

Exploring Farmers' willingness to pay for Irrigation service Improvement in Nigeria

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ABSTRACT

Although a prosperous agriculture is a key driver for poverty reduction, and irrigated agriculture contributes to agricultural productivity, the sector has witnessed tremendous decline in Nigeria due to a variety of problems. Financing needs for irrigation are not being currently met. Recurrent costs (operation and maintenance) are offset by user charges and government subsidies. However revenue raised from users is a source of finance for irrigation that is grossly under-explored, although it has the potential for sustainably financing recurrent operations. Current policy direction in the sector is to commercialize public sector River Basins with a view to revitalize Irrigated agriculture. Although it has been noted that farmers have the strongest incentives to ensure sustainability of irrigation systems as their livelihoods depend on them, a major concern about devolution of financing is if it would work where infrastructure is dilapidated and user ability to pay is limited by macro-economic factors. Using a CVM approach, this paper elicits the determinants of willingness to pay for improved irrigation service in two projects in Nigeria, using a tobit model. It provides evidence to support policy in the irrigation sector and informs the link between farmer's socio-economic characteristics and their willingness to pay for irrigation.

Keywords: Irrigated agriculture, operation and maintenance, willingness to pay, Policy, Nigeria

INTRODUCTION

Globally, irrigation has been an important factor in increasing agricultural productivity by enabling the production of improved varieties of both crops and animals and ensuring predictability in output (Cia *et al*, 2001; Upton, 1996, Van Koppen *et al* 2005, Svendsen *et al* 2007). Irrigation also enables dry season production of some crops thereby ensuring employment and income for farmers in the dry slack season (Upton 1996, Dauda *et al* 2009). Yet in Nigeria, the area under irrigation is about 974, 900hectares, which is less than 1 percent of the arable land in the country (FAO Aquastat, 2005). With a rich water resource endowment, the irrigation potential of Nigeria is put at more than 3 million hectares, which is about 10 percent of the country's arable area (FAO Aquastat, 2005; Takeshima and Edeh, 2013). The nation however has not experienced sustained growth in the sector due to some shortcomings.

The National water resource Master plan prepared in 1995 concluded that water is the major constraining factor to food production in Nigeria (Musa, 2004). As observed by Khroda (1996) a major source of worry for African farmers is the uncertainty in the availability of water during all of a crops growing season, and the possibility of dry spells within the rainy season. Consequently, in the humid zone of Nigeria, irrigation is required to extend agricultural production beyond the rainy season, while in the arid and semi-arid parts of the country, irrigation is an imperative as no meaningful agriculture can be done without supplemental water. In response to this, the Federal Government of Nigeria established large scale irrigation schemes situated around major rivers in the country (Ogunjimi and Adekalu, 2002)

Although Nigeria experienced a rapid expansion of irrigated agriculture from 1970 to 1990s, the situation has been declining due to current limited investment for new construction in public sector irrigation (Musa ,2004). The limited investment stems not only from the fact that irrigation investment cost is high but also from the perceived failures of many past irrigation schemes (Rufai, 2002; Innocencio *et al*, 2007). As observed by the Federal Ministry of Water Resources (2000), budgetary allocations to the sector are always too meager and inadequate to achieve the desired objectives and coupled with untimely fund releases, good performance of the projects have been stalled. Financing needs are not being met currently both for infrastructure development and for operation and maintenance. The 2004 report of the review of public sector irrigation shows that the Federal Government's subventions to these schemes do not offset operation and maintenance costs. It also noted that 62 public irrigation schemes surveyed in the report were in poor condition, with dilapidated infrastructure and conveyance

structures damaged or dilapidated (ENPLAN 2004). As observed by Akanmu *et al.*, (2007), the recurrent costs of operation and maintenance are rarely recovered from the farmers partly due to weak incentives to collect charges from the farmers and partly due to limited willingness to pay due to poor services. Given these circumstances, poor services have been more or less entrenched in the schemes, and this threatens the sustainability of irrigated agriculture. Improving the performance of the irrigation schemes will depend largely on the ability and willingness of farmers to pay for better water services.

