



Evaluation of Irrigation Technology Adoption in Edo State Nigeria

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The acceptance and continuous use of any innovation is the ultimate objective of extension programme. However, extension efforts have failed to avail farmers with some beneficial research-based agricultural technology. There are various factors which predispose farmers to the adoption of any innovation. This study was carried out to find out what factors would favourably dispose farmers to the adoption of irrigation technology. The study was done in the three senatorial districts of Edo State. A total of one hundred and fifty farmers were interviewed of which fifty nine were adopters of irrigation technology. Personal characteristics of farmers which were found to significantly influence the adoption of the innovation include farm size, level of education, social participation and contact with extension agents with a significant index value of 0.88. However the required impact desired through extension service is yet to be appreciated.

Keywords: Innovation, Irrigation, Technology, Agriculture, Extension, Edo-Stat

1. Introduction.

Throughout history, technology adoption has become the determinant factor for initiating and accelerating human progress and development. Technology is the system application of practical tasks including transmitting and disseminating messages or information. Obeta (2008) opines that technology is the application of scientific principles, skills, devices, tools and system in the solution of human problem. Information, according to Ayinor and Katung (2007), means pieces of fact, knowledge, ideas, feeling or thought that could be shared with others. Thus, information could be intellectual farm ideas, crops and animal production principles which can be communicated from one individual to another. The consistent increase in Nigeria population in contemporary times has contributed greatly to the increased demand of food and raw materials to agro-allied industries hence the

need for sustainable production and productivity. Crop production in Nigeria is determined by economic, political, institutional and climatic factors as well as the quality and quantity of natural resources endowment (Awoyemi and Adekanye, 2005).

Hitherto, Nigeria is in the process of transforming her agriculture, consequent upon the exploitation, degradation and increasingly abuse of vital resources of soil and water. Within this framework, irrigation which is the artificial application of water to land is inevitably indispensable in actualization of sustainable productivity. Irrigation permits all-year round crop cultivation in the presence of dependable source of water.

Larry, (1988) succinctly says, the primary reason for irrigating crop is to supplement water available from natural sources of water, such as rainfall, dew, floods and ground water which seeps into the root zone. Opining, Akoroda (1998), asserts that the length of dry spell in the southern Nigeria where rainfall is high, but when for 5-7 days of no rainfall, plants suffer from stress and wilt. For proper growth, the soil water-plant relation should be optimum. Hence, Bene (1981) suggested that the status of the soil and water are two very important variables affecting crop growth and development. Drought stress retards plants and fruit growth, triggers blossom-end rot and abortion of fruits and flower thereby reducing yield and quality (Greenleaf, 1996). High temperatures have adverse effect on fruit-set (Ryski and Spigelman, 1982). Hence, irrigation is a template to increased agricultural productivity. Low rainfall and high temperature lead plants to stop growing and in order to survive, the leaves begin to drop, a situation that leads to poor yield (Akoroda 1998).

The pre-requisite to irrigation technology adoption would require selection and utilization of proper tools and procedure. This will consequently permit the development of Nigeria agricultural vis-à-vis level of technological advancement in agricultural system. To appreciate irrigation appropriately, is basically knowing and understanding the use and ultimately its improvements on the people standard of living and national development enhancement. This study will investigate the nature, extent and determinants of irrigation technology adoption in Edo State.

Three hypotheses set in the null form were derived for this study are as follows:

1. There is no significant relationship between the selected socio-demographic characteristics of farmers and their adoption of irrigation technology;
2. There is no significant relationship between the knowledge of the benefit of irrigation technology and farmer adoption; and
3. There is no significant relationship between contact with extension agents and the adoption of irrigation technology.

