relationship between (GOVSEDU, GOVSHLTH, GOVSRDS) on INCMIL in Benue state Nigeria.

Table 3: Johansen Cointegration Test of Long-Run Relationship between Governments Rural Infrastructural Spending (GOVSEDU, GOVSHLTH, GOVSRDS) On income of Millets (INCMIL)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.985783	107.0811	47.85613	0.0000
At most 1	0.457194	17.76117	29.79707	0.5838
At most 2	0.186669	4.930097	15.49471	0.8162
At most 3	0.027756	0.591126	3.841466	0.4420

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

Johansen cointegration test of long-run relationship between government rural infrastructural spending on income of sorghum in Benue state:

The Johansen co-integration test of long-run relationship between governments rural infrastructural spending on income of sorghum is summarized in Table 4. One co-integration equation was found indicating that the trace statistic (114.8661) was greater than critical value of (47.85613) at 5%. These results confirm the presence of long run relationship between GOVSEDU, GOVSHLTH, GOVSRDS on income of sorghum (INCSORG) in Benue state Nigeria.

Table 4: Johansen Cointegration Test Of Long-Run Relationship between Government Rural infrastructural Spending (GOVSEDU, GOVSHLTH, GOVSRDS,) On Income of Sorghum (INCSORG)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.983000	114.8661	47.85613	0.0000
At most 1	0.589678	27.30059	29.79707	0.0570
At most 2	0.337237	10.59350	15.49471	0.2378
At most 3	0.088911	1.955408	3.841466	0.1620

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

*denotes rejection of the hypothesis at the 0.05 level; **MacKinnon-Haug-Michelis (1999) p-values

THE VECM MODEL OF LONG-RUN AND SHORT-RUN RELATIONSHIP BETWEEN GOVERNMENT RURAL INFRASTRUCTURAL SPENDING ON CEREALS ENTERPRISE INCOME IN BENUE STATE:

The VECM model of long-run and short-run relationship between government rural infrastructural spending on maize enterprise income in Benue state:

The estimate of vector error correction for long-run effect between government rural infrastructural spending (GOVSEDU, GOVSHLTH, GOVSRDS) on maize enterprise income is summarized in table 5. The result revealed that, the coefficient of government spending on education in the previous year (GOVSEDU$_{-1}$) and government spending on health in the previous year (GOVSHLTH$_{-1}$), government spending on road in the previous year (GOVSRDS-1), are variables that affect income of maize (INCMAZ) in the long-run.

Specifically, the coefficient of government spending on education in the previous year (GOVSEDU$_{-1}$) was negative contrary to the apriori expectations and significant at 1 percent probability level implying that, unit increase in government spending on education in the previous year (GOVSEDU$_{-1}$) will decrease income of maize (INCMAZ) by -1.5032. This may be attributed to the fact that educational facilities that should aid farmers in acquisition of new technologies and practices to improve literacy level and income generation are limited in most of the wards in Benue state. This result is in agreement with the earlier findings of Deveranjan *et al.* (1996) who conducted an empirical study in 43 developing countries. Found out that, excessive government expenditure on education negatively correlated with the country's economic growth through farm income generation.

In contrast, the effect of government spending on health (GOVSHLTH-1) in the previous year was positive and statistically significant conforming to the a priori expectation and significant at 1 percent probability level implying that unit increase in government spending on health care will increase income of maize (INCMAZ) by 2.66 in the long-run. This may be attributed to the fact that, the presence of health care facilities in most wards in Benue ensures good health, because good health enhances productivity and income generation. This result is in agreement with the findings of Bakare and Olubokun (2011) in a study, health care expenditure and economic growth in Nigeria, found a significant and positive relationship between health care expenditure and economic growth. However the coefficient of government spending on road infrastructure in the previous year (GOVSRDS$_{-1}$) was negative contrary to the a priori expectation and not significant therefore does not have effect on the income of maize in the long-run. This insignificance can be due to absence of good and motorable roads to the market centers that would have reduced the time and cost of movement of goods and enhanced interaction. This results is in disagreement with Owen, 1987; Queiros and Gautam, 1992) that, roads and transportation are very essential to every member of the society for a meaningful living, and they stressed that, road is very critical to economic growth; hence a direct relationship exist between a country's economic prosperity and kilometers paved roads.

