

Impact of Tungan-Kawo Dam Irrigation Project on Rice Production Among Small Holder Farmers in Wushishi Local Government Area of Niger State-Nigeria

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Abstract- The study examined the impact of Tungan-Kawo dam irrigation project on rice production among small holder farmers in Wushishi Local Government Area of Niger State. Multi-stage sampling procedure was used to select 180 registered rice farmers in the study area. Data were obtained through a well structured questionnaire. Descriptive statistics and z-test statistic were employed for data analysis. Results revealed that the average output of participants (3076.67kg/ha) was significantly higher than the output of non-participants (1103.33kg/ha). The estimated average monthly income of participants was N59363.89 while non-participants earned N21322.22 per month. The difference in income was N38041.67 which could be expressed as 64 percent. The results further revealed that participants' level of living was estimated to be N1760292 while non-participants level of living was N854997.80. The major constraints faced by the participants of Tungan-Kawo irrigation projects were capital, limited irrigated land and problem of pests and diseases. About 93% of the respondents reported outbreak of pests and diseases. Quilea birds invasion was also found among the major constraints faced by the participants. Since the project had a positive and significant influence on rice production, it is recommended that a similar programme should continue to be implemented in the area after the implementation of Tungan-Kawo irrigation project.

Index Terms- Impact, Irrigation project, Rice production, Niger State

I. INTRODUCTION

Agriculture is an important sector for wealth creation and poverty reduction. According to Azeez (2002), a large percentage of Nigeria population derive their income from agriculture and agricultural related activities in which over 75% of rural inhabitants are farmers. However, over the years, the rate of growth in agricultural production has stagnated and failed to keep pace with the needs of rapidly growing population, resulting in a progressive rise in import bills for food. The gap between demand and supply of food continues to widen (CBN, 2009). In essence, agriculture's contribution to the national economy has been dwindling. This is so given that Nigeria has varied and complex constraints militating against the realization of increased agricultural output (Baiyegunhi *et al.*, 2009).

The major constraint to increased agricultural production in Nigeria is inadequacy of rainfall, most especially in the Northern States, (Toro, 1997). Large areas of land are left uncultivated,

especially in the Sahel region of the North. Irrigation in Nigeria has become an issue of vital importance considering present population growth rate. Recent report shows that Nigeria population is increasing by 3.5% annually, while food production is increasing by only 2.5%. The Food and Agriculture Organization (FAO) for instance, has warned that by the year 2025, Nigeria will no longer produce enough food to feed herself, solely from rain fed agriculture (FAO, 2003). One of the complimentary measures that could be taken is to intensify irrigated agriculture (Abubakar, 2001). To assure food security in the rice consuming countries of the World, rice production would have to be increased by 50% in these countries by 2025 and, this additional yield will have to be produced on less land with less usage of water, labour and chemicals (Zeng *et al.*, 2004).

Irrigation is a powerful tool for rural economy. It can influence time of harvest which in turn can influence market prices thereby stabilizing farm economy. Bhattarai (2002) opined that irrigation development is like a normal good at the initial stage of development, where agrarian sector dominates over, and irrigation largely contributes to expansion of crop production and development of the nation. Like normal good, the demand for irrigation in any agrarian society increases steadily at the initial stages of development. Bai and Molnar (2008) observed that improved availability of irrigation water in agriculture will increase crop yield thereby increasing income and alleviating poverty among the adopting producers. It is perhaps the recognition of the above stated roles of irrigation that the Nigerian government embarked on irrigation development through River Basin Authorities, for example, the Tungan-Kawo Dam and irrigation project. This is one of the multi-purpose projects embarked upon by the Upper Niger River Basin Development Authority with the aim of providing farm efficiency and income, through optimum water conservation and utilization practices. The Authority realised that agriculture remains dominant in the region and is a strong influence on the region's economy. It was conceived as far back as 1955 by the defunct Northern Nigeria Governments as a solution to the frequent flooding of valuable agricultural land in the project area by Rivers Ubandawaki and Bankogi. The reservoir was, therefore, intended to provide controlled facilities for downstream irrigation of a gross area of 900 hectares as well as flood and drainage control works for about 1,215 hectares (Upper Niger River Basin Development Authority, 1991).

