Impact of rural infrastructure on the livelihood of smallholders in agrarian communities in Edo state, Nigeria

Emokaro, C.O. and Oyoboh, D.E.

Invited paper presented at the 5th International Conference of the African Association of Agricultural Economists, September 23-26, 2016, Addis Ababa, Ethiopia

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Emokaro, C.O. and *Oyoboh, D.E.

Department of Agricultural Economics and Extension Services, Faculty of Agriculture, University of Benin, P.M.B. 1154, Benin City, Edo State, NIGERIA
*Corresponding author's email: danoyoboh@yahoo.com

ABSTRACT

Smallholders with total farm holdings of less than five hectares constitute about 70% of the farming population in Nigeria, producing most of the food crops thereby contributing to food security and poverty reduction. This huge contribution not withstanding they are faced with the challenges of inadequate agricultural infrastructure, much needed for optimal productivity. There is therefore a need to improve the general livelihood of these largely agrarian rural poor. The impact of the Community Driven Development (CDD) approach of Edo State Government Community and Social Development Project (CSDP) in meeting the overall development objective of sustainably increasing access of the poor to rural infrastructure was evaluated in this study. The study was carried out in 44 communities spread across the three Senatorial Districts of Edo State. A stratified sampling procedure was employed in selecting the 22 treatment communities and their corresponding counterfactuals for this study. Fifteen households were selected from each of the 44 communities to give a total sample size of 660 respondents. Descriptive and quantitative techniques such as frequency tables, means, standard deviation, percentages, comparative cost ratios and Difference-in-Differences (DD) were employed in analyzing the data generated. Results of the socioeconomic characteristics of respondents showed that they were mainly smallholder farmers with mean farm size and annual income of 0.23ha and ₦ 133,500, respectively. Their average age and household size were 45 years and eight persons respectively. Over 60% of the respondents were men and about 40% of them had formal education up to secondary school level. Results of the economic analysis indicated that the cost of all the Micro Projects embarked upon by Edo State CSDP averaged about ₦4,867,704.11. The estimated comparative cost ratio showed that the cost of CSDP Micro Projects were, at the least, about a third of the average alternative cost of similar projects embarked upon by the State Government, Local Government Areas (LGAs) and the Niger Delta Development Commission (NDDC). The highest comparative cost ratio of 4.55, was recorded in the skills acquisition project. The lowest ratio of 1.6 was however recorded in the town hall (civic center) project. Results of the causality between CSDP Micro Projects (MPs) and outcomes in the six sectors considered showed that the education sector had a reduction of 29.72 minutes in the average time taken by students to get to school and 0.69 kilometers in average distance to school due to Edo State CSDP intervention in the construction and rehabilitation of schools. In the water sector, a DD of 425 persons fetching water for domestic purpose was recorded, a 47% reduction in the cost of buying water with 65% of the community members now having access to portable water as a result of CSDP intervention in the provision of motorized boreholes. Average distance to water source equally reduced by 5.82 kilometers, while average time spent in fetching water reduced by 10. 56 minutes. The result also showed a 61% reduction in reported cases of water borne diseases, with 70% of the respondents opining that there is a change in personal hygiene after the provision of water facilities by Edo State CSDP. In conclusion, the effectiveness of the CDD process in improving the lives of the agrarian populace in Edo State has been shown empirically. Effort should be made by stakeholders in agricultural development to embrace this process and ensure the sustainability of these gains.

Key words: Counterfactual, Difference in Difference, Food Security, Hygiene, Optimal, Poverty

INTRODUCTION

If agriculture, particularly smallholder agriculture is to provide one of the principal routes out of poverty for the next generation of rural men and women, and create the sectoral growth that provides non-farm opportunities for others, it must be an agriculture that is productive, profitable and sustainable. It needs to be agriculture that helps reduce the vulnerabilities of poor rural people to risks and shocks. It needs to be an agriculture that can support the livelihoods of future generations, one that does not deplete, but rather helps to protect or restore, the natural resource base (IFAD, 2011). Curiously, the inconceivable fact is that agriculture has remained undeveloped in Sub-Saharan Africa (SSA) despite remaining the mainstay of our national economies. Ayuk (2014), opined that since a majority of the population lives in rural areas and depends directly or indirectly on agriculture, it is expected to play a central role for livelihood, growth and development. The agrarian sector has a strong rural base; hence, concern for agriculture and rural development become synonymous, with a common root. The sector plays a dominant role in the food security of the people. It employs between 60-75% of the labour force in the continent and contributes between 8-45% to the GDP (World Bank, 2008; Ayuk, 2014).