The estimate of short-run relationship between governments spending on rural infrastructure (GOVSEDU, GOVSHLTH, GOVSRDS) on income of maize (INCMAZ) is summarized in table The result in table 5 revealed that, in the short-run the coefficient of determination (R^2) was 0.39 implying that, 39 percent of the variation in income (INCMAZ) is caused by the following; income of maize in the previous year (INCMAZ$_{-1}$), income of maize two years ago (INCMAZ$_{-2}$), government spending on education in the previous year (GOVSEDU$_{-1}$), government spending on education two years ago (GOVSEDU$_{-2}$), government spending on health care facilities in the previous year (GOVSHLTH$_{-1}$), government spending on health two years ago (GOVSHLTH$_{-2}$), government spending on roads in the previous years (GOVSRDS$_{-1}$) and government spending two years ago (GOVSRDS$_{-2}$). The result also shows that the F-statistics (0.6979) is positive but not significant in the short-run and long-run, implying that, all the explanatory variables have no significant effects on income of maize. Therefore, the null hypothesis which, stipulates that, there is no significant relationship between governments rural infrastructural spending (GOVSEDU, GOVSHLTH, GOVSRDS) on maize enterprise income (INCMAZ) is accepted.

Income of maize enterprise in the previous year (INCMAZ$_{-1}$), income of maize two years ago (INCMAZ$_{-2}$), government spending on education in the previous year (GOVSEDU$_{-1}$), government spending of education two years ago (GOVSEDU$_{-2}$), government spending on health care facilities in the previous year (GOVSHLTH$_{-1}$), government spending on health two years ago (GOVSHLTH$_{-2}$), government spending on roads in the previous years (GOVSRDS$_{-1}$) and government spending two years ago (GOVSRDS$_{-2}$) were all statistically insignificant in the short-run. These variables do not have significant effects on income of maize (INCMAZ) in the short-run.

Table 5: Result of The VECM model of long-run and short-run relationship between government rural infrastructural spending on income of maize in Benue State

LONG-RUN		INCMAZ$_{(-1)}$	GOVSEDU$_{(-1)}$	GOVSHLTH$_{(-1)}$	GOVSRDS$_{(-1)}$	C					
COINEq1		1.000000	-1.503229	2.661927	-0.109453	-2.20E+09					
			(0.35075)	(0.57921)	(0.09788)						
			[-4.28578***]	[4.59583***]	[-1.11824]						
SHORT-RUN	INCMAZ	INCMAZ$_{(-1)}$	INCMAZ$_{(-2))}$	GOVSEDU$_{(-1))}$	GOVSEDU$_{(-2))}$	GOVSHLTH$_{(-1))}$	GOVSHTH$_{(-2))}$	GOVSRDS$_{(-1))}$	GOVSRD$_{(-2))}$	C
COINEq1	-0.025727	-0.384479	0.038838	0.128663	0.040832	0.017548	0.062135	-0.034355	0.017725	16722068
	(0.08767)	(0.34745)	(0.36480)	(0.09952)	(0.08001)	(0.10377)	(0.05473)	(0.02757)	(0.07962)	(7.2E+07)
	[-0.29346]	[-1.10659]	[0.10646]	[1.29287]	[0.51035]	[0.16910]	[1.13522]	[-1.24628]	[0.22262]	[0.23350]
R-squared	0.385794	Adj. R-squared	-0.166992	Sum sq. resids	2.13E+17	S.E. equation	1.46E+08	F-statistic	0.697909	
Log likelihood	-397.4026	Akaike AIC	40.74026	Schwarz SC	41.23813	Mean dependent	25050700	S.D. dependent	1.35E+08	

Source: E-view computation ***, **, * significant at 1%, 5% and 10% respectively

The VECM model of long-run and short-run relationship between government rural infrastructural spending on enterprise income of millet in Benue state:

The estimate of vector error correction for long-run between governments rural infrastructural spending (GOVSEDU, GOVSHLTH, GOVSRDS) on enterprise income of millet is summarized in table 6. The result revealed that, coefficient of government spending on education in the previous year (GOVSEDU$_{-1}$), government spending on health (GOVSHLTH$_{-1}$) and government spending on roads in the previous year (GOVSRDS$_{-1}$) are variables that have significant effect on income of millets (INCMIL) in the long-run.