In spite of the huge investments in irrigation schemes, the results are generally far below expectations. Hence, national objectives of irrigation development (e.g. self-sufficiency in

food, earnings from exports or savings from imports, higher rural incomes) are seldom realized. Although literature on the disappointing results has been multiplying since 1970, it appears that lessons learnt are not put into practice (Oosterbaan, 1985). Also, governments and non-governmental agencies have taken measures through the construction of dams, provision of farm inputs, credit facilities, extension services and other irrigation farming machines to intervene in the provision of irrigation resources (FAO, 2007). This is aimed at improving the availability of irrigation water in agriculture which could increase crop yield and which could in turn increase the standard of living and societal income (FAO, 2007). Literature has also shown that the Federal Government of Nigeria (FGN) and various other international donors and bilateral organisations have invested extensively in the Public Irrigation Sector in Nigeria. However, the sector's performance has not had the anticipated impact on national food security, employment opportunities and economic growth (FAO, 2004).

Research has been earlier conducted on the effect of irrigation development project on income and income distribution (Nagogo, 2011). However, the impact of irrigation projects on rice production and the livelihoods of the participants, particularly of Tungan-Kawo irrigation project has not been addressed. This study specifically assessed the impact of Tunga-Kawo irrigation project on rice production, income and level of living of the people and identifies the constraints encountered by the participants and the management of the Tungan-Kawo Irrigation Project.

II. METHODOLOGY

The study was conducted in Wushishi Local Government Area of Niger State. The state is located in the middle belt of Nigeria. It found between latitude 8°22'N and 11°30'N and longitude 3°30'N and 7°20'E. Niger State is in Guinea Savanna region of Nigeria. Niger State has a total of population of 3,950,249 (NPC, 2006) with a projected population of 4,772,024 as at 2012 when the data was collected. Wushishi Local government has a total of population of 81783 (NPC, 2006) with a projected population of 98796 as at 2012. It is bordered by Gbako Local Government to the south, Rafi and Bosso Local Government Areas to the east, Mariga Local Government Area to the north; Mashegu and Lavun Local Government Areas to the west.

Multi-stage sampling procedure was used for this study. Wushishi Local Government Area of Niger State is made up of two districts that is Wushishi and Zungeru districts. From the reconnaissance survey conducted as at 2011, a list of two-hundred and forty-three (243) participants was obtained from the programme office. Thirty seven percent (37) percent of irrigated participant farmers were randomly selected from the list of 162 participants in Wushishi district. Also, 37% of the participants were randomly selected from the list of 81 participants in Zungeru district. Therefore a total of 90 participants were used for the study. In order to effectively study the impact of Tungan Kawo irrigation project on participants, ninety (90) were also selected as a control group for comparative analysis. Each of the two group, participants and non-participants were ninety (90) participants each making a total of one hundred and eighty (180)

respondents from the two districts in the study area. Also 10 management staff were randomly selected to assess the performance of the participants.

This study made use of primary source of information. The primary data were collected from the participating and non-participating rice farmers in the study area, as check list for the management of Tungan-Kawo Irrigation project. These were collected with the aid of structured questionnaire. The information that were collected included socio-economic characteristics as well as living condition of both participating and non-participating rice farmers, the impact of irrigation project on the output and income of the participating and non-participating farmers, the constraints encountered in the implementation of the irrigation project in the study area.

The data collected were analysed using descriptive statistics and Z-test statistic. Z-test model in this study compares the differences in crop output, income and level of living between the participants and non-participants of Tungan-Kawo irrigation project.