Available record, for instance shows that at optimal production level, the Lower Anambra – Imo irrigation Project (LAIP) in Anambra State, South Eastern Nigeria, has the potential to support the production of an average of 38,000 tonnes of paddy rice annually with a market worth of 5.4 billion Naira at 17,500 Naira (about \$168 in 2000) per tonne value in 2000 (LAIP, 2000). The inability to reach this production target, sustain it and other recorded achievements by the project has in recent times remained the problem of both past and present management in the Irrigation project. This is not peculiar to only the LAIP, as several other schemes are not meeting their production potential.

In the 80's Irrigation Management transfer (IMT) was adopted by the Federal Government of Nigeria (Musa,1999). The Policy was to gradually turn-over operation, maintenance and management (OMM) responsibilities at tertiary and even secondary levels to farmers on public irrigation schemes (Musa, 1999; Ahagbuje, 2002; Olubode-Awosola, *et al.*, 2005). More recently, the federal government is pursuing a commercialization of River Basins with a view for greater cost recovery. Part of the focus of irrigation management transfer globally is to achieve farmer participation in irrigation financing. While reforms are important, and will promote sustainability in terms of financing and management, the African Water Development Report (2006) stated that some questions are posed by these reform concepts: would the reform work where the physical infrastructure is dilapidated?, would it work where macro-economic factors severely constrain user ability to pay? Policy makers need to make informed decisions on pricing strategy for Irrigation water service and these questions are pertinent.

In ascertaining farmers' participation in irrigation service financing of a novel nature than what they are currently receiving, a hypothetical market for the good needs to be created. With this, methods that can model such market are applied. In the case of Irrigation, the CVM has been widely applied to ascertain farmers preferences for service improvements. In Bangladesh, Akter (2006) employed the CVM to determine farmers willingness to pay for irrigation. Similar

studies like Chandrasekuran, *et al.*, (2009); Namyenja, *et al.*,(2014), Omondi, *et al.*, (2014), Tang *et al.*, (2012) used the method. The African Water Development Report (2006) states that it is possible to conduct a contingent valuation study focusing on the poor, illiterate population and obtain credible answers and views it as a way of including the values and perceptions of the poor and marginalized in the decision making process. This informed this study in a developing country context.

Based on two irrigation schemes- the Lower Anambra Irrigation Project (LAIP) in Aghamelum, Anambra state, and the Lower Benue Irrigation Projects (LBIP) in Bokkos, Plateau state, this study thus evaluates farmers' willingness to pay for irrigation water under an improved service scenario. The socio-economic characteristics of the farmers as well as their willingness to pay were ascertained. The socio-economic determinants of their willingness to pay was examined.

Theoretical and empirical literature Review

The specific goal of the African Agricultural Development program (CAADP) is to achieve an annual growth rate of 6% in agriculture (UNECA, 2007). One of the key strategies for achieving this goal as expressed in the framework is investment “ to extend the area under sustainable land management and reliable water control systems”(UNCA, 2007). Van Koppen *et al* 2005, observed that given FAO projections, 73% of agricultural growth expected by 2030 in sub-saharan Africa will come from yield increases and higher cropping intensities, with the remaining 27% achieved through land expansion. In the face of this, irrigation is very important as water is essential to bring forth the potential of land and to enable improved varieties of crops to utilize fully other yield enhancing production inputs (Upton 1996, Hussaini 2004,Molden *et al* 2007). Yet the percentage of arable land that is irrigated is about 3.7% in sub-saharan Africa(NEPAD, n.d) and less than 1% in Nigeria (FAO Aquastat 2005). One key challenge in expanding irrigation is in terms of financing. Historically, large public investments in irrigation was the order in the 20th century (Svendsen *et al* 2007). However PEP, 2000 and OECD , 2004, noted some perverse effects of allowing government to be the major financier of water investments: problems of sustainability as a result of ineffective operation and maintenance and very low cost recovery rates. This is often because of a failure to include the end users of these services in their planning and design and especially in decisions over what charges should apply and the vehicle of collection(PEP, 2000)

In seeking to commercialize public sector irrigation, private agents acting in their self interest will seek to maximize benefits from the production of service (irrigation water) given the costs they face. On the other hand, the farmers (consumers) will have a defined preference for the water service, and will seek to maximize benefits (utility) from the consumption of irrigation service. In this regard, they are sensitive to the costs(price of water being offered and are restricted by their budgets when taking decisions to use or not use the service. It is noted that consumer behavior is highly influenced by preferences, as well as the price and their budget(Koutsoyiannis 1979, Varian 1993) All these will determine the willingness to pay for a good.