Specifically, the coefficient of government spending on health in the previous year (GOVSHLTH$_{-1}$) was positive conforming to the a priori expectation and significant at 1 percent probability level implying that unit increase in government spending on health (GOVSHLTH$_{-1}$) in the previous year will increase income of millet (INCMIL) by 6.4953 in the long-run. This may be attributed to the fact that, there are adequate government health care centers which are important infrastructure which facilitate provision of good health to farmers who actively participate in marketing of agricultural crops since sound health motivates and encourage farmers to produce to sell in order to generate higher income. Also, health is a direct source of human welfare and also an important instrument for realizing better income level. This result is in agreement with WHO (2004) that elimination of diseases through increase in government spending on health care facilities will improve individual health thereby enhancing income earning capacity.

In contrast, the coefficient of government spending on education in the previous year (GOVSEDU$_{-1}$) and government spending on roads in the previous year (GOVSRDS$_{-1}$) were negative and contrary to the a priori expectation and significant at 1 percent probability level implying that unit increase in both government spending on education in the previous year (GOVSEDU$_{-1}$) and government spending on roads in the previous year (GOVSRDS$_{-1}$) decreased income of millets by -2.3207 and -0.8508 in the long-run respectively. This may be attributed to the fact that roads which are important

infrastructure in most rural areas are bad requiring huge sums of investment to meaningful contribution, therefore agricultural produce find it difficult to get to the market on time. While the educational facilities that are meant to impact knowledge through extension services are simply inadequate and unavailable to farmers to optimize production and maximize profit thereby boasting their farm income level. The result is in disagreement with the earlier findings of Rosegrant and Everson (1992) both state that education, training and extension as well as technological advancement improves quality of how inputs are combined thus leading to productive gains. And Inoni and Omotor (2009) in the study 'effect of road infrastructure on agricultural output and income of rural household in Delta state, Nigeria', found out that increase in government spending on road had strong significance influence on income.

The estimate of short-run relationship between government rural infrastructural spending on income of millet is summarized in table 6. The result revealed that, in the short-run the coefficient of determination (R^2) was 0.42 implying that, 42 percent in the variation in enterprise income of millet (INCMIL) is caused by the following; income of millet in the previous year (INCMIL$_{-1}$), income of millet two years ago (INCMIL$_{-2}$), government spending on education in the previous year (GOVSEDU$_{-1}$), government spending of education two years ago (GOVSEDU$_{-2}$), government spending on health care facilities in the previous year (GOVSHLTH$_{-1}$), government spending on health two years ago (GOVSHLTH$_{-2}$), government spending on roads in the previous years (GOVSRDS$_{-1}$) and government spending on roads two years ago (GOVSRDS$_{-2}$). The result also shows that the F-statistics (0.7938) is positive and insignificant implying that all the explanatory variables have no significant effects on income of millet enterprise (INCMIL) in the short-run. Therefore, the null hypothesis which, stipulates that, there is no significant relationship between governments rural infrastructural spending (GOVSEDU, GOVSHLTH, GOVSRDS) on income of millet enterprise (INCMIL) is accepted.

Specifically, the income of millet in the previous year (INCMIL$_{-1}$), income of millet enterprise two years ago (INCMIL$_{-2}$), government spending on education in the previous year (GOVSEDU$_{-1}$), government spending of

education two years ago (GOVSEDU$_{-2}$), government spending on health care facilities in the previous year (GOVSHLTH$_{-1}$), government spending on health two years ago (GOVSHLTH$_{-2}$), government spending on

roads in the previous year (GOVSRDS$_{-1}$) and government spending two years ago (GOVSRDS$_{-2}$) were not statistically significant. However, they do not have effect on income of millet enterprise (INCMIL) in the short-run.