The Z-test model represented as follows:

$$Z = \frac{\bar{X} - \mu}{S_{\bar{X}}}$$

Where,

Z= The calculated Z-test

\bar{X} = Mean of the samples

μ = Mew: the theoretical mean of the irrigated rice output, the peoples' income and level of living

$S_{\bar{X}}$ = Standard error of the mean

Z = Significant at 5% (two-tailed) test = 1.96

III. RESULTS AND DISCUSSION

Impact of Tungan-Kawo Irrigation Project Rice output of participants and non-participants

The results in Table 1 showed the impact of Tungan-Kawo dam irrigation project on rice output. It was revealed that the average rice output for the participants was 1.175tonne per year and the output of non-participants was 0.767 tonnes. The estimated difference was 0.407 and this was 35%. The calculated z-value was 3.41 and this was greater than z-table value (1.96) this implied that the output of the participants was significantly (P<0.05) higher than the output of non-participants which indicates that Tunga-Kawo irrigation project has impact on rice production in the study area. This result conforms with the apriori expectation because it is expected that participants of the projects would have access to facilities and extension information which in turn increase their yield.

Income of participants and non-participants

The result in Table 2 shows the income of participants and non-participants of Tungan-Kawo Irrigation project. It was revealed that the estimated average monthly income of participants was N59363.89 while non-participants earned N21322.22 per month. The difference in income was N38041.67 which could be expressed as 64%. per The calculated z-value was 7.5 and this was significant at 1% level of probability which

implied that the monthly income of the participant was significantly higher than monthly income of non-participants. These findings indicate that the project has significant influence on the income of the participating farmers. This result is similar with the findings of Abdullahi (2005) who found a significant difference in income between participants and non-participants in his study of some agricultural programmes. Based on the findings, the null hypothesis which states that there is no significant difference between income of participants and non-participants was rejected and the alternative that there is significant difference between the income of the Tungan-Kawo irrigation project participants and non-participants was accepted.

Participants and non-participants’ level of living

The results in Table 3 revealed that participants’ level of living which was estimated to be N1760292 while non-participants level of living was N854997.80. It was measured by the ownership and usage of assets possessed by the farmers and computed in a monetary value. The z-calculated on level of living (3.93) was greater than the critical z-value (1.96) and this was significant at 5% level of probability. Based on the findings of this study, the null hypothesis was rejected because Tungan-Kawo irrigation project has significant effect on level of living. The implication of this is that the participants’ level of living was significantly higher compared to non-participants. These results implied that Tungan-Kawo irrigation projects exert positive and significant influence on the level of living of the participating farmers. This result is in agreement with the findings of Akpoko *et al.* (1998) in their study of impact of non-governmental agricultural extension training programme in Zaria, Nigeria.

Perceived benefits by participants of Tungan-Kawo irrigation project

The results presented in Table 4 showed the respondents opinion about the benefits of Tungan-Kawo irrigation project in the study area. About 99% perceived that the project gave them access roads. Only 18.89% perceived the provision of storage facilities while the majority (97) of the respondents perceived easy access to market. Those that perceived access to extension activities constitutes 93 %. This indicates that the extension component of the projects is functional and the agricultural information flows through extension agents to the project participants. About 94% perceived the supply of irrigation water was the benefits of the project. This indicates that majority of participating farmers had access to irrigation water as a result of the project. Musa (2004) observed that irrigation water is an important factors influencing participation and determining the crop output of the farmer.

Wage earning opportunities created by Tungan-Kawo irrigation project

As shown in Table 5, it was revealed that there was different income generating opportunities available to the participants of

Tungan-Kawo irrigation project. This implied that respondents in the study area diversify their income sources for increased income and better level of living. About 98% of the respondents engaged in trading activities and this could be attributed to increased economic activities created by the projects. Those that engaged in craft work constitute 62% while fishing and bricklaying activities constitute 96% and 77% respectively. Furthermore, about 98% worked as hired labour while the project also created the opportunities of repairs of pump and machine. About 63% reported sales of machines spare parts as rural wage earning opportunities. Majority (77%) also reported commercial transportation which is also an income generating activities as a result of Tungan-Kawo irrigation project.