In competitive markets, the free forces of demand and supply will intersect to form equilibrium, but this is rarely feasible for irrigation water service, due to its public good features. Property rights are not well delineated, and problems of asymmetric information are pervasive (Tsur 2000). Because there are no markets, to solve the problem, government authorities will issue charges to users to so as to affect demand and supply.. According to PRI (2005), economic theory suggests that demand for water should decline with rising prices. Thus pricing water has often been suggested as a way to reduce water use or to use it more efficiently. Given the public good nature of irrigation water service, the contingent valuation method is one of the stated preference method for eliciting willingness to pay and so is used in this study. To the best of the authors knowledge, this method has not been used in determining willingness to pay for irrigation service in Nigeria.

METHODOLOGY

Study area

This study was carried out in Omor, Aghamelum Local Government area in Anambra state where the Lower Anambra-Imo Irrigation Project (LAIP) is located; and Bokkos Local Government Area where one of the schemes of the Lower Benue Irrigation Project (LBIP) is located. The LAIP, which is in the southeastern part of the country has a total of 5,000 hectares, of which 3,850 hectares was developed for irrigated cropping and about 1,150 hectares was used for rain-fed cropping (LAIP 2000). The Anambra river, located at Ifite-Ogwari, is the source of water for the irrigation scheme. There are two distinct seasons in the area namely- the rainy season which begins in April or May, and ends in October or November, (about 7-8 months), and the dry season which typically begins in October/ November and ends in April/ May (about 4-5 months). The rainfall in the area is bi-modally distributed with peaks in July and September and an annual mean value of 1,730mm. The annual maximum and minimum temperatures are about 38°C and 22°C respectively (LAIP 2000, Urama and Hodge 2004). The

crop grown in this Irrigation project is rice. Other crops grown in surrounding communities include okro, cowpea and yam.