According to Machethe, *et al*. (2004), smallholder agriculture is important to employment, human welfare, and political stability in Sub-Saharan Africa. In addition, smallholder agriculture can moderate the rural exodus, create growth linkages and enlarge the market for industrial goods. Smallholder agriculture is also considered to be both a major cause of and potential solution to poverty and economic growth challenges (Machethe, *et al*., 2004). Smallholder farming literally is a type of farming that feeds the farmer's family only. It is an agricultural system in which a farm family or community uses what it produces and produces what it uses. The smallholder does not keep markets in mind when planning production. Individual farmers are islands in the agricultural inputs and outputs markets or exchange system. These resource-poor smallholders (Emokaro and Erhabor, 2006) who contribute more than 90% of agricultural output in Nigeria in particular (FMA&WR, 2008) and Sub-Saharan Africa in general (Spencer, 2002), must be assisted to rise beyond their current level of subsistence. One of the ways of doing this is to study their current production effort and identify gaps that could be bridged for optimum results (Emokaro and Omorebgee, 2011).

In many African countries, food security situation at both national and household level is poor. Nigeria, like other developing countries, is still facing persistent food crisis in spite of her vast land area of about 923,768 km^2. She cannot produce enough food in adequate quantity and quality to feed her over 140 million people. The common people especially those living in the rural areas that lack access to sufficient resources to produce or buy quality food, are worse hit by the food security phenomenon (Emokaro and Edemanrhia, 2014). Poverty within Nigeria remains staggeringly high with over 50% and 70% of its general and rural population respectively living on less than one US dollar per day (World Bank, 2007). Consequently, effort must be targeted at transforming this important sector so as to foster national development and poverty alleviation.

According to Parson (1966), agricultural development, is a transformation process which involves structural changes of an economy from a smallholder base to one that is industrial-urban oriented. The relationship between rural infrastructure and production in the agricultural sector is high and almost complimentary. Eboh (2013) defined agricultural development as an integrated approach to food production, provision of physical, social and institutional infrastructure with an ultimate goal of bringing about quantitative changes which culminate in improved standard of living of the rural population. Timmer (1998) referred to agricultural transformation as the transition from low productivity to high productivity commercial agriculture. Transformation looks for an approach that is characterized by greater partnership between federal, state and local government, economic entities, private industry and other community groups. The process of agricultural transformation involves diversification in the agricultural sector to meet changing domestic and trade demands (Eboh, 2013). Transformation of the Nigerian agricultural sector is therefore a necessary instrument if the country is going to achieve increase in domestic agricultural productivity.

Agricultural transformation is not only about food but also about the economy. The dimensions of this transformation are not only economic, but also include formal and informal institutional changes which are sociological or political in character (Colman and Nixson, 1994). The process of agricultural transformation involves a greater reliance on input and output delivery systems and increase in integration of agriculture with other sectors of the domestic and international economies (Obayelu and Obayelu, 2012). Agricultural transformation is characterized as a process of sustainable modernizing agriculture and such a process is often measured by significant improvement in land and labour productivity, greater market-orientation and production diversification, as well as increased domestic and international competiveness (Diao, 2010).

Institutional change in general and market development in particular are necessary parts of transformation. Most economists agree that the quality of institutions can explain differences in growth and transformation process by shaping incentives to develop new technologies and innovation (Easterly and Levine, 2003; Rodrik, *et al.*, 2004). Idachaba, *et al.* (1980) classified capital intensive infrastructures into three: Rural Social Infrastructure (RST) like health facilities, education facilities, rural utilities such as water and electricity supply; Rural Physical Infrastructure (RPI) like transportation, storage processing, soil conservation and irrigation systems and Rural Institutional Infrastructure (RII) which are institutions established to give support to the agricultural sectors such as research, credit, marketing and cooperative institutions. The relevance of the identified infrastructure to agricultural production cannot be over emphasized. In Nigeria, it is estimated that only about 10% of rural dwellers and about 40% of urban families have access to electricity that is usually interrupted and unreliable, with only about 30% of their demand being met (Onohaebi, 2014).