Table 6: Result of The VECM model of long-run and short-run relationship between government rural infrastructural spending on income of Millet enterprise in Benue State

LONG-RUN		INCMIL$_{(-1)}$	GOVSEDU$_{(-1)}$	GOVSHLTH$_{(-1)}$	GOVSRDS$_{(-1)}$	C				
COINEq1		1.000000	-2.320674	6.495265	-0.850810	-5.31E+09				
			(0.15890)	(0.26988)	(0.03224)					
			[-14.6047***]	[24.0676***]	[-26.3901***]					

SHORT-RUN	INCMIL	INCMIL$_{(-1))}$	INCMIL$_{(-2))}$	GOVSEDU$_{(-1))}$	GOVSEDU$_{(-2))}$	GOVSHLTH$_{(-1))}$	GOVSHTH$_{(-2))}$	GOVSRDS$_{(-1))}$	GOVSRD$_{(-2))}$	C
COINEq1	-0.068539	0.015520	-0.577396	-0.144717	-0.145747	0.307836	0.105573	0.001900	0.110696	13712633
	(0.12926)	(0.26437)	(0.36512)	(0.14939)	(0.13795)	(0.44769)	(0.23293)	(0.04341)	(0.16320)	(1.2E+08)
	[-0.53024]	[0.05871]	[-1.58137]	[-0.96873]	[-1.05651]	[0.68761]	[0.45324]	[0.04378]	[0.67827]	[0.11039]
R-squared	0.416716	Adj. R-squared	-0.108239	Sum sq. resids	8.09E+17	S.E. equation	2.84E+08	F-statistic	0.793813	
Log likelihood	-410.7657	Akaike AIC	42.07657	Schwarz SC	42.57444	Mean dependent	36006644	S.D. dependent	2.70E+08	

Source: E-view computation ***, **, * significant at 1%, 5% and 10% respectively

The VECM model of long-run and short-run relationship between government rural infrastructural spending on income of Sorghum enterprise in Benue state:

The estimate of vector error correction for long-run between governments rural infrastructural (GOVSHLTH, GOVSEDU, GOVSRDS) on income of Sorghum enterprise is summarized in table 7. The result revealed that, government spending on health (GOVSHLTH$_{-1}$), government spending on education in the previous year (GOVSEDU$_{-1}$), and government spending on roads in the previous year (GOVSRDS$_{-1}$) are variables that effect income of Sorghum (INCSORG) in the long-run.

Specifically, the coefficient of government spending on health (GOVSHLTH$_{-1}$) was positive conforming to the a priori expectation and significant at 1 percent probability level implying that, unit increase in government spending on health (GOVSHLTH$_{-1}$) in the long-run will increase the income of sorghum enterprise by 2.7679. This is attributed to the fact that, government health care facilities covers most council wards in Benue state since increase in government spending on health care facilities enhances efficiency and productivity. This result is in agreement with the earlier finding of WHO (2004) that elimination of diseases through increase in government spending on health care facilities will improve individual health thereby enhancing income earning capacity.

In contrast, the coefficient of government spending on education in the previous year (GOVSEDU$_{-1}$) and government spending on roads in the previous year (GOVSRDS$_{-1}$) were negative and contrary to the a priori expectation and significant at 1 percent probability level implying that unit increase in both government spending on education in the previous year (GOVSEDU$_{-1}$) and government spending on roads in the previous year (GOVSRDS$_{-1}$) will decrease income of sorghum by -2.6237 and -0.7593 in the long-run respectively. This may be attributed to the fact that, road and education are

important infrastructure but are limited due to under-investment in both road and education in most council wards in Benue state. This result is against the earlier findings of Balisacan and Pernia (2002) that provision of road and human capital (schooling) investment has positive impact on welfare of the poor and enhances income generation.