1.2. Theoretical-Conception Framework

The ultimate goal of any agricultural research and technology development is the adoption and continuous use of such an innovation by the farmers (Fawole and Fasina 2005). In Nigeria, extension efforts of over several decades to avail farmers with beneficial research-based agricultural technology do not seem to have yielded the expected impact (Akinbode, 1982). The concept of adoption has however, been researched into over the decades (Ryan and Gross (1953). Williams et al (1984), recognized leadership structure in a community as a factor affecting adoption. They posited that the success of any programme depends on the approve formal and informal leaders. According to William et al (1984), the acceptance of a new idea is a complex process and it involves a sequence of thoughts and actions about which we have limited knowledge. Such that, information is needed often as to what influences farmer decision per time and location. Agbamu (1993) believed that the level of adoption of agricultural technology in given locality is dependent on the extent to which the characteristic of individuals' farmers permits the acceptance of new ideas. Adoption is the final stage of the complex process of decision making that farmers go through before they decide to use and continue the use of innovation disseminated to them. It consists of four initial stages: awareness, interest, evaluation and trial. The final stage according to Williams (1984), is the stage at which farmers decides to experiment with the new idea to see how it will perform, after weighting the advantages and risks that may be involved. This is done usually on a small-scale. However, it is not untrue that the diffusion of agricultural innovation will help distribute the benefit of new technology breakdown, social cultural barriers and promote general economic growth (Gross, 1979; Atala and Vol 1987).

2. Materials and methods

A stratified and purposive sampling procedure was used for the study and data was collected using an interview schedule. This was carried out in July-September 2012. The respondents were samples from the three senatorial districts of the state based on information received from Edo State Agricultural Development Project with respect to irrigation adoption. 50 respondents were interviewed each in the 3 districts. A total of 150 farmers were interviewed. The Chi-square analysis was used to test the three hypotheses derived for the study at the 0.05% level of significance. Frequency counts, percentages, mean and modal values were also used in analyzing the data gathered.

Table1. Social-Demographic Characteristics of Respondent.

Variable	Frequency	Percentage
Sex		
Female	28	18.70
Male	122	81.30
Total	150	100.00

i. Farm size (hectare)

<2	41	27.33
2-4	52	34.67
4-6	36	24.00
>8	21	14.00
Total	150	100.00

ii. Farming years

<10	22	14.67
10-20	39	26.00
20-30	51	34.00
>30	38	25.33
Total	150	100.

iii. Age (years).

<30	17	11.35
30-40	38	25.33
50-60	65	43.33
>60	30	20.00
Total	150	100

Variable	Frequency	Percentage
Number of Wives		
1	29.50	36.00
2	30.60	37.33
3	15.30	18.67
>4	6.60	8.00
Total	122	100

iv. Number of Children

<5	23	15.34
5-8	77	51.33
8-11	29	19.33
>11	21	14.00
Total	150	100

v. Farm ownership/Government (lease)/Farm settlements

Self	128	85.34
Rented	9	6.00
Relative	11	7.33
Squatters	2	1.33
Total	150	100

vi. Education level

No formal education	30	20.00
Primary education	53	35.33
Secondary education	44	29.34
Post secondary education	23	15.33
Total	150	100

Variable	Frequency	Percentage
Religion		
Christianity	36	24.00
Islamic	64	42.67
Traditionalist	48	32.00
Total	150	100

Source: Field Survey Data (2012)

Table 2. Area of Land under Irrigation

Irrigation (hectares)	Frequency	Percentage
<1	38	64.41
1-3	21	35.59
3-6	0	0.00
>6	0	0.00
Total	59	100

Source: Field Survey Data (2012)

Table 3. Knowledge Score

0	7	4.70
1	14	9.30
2	18	12.00
3	37	24.70
4	39	26.00
5	35	223.30
Total	150	100.00

Source: Field Survey Data (2012)

Table 4. Social Participation Scores Social Participation Frequency Percentage Scores

1-5	81	50.00
6-10	48	39.34
11-15	13	10.66
Total	122	100.00

Source: Field Survey Data (2012)

3. Results and Discussion

Data analysis reveals that among the farmers (39.33%) adopts irrigation technology may be out of curiosity. Thus confirms the characteristics of the trial stage of adoption i.e. it is done on small scale (William et al, 1984). Table 1 reveals that majority (81.30%) of the respondents were males. However, the Chi-square test results show no significant relationship between the gender of farmer and the use of the innovation ($X^2= 1.82, P>0.05$). Thus gender is not likely to influence the adoption of irrigation. The average farm size (3.68 hectares) seems to be larger than the expected, this is due to the fact that most of the respondents are peasant farmers and they practice subsistence agriculture. Farm size does however, proves to be significantly related to the adoption of innovation ($X^2= 21.70; P< 0.05$). Thus, bigger farm sizes will make space available for trial of innovations.