The Federal Government of Nigeria (FGN) and the World Bank (WB) are unanimous on the desirability of the Community Driven Development (CDD) approach in the overall strategy for poverty reduction in the country. The Community Social Development Project (CSDP) emerged in 2008 as a new intervention that was designed to effectively target social and environmental infrastructure at the community level, as well as improve Local Government Area (LGA) responsibility to service delivery. The development objective of this project was

to sustainably increase access of poor people to improved social and natural resource infrastructure services (CSDP, 2008). In the light of these developments, the question that readily comes to mind with respect to governance and farming communities in Edo State is whether the provision of rural infrastructure has made any impact on the livelihood of smallholders in the State?

The main objective of this study was thus to evaluate the impact of the CDD based CSDP intervention on the livelihood of smallholders in the largely agrarian participating communities and to evaluate the cost effectiveness of such projects in comparison with alternative interventions in Edo State. The aim is to assess changes in the well-being of individuals, households or communities attributable to the CSDP Micro Projects. The key performance indicator would be; increased number of smallholders with access to social services and access to rural infrastructure.

METHODOLOGY

Study Area: This study was carried out in 44 communities participating in CSDP projects in Edo State. These communities are spread over the three Senatorial districts of the State, namely, Edo South, Central and North, with seven, five and six Local Government Areas respectively.

Sampling Technique/Procedure: A stratified sampling procedure was employed in selecting the 22 treatment communities and their corresponding counterfactuals for this study. The treatment communities were selected, based on completed and functional micro-projects from six sectors, as at July 2013. For effective impact evaluation and comparison, the following minimum period of time was used; Education (2 years), Water (1 year), Health (1 year), Transport (1 year), Rural Electrification (6 months) and Socio-Economic Activities (6 months).

Fifteen households were randomly selected from each of the 22 selected treatment communities. In addition, equal number of non-benefiting communities and households were selected as control for the estimation of counterfactuals per sector. Benefiting and non-benefiting communities were identified in conjunction with the State Agency. In this study, maximum of five communities per sector were chosen for both treatment and control. Where the number of micro-projects in the communities by sector were not up to five, all the communities that executed the projects were taken (as was the case in Health and Transport sectors, where only one project was chosen respectively). All the interventions in socioeconomic sector were regarded as a sector and treated as such. For the estimation of counterfactual, the control communities selected were close to the treated communities and they shared similar socioeconomic characteristics. Ultimately, 44 communities and 660 households were selected for both benefitting and non-benefiting communities respectively. The sampled micro-projects and their respective sector, community and Local Government Areas are presented in the Table 1.

Table 1: Sectoral Distribution of Sampled Micro-Projects per Treatment and Counterfactual Community respectively

S/N	Communities Treatment Counterfactual		Micro-Project	Sector
1	Ekpedo	Lampese	School Staff Quarters	Education
2	Iyamoh	Ogido	Secondary School	Education
3	Okhokhugbo	Igieghudu	Sec. Sch. Class Room	Education
4	Uhen	Ugbuwe	Sec. Sch. Renovation	Education
5	Ugbogui	Utesse	School Staff Quarters	Education
1	Eyaen I	Irhue-nowina	Electrification	Electrification
2	Obenevbueribo	Ehanlen	Electrification	Electrification
3	Osakwe	Emaudo	Electrification	Electrification
4	Powerline	Evbuekhae	Electrification	Electrification
5	Uselu Nahor	Uyinmwendin	Electrification	Electrification
1	Auchi	Ibienefe	Lock-up Stores	Socio-Economic
2	Idumonka	Egbeta	Town Hall	Socio-Economic
3	Igiode	Ikao	Skill Acquisition Center	Socio-Economic
4	Oria	Amendokhian	Town Hall	Socio-Economic
5	Utagban	Azagban	Town Hall	Socio-Economic
1	Agbodo	Ikpe	Water Scheme	Water
2	Agbomoba	Evbuabogun	Water Scheme	Water
3	Eguare-Ewu	Ogbesse	Water Scheme	Water
4	Ogwa	Ofumwengbe	Water Scheme	Water
5	Otuo	Ivuikwe	Water Scheme	Water
1	Oduna	Okeze	Primary Health Center	Health
1	Abiala I	Abiala II	Speed Boat	Transport

Source: Computed from Survey Data, 2013.

Data Collection: A combination of qualitative and quantitative research methods were used in generating the data for this study. Primary data were obtained using, Focus Group Discussions (FGDs), case studies, key informant interviews and in-depth interview, with the aid of structured questionnaire sets. Secondary data were obtained from Monitoring and Evaluation data sets of the State Agency including baseline, written official records, school and clinic records, brief interview and schedules.