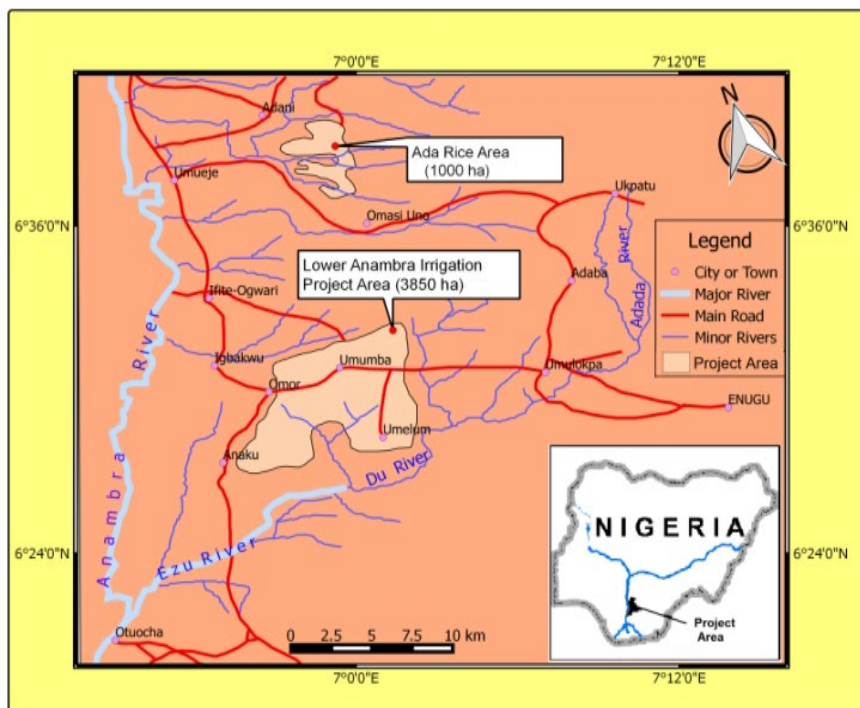


Fig 1: map of the Lower Anambra Irrigation Scheme

The Bokkos project of the Lower Benue Irrigation Project (LBIP) is located in Plateau state. The state is in the middle belt zone of Nigeria, between latitudes $8^{\circ} 22'$ and $10^{\circ} 24'$ North and longitudes $8^{\circ} 22'$ and $10^{\circ} 24'$ East. There are four vegetation zones in Plateau State namely: the Montane, the Northern guinea savanna, the southern Guinea savanna and the sub- Sudan zone. (PADP 2000). The average annual rainfall varies from 890 mm in the sub- Sudan zone to 1500mm in the southern Guinea Savanna zone. Rainy season in the state starts from April and ends in October, with an average precipitation of 1,500mm. The major crops produced in the state include potatoes, cassava, millet, maize, rice and yam. (PMARD 2008). The state has seventeen local government areas including Bokkos where the irrigation project is located. The Bokkos irrigation scheme covers a land area of 500 hectares with about 70 hectares already developed for irrigation. The project is well patronized by vegetable farmers and is a major source of Irish potato, cabbage and lettuce.

Sampling Procedure

Multi-stage sampling technique was used in the selection of the respondents for this study. First the Lower Anambra and the Lower Benue Irrigation Projects were purposively selected for this study based on relative functionality of the Projects. Both projects are in a transition phase with dilapidated infrastructure. In the LAIP mainly rainy season production is currently carried out but it is amongst the projects selected by the Federal Government for re- invigoration. Issues of concern for the project managers include ability to offset operation and maintenance costs after the new facilities have been installed. Also new policy directive by the current federal Government is to commercialize River Basin Authorities to improve irrigation schemes financing. From the list of farmers in the LAIP project, a total of 160 farmers were randomly selected. In the Bokkos project, a total of 45 farmers were randomly selected from the list of farmers that farmed in the project. After data cleaning, 143 questionnaire from the LAIP and 31 from the LBIP were used. A total of 174 farmer responses were used for the study.

Data Collection

A focus group discussion was first organized with some farmers and key staff in each of the schemes. In the LAIP, 10 representative farmers and 4 key project staff were involved in the focus group discussion. In the LBIP Bokkos, 8 representative farmers along with 2 key staff participated in the focus group discussions. The focus group discussions were to elicit the farmers perception of issues around crop production, financing of operations and maintenance, and then on management in the schemes. The farmers were also asked to describe their dream irrigation scheme and this formed the basis for the irrigation scenario presented for the contingent valuation. The input from these discussions formed the basis for the preparation of the questionnaire for this study. A pilot test of the questionnaire was done so as to remove ambiguity and to ensure accuracy and also to ascertain initial start price for the locations. Data collected using the questionnaire includes socio-economic characteristics of farmers, institutional and management patterns of irrigated farming, farmers input costs and output price data, maximum amount willing to pay, as well as reasons for rejecting the scenario for those not willing to pay.

Model Specification

The Contingent Valuation Method (CVM) is a hypothetical- direct valuation technique that uses survey questions to ascertain what value people place on goods for which there exists no markets. The method determines what the respondents would be willing to pay for

improvements in the goods or willing to accept for reduction in value of the goods. The method is very useful in the area of natural resource management. In the absence of markets for the goods, it presents the respondents with hypothetical market where they are asked what they are willing to pay for a specified benefit, or what they are willing to accept for the loss of a benefit (Mitchell and Carson 1989). The WTP has been defined as the amount that must be taken away from a person's income while maintaining his utility at the same level (FAO 2000). Mathematically stated as $U(y - wtp, p, q_1, z) = U(y, p, q_0, z)$ where U represents the indirect utility function, Y is the person's income, p is a vector of prices faced by the individual, and q_1 , and q_0 are the alternate levels of good or quality indexes. (with q_1 greater than q_0 showing that q_1 refers to improved environmental quality). The contingent valuation method has been widely applied in evaluating people's preference for public goods or environmental amenities. In eliciting the total economic value of domestic water services in Palestine, Awad and Hollander (2010) used the CVM approach. Chukwuone (2007) applied the CVM in his study of willingness to pay for systematic management and improvement of community forests in Nigeria. Also Ahmed, et al (2003) applied CVM in their work on willingness to pay for arsenic-free safe drinking water in Bangladesh. A multinomial logit model was used in their study.