Majority (85.34%) owns their farmland probably inherited through traditional tenure procedure. This is in agreement with Egbugara (1990) that men have the right to land. From table 1, it can be seen that majority (59.33%) of the farmers have been farming for over 20 years while only (14.67%) have been farming for less than 10 years. This invariably implies that respondents are well experienced in farming. The Chi-square analysis results revealed that that there is no significant

relationship between the number of years in farming i.e. experience and adoption of irrigation ($X^2 = 6.03$, $P > 0.05$). This however, is contrary to the idea that the more experienced farmers are the more conservative and resistant to change they will be. Table 1 further revealed that (66.33%) of the farmers are about 50 years of age and above specifically (20.00%) are above 60 years. About (11.35%) of the farmers age is below 30 years of age showing that the older generation are still the ones involved in farming. Majority (63.00%) of the farmers have more than two wives as shown in table. 1 and this is not significantly related to irrigation adoption ($X^2=03.86$; $P > 0.005$), so also is the number of children. ($X^2=5.46$, $P > 0.05$). The modal class range for the number of children is 5-8, while the mean number of children is approximately 7.

The level of education of farmers is found to have a significant relationship with the adoption of irrigation technology ($X^2 = 15.92$; $P < 0.06$), Thus, the more educated, the more innovative farmers are likely to be. About (20.00%) of the farmers have no formal education, (35.33%) had primary education while (44.67%) attended secondary school and tertiary institutions.

Religions affiliation proved not to be significantly related to innovation adoption ($X^2=22.25$, $P > 0.05$). Low percentage farmers are traditionalist while (42.67%) and (24.0%) represents Islamic faith and Christians respectively. Participation in social groups and activities was also found to be significantly related to the adoption of the innovation ($X^2=13.75$; $P < 0.05$). This implies that interaction with other members of the society helps in the diffusion of ideas and also encourages individuals to try the ideas, when they hear reports of friends. Igodan et al (1987) also testify it to be true in their study. Majority (69.82%) have a good knowledge of the benefit of the innovation. However, only 55 farmers out of 150 interviewed practice irrigation on a small scale basis. The reason is not that they are unaware of the benefit of irrigation but the money to buy and install irrigation equipment is expensive. significant relationship was also found between the adopters of innovation and contact with extension agents ($X^2= 28.09$; $P < 0.05$). This confirms the importance of extension agent in the process of information dissemination and technology adoption.

4. Conclusion

From the discussion, it could be affirmed that there are inconsistencies in the findings of adoption studies since human beings are motivated by different factors and influenced by varied socio-economic and demographic variables. Moreover, the characteristic of the innovation being introduced vary as well as the cultural and developmental context of the society in question. The Onus calls for continuous studies for various innovations and in various societies.

Any innovation to be introduced should help discover the factors that may militate against its adoption as well as those that could enhance it. Nevertheless, some factors considered in this study have general acceptance to an extent. Thus

farm size, level of education, and contact with extension agents are likely to influence the adoption of irrigation technology. The religious affiliation of farmers in this study is however, a factor which cannot really be explained as it not certain that there are religions restrictions on adoption of technology except probably in the case of ritual streams which any community may not use as irrigation water source. This is very likely in the world of traditionalist. It is not untrue that intricate personalities built into adherents of the different faith. This cannot be ignored and may thus be a significant factor to consider.

Lastly, if effort is put in educating the farmer on the benefit of irrigation technology adoption in spite of the high cost of installation, as well as encouraging social participation with the effectiveness of extension agents in discharging of their duties, this innovation will be adopted very quickly.