Data Analysis: To establish causality between a program and an outcome, impact evaluation method that rules out the possibility of any factors other than the program of interest will be

used to explain the impact. The impact or causal effect (α) of a program (P) on an outcome of interest (Y) is given by: $\propto = (Y|P = 1) - (Y|P = 0)$

That gives the difference between the outcome of with (P=1) and without (P=0) the program. This approach therefore necessitates the estimation of counterfactual. At any given moment in time, a community either participated in the program or did not participate. Since the community cannot be observed simultaneously in two different states, it is called the counterfactual problem. The counterfactual is an estimate of what the outcome (Y) would have been for a program participant in the absence of the program (P). The concept of CSDP requires that Difference-in-Differences (DD) be used for the impact evaluation. DD estimates the counterfactual for the change in outcome for the treatment group by calculating the change in outcome for the comparison group. This method takes into account any differences between the treatment and comparison groups that are constant over time. This impact evaluation tool was used to elicit the differences in outcomes of the respective State CSDP interventions.

Descriptive and quantitative techniques such as frequency tables, means, standard deviation, percentages and ratios, were employed in the analysis of the study data. The comparative cost ratio (which is the average alternative cost, deflated by the CSDP cost), was used in ascertain the cost effectiveness of the CSDP micro projects as against alternative projects.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Respondents

The socioeconomic characteristics of a total of 641 respondents sampled from both the treatment and control communities were described in this section, as summarized in Table 2, and discussed under their respective sub-headings.

Sex Categorization of Respondents: The study area was dominated by men (392 as against 249 women). The crucial role played by women in a rural economy cannot be overemphasized, irrespective of the patrimonial nature of the Nigerian society, as confirmed by this result. This further strengthens the argument for the mainstreaming of the womenfolk, so as to avoid lopsidedness in our developmental drive.

Level of Education: Result shown in Table 2 indicates high level of literacy among the respondents. This is a positive indication that beneficiary communities (from where this sample was drawn), would understand with little promptings, the rudiments of the CDD driven CSDP initiative in the developmental drive of their respective communities.

Marital Status: Most of the sampled respondents (495 out of 641 persons) were married. This could suggest stability and societal cohesion, attributes that can easily translate to socially responsible behavior, capable of enhancing the identified goals of development.

Other Socio-Economic Characteristics of the respondents: The respondents were mainly smallholders with a mean farm size of 0.23 and averaged income of ₦ 133,000/annum. They were still in their active/productive years, with a mean age of 45 years, and average household size of eight persons.

This annual income value is less than the ₦ 217,872/annum reported by Emokaro and Edemanrhia (2014). The categorization of respondents as smallholders based on their average

farm size however agrees with the findings of Akinwale (2000) and Idowu, *et al.* (2007), who regarded cocoa farmers with less than five hectares as smallholders in their respective studies. These indices confirm the poverty status of the respondents, thereby buttressing the need to find ways of improving on their income generating power from agricultural activities. Effort must be made to help reduce the vulnerabilities of these poor rural folks to risks and shocks. This would help create an agriculture that can support the livelihoods of future generations, one that does not deplete, but rather helps to protect or restore, the natural resource base (IFAD, 2011).

Table 2: Summary Statistics of Respondents Socioeconomic Characteristics

Variables	**Mean**	**Standard deviation**	**Variance**	**Dominance analysis**	
				Definition	Value
Age of respondents (years)	45.0	2.8	8.0	% within the age bracket of 26 – 60	66.0
Sex of respondents (1 = male, 0 = female				% of male respondents	61.0
Marital status (1 = married, 0 = otherwise)				% of married respondents	77.2
Formal Education (years)	9.0	1.7	2.9	% of respondents with more than six years of formal education	57.0
Household size (numbers)	8.0	2.0	4.0	% of respondents with more than seven individuals in the household	62.0
Experience in primary occupation (years)	16.0	2.9	8.5	% of respondents with more than 10 years of experience	77.0
Membership of association (1= Yes, 0 = No)				% of respondents who were members of associations	35.4
Engagement in agricultural activities (1= Yes, 0 = No) Farm size (hectares)	0.23	1.6	2.0	% of respondents who are engaged in agricultural activities	61.0
Total amount of income generated per	₦133,500:00	3.7	13.7	% of respondents with more than ₦240,000:00 annual	26.0

year				income	

Source: Computed from Survey Data, 2013.

Sectoral Analysis of Project Performance

Result of the outcome, output and impact of CPMC Micro Projects on the livelihood of respondents is analyzed in this section. The outcome indicators for all the community driven investments in Education, Water, Health, Transport, Electricity and Socioeconomic Sectors are presented in Tables 3 – 8.