The estimate of short-run relationship between governments rural infrastructural spending (GOVSEDU, GOVSHLTH, GOVSRDS) on income of Sorghum enterprise (INCSORG) is summarized in table 7. The result revealed that, in the short-run the coefficient of determination (R^2) was 0.29 implying that, 29 percent variation in income of sorghum (INCSORG) is caused by the following; income of Sorghum in the previous year (INCSORG$_{-1}$), income of Sorghum two years ago (INCSORG$_{-2}$), government spending on education in the previous year (GOVSEDU$_{-1}$), government spending on education two years (GOVSEDU$_{-2}$), government spending on health care facilities in the previous year (GOVSHLTH$_{-1}$), government spending on health two years ago (GOVSHLTH$_{-2}$), government spending on roads in the previous years (GOVSRDS$_{-1}$) and government spending on roads two years ago (GOVSRDS$_{-2}$). The result also show that the F-statistics (0.4442) is positive and not significant implying that all the explanatory variables have no significant effects on income of Sorghum (INCSORG) in both the long-run and short-run. Therefore, the null hypothesis that, stipulates that, there is no significant relationship between government rural infrastructural spending (GOVSEDU, GOVSHLTH, GOVSRDS) on income of sorghum (INCSORG) is accepted.

Specifically, the coefficient of government spending on education two years ago (GOVSEDU$_{-2}$) was positive conforming to the a priori expectation and significant at 10 percent probability level implying that increase in government spending on education facilities will increase the income of sorghum in the short-run by 0.5018. This

may be attributed to the facts that, increase in government spending on education enhances productivity and income generation. This result is in disagreement with the findings of Anand and Ravallion's (1993) their empirical result indicated that there was no significant relationship between education outcomes and public spending on education.

However, income of Sorghum in the previous year (INCSORG$_{-1}$), income of Sorghum two years ago (INCSORG$_{-2}$), government spending on education in the previous year (GOVSEDU$_{-1}$), government spending on health care facilities in the previous year (GOVSHLTH$_{-1}$), government spending on health two years ago (GOVSHLTH$_{-2}$), government spending on roads in the previous years (GOVSRDS$_{-1}$) and government spending on roads two years ago (GOVSRDS$_{-2}$) were all Statistically not significant. Therefore the stated variables have no effect on income of sorghum (INCSORG) in the short-run.

Table 7: Result of The VECM model of long-run and short-run relationship between government rural infrastructural spending on income of sorghum in Benue State

LONG-RUN		INCSORG$_{(-1)}$	GOVSEDU$_{(-1)}$	GOVSHLTH$_{(-1)}$	GOVSRDS$_{(-1)}$	C				
COINEq1		1.000000	-2.623717	2.767921	-0.759313	1.16E+09				
			(0.23011)	(0.43004)	(0.05636)					
			[-11.4023***]	[6.43645***]	[-13.4735***]					
SHORT-RUN	INCSORG	INCSORG$_{(-1)}$)	INCSORG$_{(-2)}$)	GOVSEDU$_{(-1)}$)	GOVSEDU$_{(-2)}$)	GOVSHLTH$_{(-1)}$)	GOVSHTH$_{(-2)}$)	GOVSRDS$_{(-1)}$)	GOVSRD$_{(-2)}$)	C
COINEq1	0.125714	0.036612	-0.003990	0.402686	0.501806	-0.415198	-0.333269	0.086255	0.100393	-1.76E+08
	(0.10061)	(0.28250)	(0.28571)	(0.28940)	(0.27209)	(0.29301)	(0.27433)	(0.08135)	(0.10663)	(1.4E+08)
	[1.24953]	[0.12960]	[-0.01396]	[1.39146]	[1.84428*]	[-1.41700]	[-1.21485]	[1.06031]	[0.94147]	[-1.22607]
R-squared	0.285621	Adj. R-squared	-0.357320	Sum sq. resids	1.12E+18	S.E. equation	3.35E+08	F-statistic	0.444242	
Log likelihood	-414.0505	Akaike AIC	42.40505	Schwarz SC	42.90292	Mean dependent	-5276902.	S.D. dependent	2.88E+08	

*Source: E-view computation ***, **, * significant at 1%, 5% and 10% respectively*