In using the CVM, various regression models can be used for the econometric analysis based on data type and structure of the survey. In this study the tobit model with selectivity as proposed by Greene (2002) was used.

The Model is specified as follows:

$$\begin{aligned}
 Y^* &= \beta^1 X + \varepsilon \\
 Y &= 0 \text{ if } Y^* \leq 0, Y^* < T \\
 Y &= 1 \text{ if } Y^* > 0, Y^* \geq T \\
 \text{and } Y &= Y^* \text{ otherwise}
 \end{aligned}
 \tag{1}$$

$$\begin{aligned}
 Z^* &= \alpha^1 V + U \\
 Z &= 1 \text{ if } Z^* > 0 \\
 \text{and } Z &= 0 \text{ if } Z^* \leq 0
 \end{aligned}
 \tag{2}$$

Here Y is a vector of WTP that is censored at 0; T is the initial price offered, X is matrix of explanatory variables that can influence WTP, Z is a vector of a dummy variable which is 1 when the observation has valid response and 0 otherwise; V is a matrix of explanatory variables that may have an influence on the probability of giving a valid or invalid response, α and β

are vectors of unknown parameters to be estimated corresponding to the matrix of predictor variables V and X , respectively; ε and u are the error terms that could have a correlation with the correlation coefficient ρ ; and Y^* and Z^* are unobserved or latent variables corresponding to Y and Z respectively. Y values are observed when Z equals 1. The existence of selection bias would be confirmed if there is correlation between the error terms of equations (1) and (2) as measured by estimates of ρ and its standard error. This makes the use of tobit model with sample selection appropriate. This model enables one to compare the statistical difference between valid and invalid responses and then estimate the mean WTP for the different categories and ascertain socio-economic variables affecting willingness to pay.

Description of the CVM elicitation Technique

The contingent valuation method as a type of hypothetical- direct valuation technique, requires active involvement of the respondents. A pilot survey using focus group discussion and questionnaire administration was done to have an idea of the variables that could be included in the model and to ascertain the existing issues around the irrigation water service in the schemes. Also consultations were made with economists who have experience in the use of the CVM as the development of a good elicitation instrument is important for the success of the study. Following FAO (2000) guidelines for the development and administration of a CVM survey instrument, the questionnaire used for this study first gave a good introduction of the exercise, elicited the respondents socio-economic characteristics and other information relevant to the broad study being undertaken before zeroing in on the scenario design, elicitation format, and payment vehicle. In the introduction aspect of the valuation, a good description of the current state of irrigation water service in the scheme in terms of funding and state of infrastructure as well as the description of the alternative service being valued was given as this is critical in ensuring accurate benefit estimates (Awad & Hollander 2010). The value elicitation format that was used is discrete choice with open ended follow-up question of the maximum amount the respondent is willing to pay, where the respondent indicated a positive response, or reason for not being willing to pay where the respondent indicated a negative response. The starting prices used were obtained from the analysis of the pilot survey which was open ended. The starting prices were N500, N1000, N5000, N10,000 and N15, 000 per year administered at random to the respondents. The payment vehicle described was to pay into an account that will be jointly managed by their elected representatives and irrigation agency officials. These representatives were to be trained to take on responsibilities of ensuring adequate functioning of the scheme in terms of timely and adequate water supply, early

identification and reporting of breakdown of equipment/ facilities and maintenance. The interview was conducted in Igbo language in LAIP while in LBIP it was conducted in Hausa. Where the respondents showed a good understanding of English, it was communicated to them in English with explanations where necessary. The data collected on the CVM was screened for valid and invalid responses.