Education: Outcome results in the education sector were positive, based on available indices (Table 3). The causality between CSDP Micro Projects (MPs) and outcomes showed that the education sector had a reduction of 29.72 minutes in the average time taken by students to get to school and 0.69 kilometers in average distance to school due to Edo State CSDP intervention in the construction and rehabilitation of schools. Measurable improvements were also recorded in number of students in science classes in Iyamoh community, where a science laboratory was provided. These outcomes should encourage the State and LGA authorities to intensity effort in this direction, for the purpose of strengthening agricultural productivity on a sustainable basis.

Table 3: Outcome Result in the Education Sector

S/N	Indicator	Definition	Unit of Measure	Treated Difference in outcomes (before and after)					Control Difference in outcomes (before and after)					Treat Outco
				TC1	TC2	TC3	TC4	TC5	CC1	CC2	CC3	CC4	CC5	Avera
1	Increase in the no of school age children enrolled in schools	Number of additional children that have registered in the schools (disaggregated by Male and Female)	Number Male: Female:	 NA NA	 NA NA	 NA NA	 NA NA	 NA NA	 - -	 - -	 - -	 - -	 - -	 - -
2	Average time taken to get to school	Average time taken to get to school from different sections of the community.	Minutes	0	15.6	0	0	43.84	-	-	-	-	-	29.72
3	Average distance taken to get to school	Average distance taken to get to school from different sections of the community.	Km	0	0.61	0	0	0.76	-	-	-	-	-	
4	Average school attendance	Average no. of pupils/students that come to school (disaggregated	Number Male: Female:	 NA NA	 NA NA	 NA NA	 NA NA	 NA NA	 - -	 - -	 - -	 - -	 - -	 - -

		by male and female)												
5	Students learning sciences	No. of students in science classes (disaggregated by male and female)	Number (Male): (Female):	- -	- -	46 -	- -	- -	- -	- -	- -	- -	- -	46 -
6	Student's library attendance	No. of students using the library (disaggregated into male and female)	Number	NA NA	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

Source: Computed from Survey Data, 2013.

Water Sector: In the water sector, a DD of 425 persons fetching water for domestic purpose was recorded, a 47% reduction in the cost of buying water with 65% of the community members now having access to portable water as a result of CSDP intervention in the provision of motorized boreholes (Table 4). Average distance to water source equally reduced by 5.82 kilometers, while average time spent in fetching water reduced by 10. 56 minutes. The result also showed a 61% reduction in reported cases of water borne diseases, with 70% of the respondents expressing the opinion that there is a change in personal hygiene after the provision of water facilities by Edo State CSDP in their communities. Some of the benefitting communities, relied on open streams as their a source of water supply for domestic use before CSDP's intervention. The positive indicators recorded in this sector further strengthens the argument for increased funding in this sector. However, experts are of the opinion that the borehole water project largely embarked upon as a source of portable water, is rather simplistic and only a temporary panacea. More sustainable rural water schemes should be explored.

Table 4: Outcome Result in the Water Sector

S/N	Indicator	Definition	Unit of Measure	Treated Difference in outcomes (before and after)					Control Difference in outcomes (before and after)					Treate Outcor
				TC1	TC2	TC3	TC4	TC5	CC1	CC2	CC3	CC4	CC5	Averag
1	People fetching water for domestic use	No. of people fetching water from water facilities /week.	Number Male: Female:	516 201	80 25	428 80	190 44	508 63	3 1	4 2	3 -	2 1	3 1	344 83
2	People using water facility	Percentage of people the water facility is serving (i.e the proportion of the	Percentage	83	54	75	57	68	2	3	1	3	1	67.40

		community being served by the facility).												
3	Reduction in cost of water	Difference in the average amount spent by household on water on monthly basis after the provision of water facility by the Project	Percentage	92	40	48	23	33	-	-	-	-	-	47.20
4	Average distance to water source	Average distance from the various households in different section of the community to the provided water point (Rehabilitated or newly constructed) by CSDP	Km	1.20	0.34	15.22	2.32	10.00	-	-	-	-	-	5.82
5	Average time spent fetching water	Average time taken to fetch water from the water facility from different sections of the community	Minutes	27.07	24.2	35.95	18.4	26.40	-	-	-	-	-	10.56
6	Reduction in the number of reported cases of water borne diseases	Difference in the number cases of water borne diseases reported before and after the provision of the water facility	Percentage	82	46	74	50	62	5	3	-	1	1	63.2
7	Perception of community members on personal	Opinion of households about change in personal hygiene after the provision	Percentage 'No change: Improved: Highly	10 56	56	80	56	74	4	1	-	-	-	10 56 34

	hygiene	of water facility.	improved:	34										

Source: Computed from Survey Data, 2013.