CONCLUSION AND RECOMMENDATION:

The study empirically analyzed the effects of government rural infrastructural spending on income generation of cereals enterprise in Benue State Nigeria. Findings from this study revealed that, government rural infrastructural spending exalted a positive but no significant effects on output of maize, millets and sorghum both in the long and short-run analysis. Based on findings from the empirical analysis, the study recommends: That, policy makers should pay closer attention to rural infrastructures as a whole rather than a discrete component of infrastructure by increasing promoting larger production of cereals and yearly budgetary allocation procedure to benefit from ecologically disadvantaged areas in cereals production in the state thereby fostering higher income base.

REFERENCES:

1. African Development Bank (ADB) (2005), fundamental *importance of infrastructure*.
2. Adenikinju, A. (2005) analysis of the cost of infrastructure failure in a developing economy: the case of the electricity sector in Nigeria. AERC research paper No.148. African economic research consortium, Nairobi. Nairobi, Kenya: the regel press Kenya Ltd.
3. Akinola, S. R. (2007). Coping with infrastructural deprivation through collective action among rural people in Nigeria. *Nomadic Journal of African study*. 16(1):30-46.
4. Anand, S. and Ravallion, M. (1993): 'human development in poor countries: on the role of private incomes and public services'. Journal of economic perspectives, 7 (winter).
5. Ater, P.I., Umeh, J.C., and Aye, G.C. (2014) poverty incidence and infrastructure status in peri-urban makurdi of Benue state Nigeria. *International jounal of research information, management and engineering* Vol.5 No. 9. Pp43-51.
6. Bakera A.S and Olubokun, S. (2011). Health care expenditure and economic growth in Nigeria: an empirical study. *Journal of emerging trend in economics and management science, (JETEMS)* 2(2) 83-872.
7. Bakera A.S and Olubokun, S. (2011). Health care expenditure and economic growth in Nigeria: an empirical study. *Journal of emerging trend in economics and management science, (JETEMS)* 2(2) 83-872.
8. Balisacan , A. M, Pernia E.M.(2002) *Probing beneath cross-national averages: poverty, inequality, and growth in the Philippines,* vol 7, ERD working paper series. Economics and Research Department, Asian Development Bank, Manila.
9. Blejer, M. and Khan, M. (1984). *"Government Policy and Private Investment in Developing Countries"* IMF staff papers, 40:379-403.
10. Deverajan S, Swaroop V, Zou H.F. (1996). *The composition of public expenditure and economic growth*. J. Monet. Econ. 37: 313 – 344.
11. Greaney. V, Khandker , R. and Mahmudul, A. (1999). *Bangladesh: Assessing basic learning skills. Dhaka, Bangladesh*: The University Press Limited.
12. Haller, P. S. and J. Diamond (1990) *International Companies of Government Expenditure Revisited.* The developing countries occasional paper 69, International monetary.
13. Inoni, O.E. and Omotor, D.G. (2009) *'effect of road infrastructure on agricultural output and income of rural households in Delta sate'.* Agricultura tropica et subtropica vol.42(2).

14. National Population Commission (NPC) (2006), Population Census, Official Gazatte (FGP 71/52007/2, 500 (OL24, also available on www.nigerianstat.gov.ng.

15. Oyewole, B. A. & Oloko, S. A. (2006). Agricultural and food losses in Nigeria: the Way out. *International Journal of rural studies (IJRS).* 13(1):14-16.

16. Perkins, P. & Luiz, J. (2005). An analysis of Economic infrastructure investment in South Africa. *South African Journal of Economics*. 73(2).

17. Rosegrant, M.W. and Everson, R.E. (1992). Agricultural productivity and sources of growth in south Asia. *American journal of agricultural economics,* 74 August 757-761.

18. Solano, P. L (1983) *Institutional Explanations of Public Expenditure among High Income Democracies.* Public finances 38: 440-458.

19. World Health Organization (2004). "Country Health System Fact Sheet (Nigeria)." www.afro.who.int/home/countries/fact_sheet/nigeria.pdf.