RESULTS AND DISCUSSION

Farmer willingness to pay for Irrigation Service

The maximum amount respondents were willing to pay for irrigation service improvement were categorized and presented in Table I. Also the category of validity: Not willing to pay, (NWTP) , willing to pay (WTP), Protest zero and outliers and those whose amount willing to pay were smaller than the start price were presented.

Table I: Distribution of Respondents based on Willingness to Pay

Category	Frequency	Percentage
Maximum Amt WTP (₦)		
0	61	35.1
500-2500	39	22.4
2600-5000	20	11.5
5100-10000	26	14.9
10100-15000	11	6.3
15100-20000	13	7.5
More than 20000	4	2.3
Category of validity		
NWTP	40	23.0
WTP	79	45.4
Protest zero	22	12.6
Outliers	24	13.8
Amount smaller than start price	9	5.2

Note: ₦ 1 was equivalent to 0.0066 dollar

The table shows the number of respondents whose maximum amount willing to pay falls into the various categories. It can be seen that 35.0% of the respondents were not willing to pay anything. In other words when the market scenario was presented to them and the start price was indicated, they stated they would not pay. Out of the total respondents, 22.4% were willing to pay an amount between ₦ 500 – ₦ 2500. Those who were willing to pay an amount

between ₦ 2600 – ₦ 5000 were 11.5% of the respondents. Only 2.3% of the respondents were willing to pay beyond ₦ 20, 000.

Summary of some socio-economic characteristics

The respondents socio-economic characteristics were summarized and are presented in table 2. The minimum, maximum and mean values of some socio-economic characteristics of the farmers including their maximum amount willing to pay were calculated and presented in Table II. Specifically of interest is their average yearly income which in the LAIP is ₦ 477,910 (about US \$ 3,152), and 261,290 (about US\$ 1723) in LBIP. The mean annual WTP for the improved irrigation service in LAIP is ₦6129 (\$40.41) and is 1.29% of their mean annual income, and 6.90% of their mean annual agricultural income. For LBIP, the mean amount they would pay is ₦ 6379 (\$ 42). This is 2.44% of their total annual income, and 5.44% of their agricultural income. This shows that it is feasible for them to pay that amount.

Table 2: some relevant socio-economic characteristics

Characteristics	Location	Min	Max	Mean	Stand.Dev
Age	LAIP	19	78	41.61	11.726
	LBIP	23	70	46.0	11.16
Household Size	LAIP	1	14	5.	2.922
	LBIP	1	17	7	2.93
Years of education	LAIP	0.00	23	9.10	4.644
	LBIP	0	16	7.69	4.82
Total income	LAIP	29,500	2,620,000	477,910	437588
	LBIP	120,000	770,000	261,290	149553
Farm experience	LAIP	2.00	34.00	13.9231	8.375
	LBIP	4.00	40.00	13.0	7.85
Maximum amount WTP	LAIP	0.00	100,000	6192.3	12808.57
	LBIP	0.00	50,000	6378.80	11017

Note: ₦ 1 was equivalent to 0.0066 dollar

Determinants of Willingness to Pay for Irrigation

The generally held position in Nigeria is that water for irrigation should be subsidized for farmers but increasingly government is unable to meet financing obligations. The critical question therefore is “are farmers willing to pay and what socio-economic factors determine

their willingness to pay”. The willingness to pay bid function was estimated using tobit model with selectivity and the results are presented below.

The result shows that some variables significantly influenced having a valid or invalid response. Valid responses were those who indicated a willingness to pay and whose maximum amount willing to pay was less than 5% of their total income, and those who were not willing to pay but did not protest. The invalid responses were outliers, protest zeros and responses where maximum willingness to pay was less than the starting price. To prevent sample selection bias, both the valid and invalid responses were used in the model. The hypothesis that socio-economic characteristics of the farmers do not influence their willingness to pay is rejected. Occupation being farming showed a positive and significant influence on being a valid response. The respondents whose main occupation was farming were more likely to make a valid response to the bid. This is obviously because their major