Health sector: Assessment of CSDP's intervention in the health sector was only possible in one community (Oduna). Primary Health Center (PHC) was built in this community, and it resulted in measurable increases in the number of children immunized (DD 40), and increased access to Medicare by members of Oduna community (Table 5). This appears more like a drop of water in an ocean, considering the myriads of health related problems more substantial interventions would solve. This is the only health facility in the entire community as of now and concerned authorities can leverage on these success to replicate same. There is a direct and positive relationship between the health of these rural dwellers and agricultural productivity, since over 60% of them have been shown to be involved in agriculture. This is in agreement with Osabuohien and Alufohai (2015), who established a nexus between agricultural productivity and farmers' wellbeing. Olowogbon and Jolaiye (2012) opined that agriculture as carried out today is a dangerous occupation as millions of agricultural workers sustain injuries and death throughout the world. Health and Safety Executive (2009) equally reported that agriculture is an industry with high incidence of human accident and ill health. Farmers' illness and disease problems are capable of reducing agricultural productivity through the loss of productive adults and their assets with which they cope with these illnesses (Spore, 2009; Sharma, Njem, Bjertnes and Kristensen, 2010; Ulimwengu and Badiane, 2011).

Table 5: Outcome Result in the Health Sector

S/N	**Indicator**	**Definition**	**Unit of Measure**	**Treated Difference in outcomes (before and after)**					**Control Difference in outcomes (before and after)**					**Treated Outcome**	**Control Outcome**	**DD**
				TC1	**TC2**	**TC3**	**TC4**	**TC5**	**CC1**	**CC2**	**CC3**	**CC4**	**CC5**	**Average**	**Average**	
1	People attending Health Centers for treatment/counseling	No. of people visiting the Health centre provided for treatment/counseling (disaggregated by male and female).	Number Male: Female:	13 08					- -					13 08	- -	**13 08**
2	People attending ante-natal/post-natal clinic	Number of women attending Health centers for Ante-natal and post natal clinics	Number	-					-					-	-	-

3	Children immunized	No. of children immunized (disaggregated by Male and Female)	Number Male: Female:	40 24					1 1					40 24	9 4	**31** **22**
4	Medical Staff deployed to Centers	No. of Medical staff posted by the LGA to work in the Health centre	Number of Medical staff	1					-					1	-	**1**
5	Average distance to health centers	Average distance taken to get to the Health centre from different sections of the community.	Km	5.7					-					5.7	-	**5.7**
6	Average time to health centers	Average time taken to visit the Health centre by households from different sections of the community	Minutes	45.14					-					45.14	-	**45.14**

Source: Computed from Survey Data, 2013.

Transport Sector: As was the case in the health sector, the Abiala I speed boat project was the only intervention in the transport sector that qualified for assessment. The template for assessment could not really capture its outcome result (as it tends to fall out of the main transportation concepts of the provision of roads, bridges, culverts etc), there were still measurable outcomes though (Table 6). A clear outcome under this was the reduction in average travel time (DD 65%). This is very instructive in a community like Abiala I, which is only accessible by the waterways in the heart of the rains. One speed boat is thus clearly inadequate, especially when viewed against the backdrop of the timely transportation of farm produce to the markets. Transportation challenges remain detrimental to smallholder agricultural development as the paucity of good feeder roads in agrarian communities continues to create challenges for marketable agricultural surpluses and overall rural development.

These findings agree with earlier results that describe transportation as a major constraint to the marketing of agricultural products (Emokaro and Erhabor, 2006; Ayuk, 2014). In Nigeria, the movements within rural areas are made on foot and by bicycles along foot path and at best on narrow roads. In the riverine areas, small water craft and canoes are used instead of lorries and motor cars. In the northern parts of the country, animals (horses, donkeys and camels) transportation is widely practiced. In order to make rural-rural and rural-urban mobility much easier and thus facilitate the evacuation of produce as well as feed the rural areas with essential commodities, there is a dire need to improve the transportation system in rural Nigeria (Idode, 1999).