Constraints Faced by the Participants

The results presented in Table 6 showed that 92% of the respondents experienced quilea birds invasion. About 94% had problem of limited irrigated land. Irrigated farm land is very important in irrigated rice production as it determines the scale of rice production. About 97% had inadequate capital and this was ranked first among the constraints. Availability of capital would encourage farmers to invest on large scale irrigation farming. It will also enhance the adoption of improved farming practices. Pest and disease was also among the constraints faced by the farmers in the study area. About 93% of the respondents reported outbreak of pests and diseases.

IV. CONCLUSION AND RECOMMENDATIONS

The findings reveal that the participants rice output, rice yield, income and level of living of the participants were significantly higher than the non-participants. This implies that the participants had more household basic needs and assets, means of transportation, farm implements, which reduce drudgery in farming. The major constraints faced by participant of Tungan-Kawo irrigation project were inadequate capital, quila bird invasion, inadequate irrigated land, high cost of maintenance, flooding, pest and diseases. These constraints might have reduced the positive impact of the project on the participants.

The findings revealed that the project had a positive influence on the output, income and level of living of the participants therefore it is recommended that a similar programme should continue to be implemented in the area after the implementation of Tungan-Kawo irrigation project. Inadequate funding was also one of the major constraints in the implementation process. Government and non-governmental agencies should always collaborate in the implementation of agriculture based programmes to put enough funding together for the implementation of agricultural programme.

Table 1: Impact of Tungan-Kawo Irrigation Project on the Rice Output

Group	Mean Output (tonne)	St. Error	St. Dev	95% confidence	Interval
Participants	1.175	0.087.81	0.833	1000.67	1349.63

Non-participants	0.767	0.074.46	0.706	619.74	915.63
Difference	0.407	0.119.44	1.133	170.13	644.80

z-value = 3.41*** *** P < 0.01

Table 2: Impact of Tugan-Kawo Irrigation Project on the Income

Group	Mean Income (N)	St. Error	St. Dev	95% confidence	Interval
Participants	59363.89	3774.081	35804.08	51864.87	66862.91
Non-participants	21322.22	2952.248	28007.49	15456.17	27188.28
Difference	38041.67	5045.208	47863.05	28016.95	48066.39

z-value = 7.5* * P < 0.01

Table 3: Impact of Tugan-Kawo Irrigation Project on the Level of Living

Group	Mean Livelihood (N)	St. Error	St. Dev	95% confidence	Interval
Participants	1760292	184725.8	1752463	1393246	2127339
Non-participants	854997.8	121801.3	1155508	612981.2	1097014
Difference	905294.7	229784.5	2179927	448717.8	1361872

z-value = 3.93* * P < 0.05

Table 4: Perceived Key Benefits by Participants of Tugan-Kawo Irrigation Project

Perceived Key Benefits by Participants of Tugan-Kawo Irrigation Project	Rank	
	Frequency*	Percentage
Access roads	89	98.89
Easy access to market	87	96.67
Supply of irrigation water	85	94.44
Access to extension services	84	93.33
Electricity	77	85.56
Health care services	76	84.44
Recreation	76	84.44
School	75	83.33
Community network	74	82.22
Storage facilities	17	18.89

* Multiple responses were allowed

Table 5: Wage Earning Opportunities Created by Tugan-Kawo Irrigation Project

Employment opportunities	Frequency	Percentage
Trading	88	97.78
Craftwork	56	62.22
Fishing	86	95.56
Bricklaying	54	60.00
Transportation	69	76.67
Hired farm labour	88	97.78
Repairs of pump machines	57	63.33
Sales of spare parts	57	63.33

Table 6: Constraints Faced by Farmers in Tungan-Kawo Irrigation Project

Problems	Frequency*	Percentage
Inadequate capital	87	96.66
Inadequate irrigated land	85	94.44
Pest and diseases	84	93.33
Quilea bird invasion	83	92.22
High cost of operation and maintenance	81	90.00
Flooding	5	5.56

*Multiple responses are allowed

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