References

- [1] Adefuye B.O., Subair S.K., *Adoption of Agricultural Innovation: Towards a Consistent View of Farmers Behaviour*, The Nigerian Journal of Rural Community Development, 1987, Vo1 1, No.1,46-56Pp
- [2] Agbamu J.U., *Analysis of Farmers*, Characteristics Associated with Adoption of three Farm Practices in Western Nigerian"University Ife Research Bulletin, Faculty of Agriculture Ile-Ife, 1993.
- [3] Akinbode T.A., *A Critical Analysis of the Management of Agricultural Extension in Nigeria*, Agricultural Administration, 1982, 10:45-60 Pp.
- [4] Akoroda M.O., *Element of Agricultural Meteorology*, Department of Agronomy University of Ibadan, Ibadan-Nigeria p41., 1998.
- [5] Awoyemi T.T., Adekanye T.O., *Gender Analysis of Economic Efficiency in Cassava-based Farm holding in South-Western Nigerian*, Journal of Rural Economics and Development, 2005, Vol. 14, No 2, Pp 65-79.
- [6] Ataramu A.O., *An Econometric Analysis of the Adoption of Agroforestry based Technology in Oyo State Nigeria*, PhD Thesis; Dept of Agric Economics (Unpublished) University of Ibadan, Nigeria, 2003.
- [7] Atala I.K., Voh J.P., *Role Performance of Extension Agents in Kaduna State of Nigeria: Evidence from path Analysis*,The Nigeria Journal of Rural Community Development1:25-45, 1987.
- [8] Ayinor S.E., Katung A., *Forum Academia: A Multi disciplinary Journal of Education*, 2007 Vol.1, Pp 24-25.
- [9] Bene J., *Soil-Water-Plant Relation*, Ministry of Plateau State Agricultural News 2 (3), 12-13p, 1981.
- [10] Daramola A.G., *A Quatitative Analysis of the Adoption of Improved Food Production Technology in Oyo State Nigeria*, Ph.D Thesis, Dept of Agric. Econs (Unpublished) University of Ibadan, Nigeria, 1987.

- [11] Egbugara C.A., *An Analysis of the Roles of Rural Women in Production and Processing of Selected Food Crops in Uti L.G.A of Imo State*, An Unpublished Ph.D Thesis, University of Ibadan, Pp 90-96, 1990.
- [12] Fawole O.P., Fasina O., *Factors Predisposing Farmers to Organic Fertilizer Use in Oyo State Nigeria*, Journal of Rural Economics and Development, 2005, Vol. 14:No 2 Pp81-89.
- [13] Greenleaf, W.H., *Pepper Breeding in: Breeding Vegetable Crops*. M.J. Basset (ed) Av Publishing Co. Inc. West Port Connecticut, 1996.
- [14] Gross, *Consequences of Diffusion of Innovations Rural Sociology*, 44 (4): 754-772, 1979.
- [15] Igodan O., Adeyemi, *Social Economic Determinants of Farmers Use of Extension Information Sources in Lagos State*, The Nigeria Journal of Rural and Community Development, 1987, 1:87-93 Pp.
- [16] Larry G.G., *Principles of Farm Irrigation*, John Wiley and Sons Inc. New York Pp 1-2, 1988.
- [17] Obeta A.N., *Ebonyi*; Technology and Vocational Journal, 2 Edition Vol. 2 No 11 Pp 150-166., 2008.
- [18] Ogunnubi C.S., Omonona B.T., *The Need For Irrigation*, Engineering and Technology, 2013, Vol.4 (1) Pp 59-65.
- [19] Ogunfeditimi T.O., *Adoption of Improved Farm Practices. A Choice Under Uncertainty*, India Journal of Extension Education, 1981, Vol, XV 111, Pp 30-35.
- [20] Olonu T.A., Anthony I.I., Ekpere J.A., *Farmers Characteristics and Adoption of Improved Cassava Varieties in Imo State Nigeria*, Proceedings of the Nigerian Academy of Science 2, 93-101 Pp., 1990.
- [21] Ryski I., Spigelman M., *Effect of Different Diverse Temperature Combination on Fruitset of Sweet Pepper*. Scientia Horticultural, 1982, 17: 101-106.
- [22] Ryan E., Gross F., *The Diffusion of Hybrid Corn in two Iowa Communities*, Rural Sociology, 1950, Vol.5 No, 6 15-24 Pp.
- [23] Williams S.K.T., Fenley J.M., Williams C.E., *A Manual for Agricultural Extension Workers in Nigeria*, S.T. Printers. Rawa (Pindj; Pakistan p 169, 1984.
- [24] Wainaina S., (1990); *Major Agricultural Reforms Needed expert say: Africa Farmer*. 3:34 Publ. retrieved Nov; 14, 1996, accepted April 1999.

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