Table 6: Outcome Result in the Transport Sector

S/N	Indicator	Definition	Unit of Measure	Treated Difference in outcomes (before and after)					Control Difference in outcomes (before and after)					Treated Outcome	Control Outcome	DD
				TC1	TC2	TC3	TC4	TC5	CC1	CC2	CC3	CC4	CC5	Average	Average	
1	Average no of vehicles plying the roads per week	Average no. of vehicles using the constructed/rehabilitated road on weekly basis	Number	NA												
2	Reduction in average travel time with the provision of speed boat	Difference in the average travel time before and after the provision of speed boat	percentage	65					-					65	-	**65**
3	Reduction in cost of transportation	Difference in the cost of transportation before and after the provision of the speed boat	Percentage	-7.9					-					-7.9	-	**-7.9**

Source: Computed from Survey Data, 2013.

Electricity Sector: Results of the analysis carried out in the five communities where Micro Projects on rural electrification were executed is presented in Table 7. The established outcome from executed Micro Projects in the electricity sector, as measured by increase in recreation centers, though positive (with a DD value of 2.06%), was quite low. It may not be entirely right to base the measurement of such an impact entirely on recreation centers. Such ventures may not rank high in the scale of rural folks trying to irk out a living. The DD estimate for number of households connected to electricity however, gave a comparatively better result. The best outcome, as measured by the DD value of 4.5 was recorded in the increase in number of new businesses established as a result of provision of electricity through CSDP's intervention. This would go a long way in strengthening the income earning

ability of beneficiaries, who are currently on an estimated annual average income of ₦133,500 from agricultural activities, as reported under socioeconomic characteristics. This intervention could easily expand the agricultural value chain in the micro community in the short run and ultimately beyond on a more sustainable basis.

Table 7 Outcome Result in the Electricity Sector

S/N	Indicator	Definition	Unit of Measure	Treated Difference in outcomes (before and after)					Control Difference in ou (before and a		
				TC1	TC2	TC3	TC4	TC5	CC1	CC2	CC3
1	Households connected to electricity	No. of households connected to electricity	Number	26	70	15	6	3	-	-	-
2	Small scale businesses established	No. of new businesses established as a result of electrification	Number	2	2	1.3	4.43	10	-1	-	-
3	Households using electrical/electronic gadgets	No. of households using electrical /electronic gadgets as a result of electrification	Number	3.5	4	4	6.44	4.12	0.25	0.34	-
4	Increase in recreation centers established	Difference in the no. of recreation centers springing up before and after electrification	percentage	.154	,27	-	1.75	5	1	1	-

Source: Computed from Survey Data, 2013.

Socioeconomic Activities: This sector is quite unique in that three different projects (town hall/civic center, skills acquisition center and markets stalls) were considered under it. Again the outcome results were positive in all the projects. This is one sector that can easily be bought into by stakeholders, because of its largely commercial nature. Communities can even be encouraged to replicate same, in cases where government agencies are foot-dragging. The relative ease of implementation is shown in the fact that this sector had the highest proportion

of projects. It also has the potential of diversifying the income stream of respondents who may have relied mainly on income from agriculture, on a more sustainable basis. This would ultimately result in long term transformation of the rural economy and beyond. It is in consonance with the thoughts of Timmer, (2009) on agricultural transformation as a process based on significant long-term productivity increase leading to increase in people employed in agriculture and releasing labour to be transformed to other sectors of economy. It equally agrees with the view of Eboh (2013), that such development would ultimately bring about quantitative changes which culminate in improved standard of living of the rural population.

Table 8: Outcome Result in the Socioeconomic Sector

S/N	**Indicator**	**Definition**	**Unit of Measure**	**Treated Difference in outcomes (before and after)**					**Control Difference in outcomes (before and after)**					**Treated Outcome**	**Control Outcome**	**DD**
				TC1	**TC2**	**TC3**	**TC4**	**TC5**	**CC1**	**CC2**	**CC3**	**CC4**	**CC5**	**Average**	**Average**	
1	Persons trained in skill acquisition and utilizing skill	The percentage of persons utilizing the acquired skills.	Percentage	62					-					62	-	62
2	Average social activities carried out in the centre.	No. of social activities carried out in the constructed/rehabilitated centre on monthly basis	Number		5	5	8			2	2	2		6	2	46
3	Revenue generated from															
4	i. Multi-	Amount realized from the Multi-	Naira		25,000	25,0	40,0							30,000	-	30,000

	purpose centers	purpose centre per month				00	00									
5	ii. Stalls	Amount realized from the stall per month	Naira					1,500					-	1,500	-	1,500
6	Estimated total population utilizing market stalls	Estimated number of people using the stalls constructed/rehabilitated	Number					260					-	260	-	260

Source: Computed from Survey Data, 2013.