Table 3: Parameter estimates of the selection model

Variables	Selection Equation Results	Outcome Equation Results
Sex	-.3955651 (.3480054)	
Age	-.0200223 (.0125758)	29.6483 (74.72037)
Occupation Farming	1.064736 * (.6251477)	1093.378 (2093.77)
Occupation farming income interact	-.00000432 *** (000000138)	-0.0026202 (.0033098)
Hectare farm size		255.516 (408.3266)
Married	0.4093441 (.2816988)	
Occupation civil service	-.2903278 (.4812319)	
Household size	.0520471 (.0565327)	
Total income	.00000520 *** (.00000132)	0.0090772 (0.0074125)
Start price	-.0000526 ** (.0000226)	0.3321826 *** (0.1215113)
Location Omor	.6383768 ** (.305943)	-4598.101 ** (1857.727)
Farm experience	.0010111 (.0132201)	
Willing to pay	.5181943 **	

	(.2370829)	
Constant	-0.8645057	6466.108
	(0.9273142)	(4155.142
Rho (ρ)		-.7962601
		(0.1223535)
Sigma		6286.147
		(619.7098)

Note: Variables in parenthesis are standard errors;

Number of obs = 174; Censored obs =59

Uncensored obs =115

Log likelihood (full model) = -1239.386

LR test of indep. Eqns. (rho=0) : chi2(1) =8.60 prob> chi2 = 0.0034

source of livelihood depended on farming, and so would be willing to contribute to ensure that the production base is sustainable. The total income of the respondents also showed a positive and significant influence on being a valid or invalid response. This is expected as those with higher incomes would be more disposed to make a valid response. The variable start price had a negative and significant influence on the respondent making a valid response. The negative sign in the start price suggests that respondents whose start price was high were likely to make an invalid response. Chukwuone (2007) also had similar findings in his study of willingness to pay for systematic management and improvement of community forests. Location was also positively related and significant in determining whether the response was valid or invalid. In other words, farmers from LAIP, Omor were more likely to make a valid response than farmers from LBIP Bokkos. Indicated willingness to pay also positively and significantly influenced being a valid or invalid response.

The variables that influenced amount willing to pay, subject to being a valid response, are start price and location being Omor. The start price has a positive and significant effect on the amount willing to pay. That is, the amount respondents were willing to pay was closely related to the start price. The higher the start price the higher the amount people were willing to pay subject to being a valid response. This is expected as the start price was varied randomly amongst the respondents. Location negatively and significantly influenced the amount respondents were willing to pay. In other words respondents from Omor were more likely to pay lower amounts than respondents from Bokkos. This could be an indication of their perceived benefit from Irrigation. In Omor rainy season rice production could still go on without a need to apply water, but in LBIP Bokkos rainy season production of potato still

requires supplementation with irrigation. That is, the farmers in LBIP Bokkos have more dire need of irrigation given their crop type and agro-ecological zone.

CONCLUSION

Irrigation is a key strategy for increasing agricultural productivity. This study focused on the determinants of the willingness and ability to pay for improved irrigation service in Nigeria. The variables that influenced willingness to pay subject to being a valid response were start price and location being Omor (Aghamelum). The variables that influenced being a valid or invalid response were farming as an occupation, total income, start price and location. The two major reasons some farmers were not willing to pay was that the start price presented was too much and that the schemes belonged to the government. The study showed that the farmers were willing to pay for irrigation water service, with a mean value of ₦6129 (\$40.41) in LAIP and ₦ 6379 (\$ 42) in the LBIP. It showed that pricing can be an important factor in eliciting farmers' interest in and ability to pay for irrigation water. There is need to factor in this willingness to pay by restructuring irrigation water tariff to enable cost recovery for at least some or part of the operation and maintenance cost.

It also showed that ownership matters a lot. So long as farmers do not have a stake in ownership and see irrigation water as government service, they will not be willing to pay appropriate price for irrigation. The farmers' concerns about transparency and accountability, and also fear of failure of the proposed improvements needs to be addressed. Policy reforms should take cognizance of these issues. In particular, improved and sustainable water service should be provided. There is need to put in place a mechanism for ensuring transparency and accountability of those charged with management. Also, the farmers need re-orientation with respect to clarification on property rights.

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