Economic Analysis

In order to ascertain the cost efficiency of CSDP Micro Projects, it was necessary to compare the cost of CSDP projects with similar projects carried out by other agencies in benefitting communities. Three agencies were considered, based on their preponderance in these communities. These are the Edo State Government, the 18 LGAs that cut across Edo State and the Niger Delta Development Commission (NDDC). As shown in Table 9, the cost of all the Micro Projects embarked upon by Edo State CSDP was readily made available and averaged ₦4,867,704.11. The comparative cost ratio (which is the average alternative cost, deflated by the CSDP cost), showed that the cost of CSDP Micro Projects were about a third of the average alternative cost (at the least). This clearly ascertains the cost effectiveness of the CSDP projects. A major reason that could be adduced for this is the effectiveness of the CDD approach adopted by CSDP, which ensures the involvement of the community members, right from conception through to the completion of the projects. It was not possible to access project details from alternative sources, so as to decipher possible reasons for such wide variations in project cost. The CDD approach, apart from ensuring transparency, gives the community members a clear sense of ownership and as such ensures cost reduction, through such cost saving measures as the use of direct labour and contributions from community members in kind.

Table 9: Comparative Cost Analysis of CSDP Micro-Projects

Type of project	CSDP (₦)	State Government (₦)	Local Government (₦)	Other agencies (NDDC)	Total alternative cost (₦)	Average alternative cost (₦)	Cost comparative

							ratio
1 block of 3 classrooms	2,893,576:38	12,000,000:00	11,000,000:00	7,000,000:00	30,000,000:00	10,000,000:00	3.46
1 block of 6 classrooms	5,787,152:75	18,000,000:00		14,000,000:00			
Staff quarters	5,045,233:50						
School library	5,000,000:00						
Science laboratory	5,624,737:50						
Electrification	5,174,980:00			8,750,000			
Health Centre	4,980,922:40	17,000,000:00	24,000,000:00		41,000,000	20,500,000	4.12
Motorized Borehole	4,616,310:40	8,983,150:50	7,000,000:00	22,000,000	37,983,150.5	12,661,050.17	2.74
Market stalls (unit cost)							
Open stalls							
Lock-up stalls	4,197,472:00		13,800,000:00				
Skill acquisition centres	5,500,000.00	25,000,000:00					
Town halls (Civic centres)	4,764,360.33			8,000,000			

Source: Computed from Survey Data, 2013.

CONCLUSION

This study considered the impact of the CDD approach adopted by the Edo State Government CSDP in transforming the lives of smallholder agrarian communities in the State. it was observed that this approach was quite effective in achieving the objective of increasing access of the rural poor to improved infrastructure on a sustainable basis. The cost efficiency analysis showed that CSDP Micro Projects performed more efficiently than conventional State, LGA and NDDC Micro Projects. There were measurable improvements in the income earning power, health status and personal hygiene of rural dwellers provided with electricity, primary health care centers and water supply. The number of school enrolments also increased for communities provided with educational facilities as well as improved social activities in areas where socio-economic projects were executed. The CDD approach to community development, adopted by Edo State CSDP in the provision of rural infrastructure

was proven to be quite effective in improving the general well being of the poor. While the extension of the project is highly advocated, Edo State Government must be encouraged to buy into this proven process by substantially funding the State Agency, which has been empowered by law to drive the CDD process in critical areas of development throughout Edo State.

RECOMMENDATIONS

The following recommendations are made as a way of transforming the lives of smallholder farmers in the State on a more sustainable basis:

1. Relevant authorities should make it mandatory for LG authorities to be more transparent with their records, particularly their financial records. This would go a long way in aiding policy formulation, planning, research and development in rural communities.
2. The World Bank, as a matter of deliberate policy should publicize the proven effectiveness of that of the CDD approach to community development so that all citizens can have the opportunity to buy into the concept and ensure its adoption by governments.
3. Effort should be geared towards the provision of more specific agricultural infrastructure in rural communities to increase the productivity of the farmers and enhanced their improved standard of living. More specifically, rural physical infrastructure (storage equipment, farm machineries, herbicides and pesticides, fry and fingerlings, fishing boats and nets) and rural institutional infrastructure (fertilizer distribution centres, agricultural advisory services, micro credit centres) should be provided for increased productivity.

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