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Impacts of Bakalori Irrigation Scheme on Socio-economic Development of the Communities in Zamfara State, Nigeria

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ABSTRACT: For a long time, irrigation projects have been considered a way to end the nation's and the community's cycle of poverty. The goal of the current study is to examine the socioeconomic effects of an irrigation plan utilizing the Bakalori Dam in three local government areas in Zamfara State: Talata Mafara, Bakura, and Maradun. A reconnaissance survey was utilized to identify the areas of interest, and then the agripreneurs were given questionnaires based on random sampling. The questionnaires covered the following topics: the education and occupation of the household, assets and investments, ownership of livestock, infrastructure accessibility, and finally, the challenges faced by farmers when implementing irrigation schemes. Descriptive statistics were used to analyze the data, and the outcome demonstrates that the irrigation scheme has improved the socioeconomic growth of the communities, particularly for the agribusiness owners. However, in order to increase agricultural productivity and accelerate farmers' annual income per capital, the government must make improvements in the following areas: farm mechanization, veterinary services, and input supply.

Keywords: Irrigation scheme, agripreneurs, socio-economic
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INTRODUCTION

Irrigation is the artificial application of water to land or soil. It is used to help produce agricultural crops, maintain landscapes, and re-vegetate damaged soils in dry places and during periods of insufficient rainfall (Masari et al., 2020). Additionally, irrigation has a few other uses in crop production, such as frost protection, weed suppression in grain fields, preventing soil consolidation, and dust suppression (Somnath, 2012).Irrigation scheme is the systematic arrangement and combination of irrigable land and hydraulic structures such as dams, reservoirs, and canals for crop cultivation; the efficient operation of these components will aid in the production of both food and cash crops for long-term development (Dabai and Magaji, 2023). Food security in a broad sense refers to having an adequate supply of fundamental products at all times to fulfil rising consumption demand while mitigating variations in output and pricing (Idrissa et al. 2008). Food is commonly regarded as a basic necessity of existence, and its importance in the family is clear given that it is a primary source of sustenance. Adequate consumption of high-quality food is essential for a healthy, productive life. It is asserted that food is useful for maintaining political Stability and ensuring peace among people while food insecurity result in poor health and reduced performance of children (Halen, 2002). It is important to note that irrigation supplements water available through rainfall for increasing crop yields and/or crop quality. Hence, irrigation provides a good alternative source of moisture against inadequacy of rainfall and makes it economically attractive to grow with other agronomic conditions thus giving room for a boost in yields (Bede, 1991). As a result, irrigation development promotes economic growth and rural development while also serving as the foundation for food security and poverty reduction

(Makombe et al., 2007). Irrigation increases the value of cultivated land in places with poor or unpredictable rainfall. Irrigated areas have nearly doubled in the previous 50 years, from 161 million hectares in 1961 to 318 million hectares in 2010 (FAO STAT, 2013). It is crucial to emphasize that irrigation farming provides huge socioeconomic development benefits, including increased regional income, production, employment, and income distribution (Hagos et al., 2009), as well as the attraction of physical, social, and economic infrastructure. Accordingly, Hussain and Hanjra (2003) stated that irrigation had considerable poverty reduction and income generation impacts, as well as being an important contributor to real food price reductions from the 1970s to the 1990s. Furthermore, achieving self-sufficiency in food production solely through rainfed agriculture is difficult. This is particularly true in Nigeria. So, in order to achieve self-sufficiency in food production, the farming season must be extended beyond the rainy season using irrigated agriculture (Ajayi and Nwalieji, 2010). As a result, the socioeconomic relevance of irrigation to the rural economy cannot be overstated, as its growth fosters an economic environment that has a direct impact on local economies. Despite irrigation's significant contributions to increased food production and overall socioeconomic development, it has come under increasing criticism in recent decades for concerns such as socioeconomic inequity, social disruptions, and environmental changes associated with irrigation development and reservoir construction (Rosenberg et al. 2000). This means that irrigation may have negative externalities or limitations for development. Nigeria is truly a blessed nation. The country is endowed with an abundance of natural resources. These include 68 million hectares of arable land, 12 million hectares of fresh water resources, 960 kilometres of coastline, and biological diversity, allowing the country to produce a diverse range of crops, livestock, and fishery goods (FAO 2009). Despite these natural resources and favourable agro-ecologies, Nigeria remains far from achieving sustainable agricultural growth. Per capita food production has not kept up with the expanding population. The country continues to import agricultural raw resources. Agriculture is the most important long-term economic driver in Nigeria, accounting for 40% of GDP and 60% of jobs. Indeed, agriculture contains the veritable growth resources that would propel Nigeria's economic greatness. However, according to the experts' inputs, Nigeria's arable land continues to be grossly underutilized, with only 32 million hectares, or 46%, under cultivation. Nearly 90% of this is accounted for by households with less than two hectares under cultivation, with farm sizes ranging from 0.5 hectares in southern Nigeria to four hectares in the north (IFAD, 2008). Therefore, the aim of this research is to assess the impacts of Bakalori irrigation scheme on socio- economic development of the communities.

METHODOLOGY

Study area

Bakalori is the name of a small hamlet in Zamfara State, northwestern Nigeria. Given the country's abundant water resources and the potential for increased agricultural production in Nigeria, the Federal Government established the Sokoto Rima River Basin Development Authority (SRRBDA) to mitigate the effects of persistent dry spells in the area caused by the area's too short rainy season, as well as the desire to increase crop yield and improve community livelihoods. Bakalori Irrigation Project was commissioned for these reasons. The goal was to provide irrigation water to the project area's anticipated population of around 50,000 farm families. Construction for the dam began on June 5, 1975, and was substantially completed and commissioned on April 9, 1983 (Mohammed, 2002; SRRBDA, 1992). Bakalori Reservoir is fed by the rivers N'kaba and Tarka in Niger Republic and joins the Rima River after entering Nigeria (Figures 1 and 2). At the time of construction in 1979, the reservoir had a capacity of 450 million m3, a lake area of 8000 hectares and a length of 19 kilometres, and a spillway discharge of 1650 m3/s. The dam had a water storage capacity of 450 million m3 and was fully built by 1983, but its present capacity was assessed at 351, 010, 027 m3 in 2003 (Enplan Group, Nigeria, 2013; USAID, 2010; FAO, 2004; SRRBDA, 1992). The Bakalori Irrigation Scheme covers three Local Governments: Talatan Mafara, Bakura, and Maradun, with a total area of 23000 ha. Sprinkler irrigation covers 65% of the land (15000ha), with gravity-fed surface irrigation covering the remaining 8,000ha, which is home to around 22,000 farmer units and is located 110 kilometres southeast of Sokoto. Currently, the gravity irrigation area is 7,039ha for surface and converted sprinkler areas, whereas the non-irrigable area is 15,961ha for sprinkler and some surface lift (Enplan Group Nigeria, 2013; USAID, 2010; Kebbeh et al., 2003).Three piezometric towers and 24 pumping stations have depreciated to the point of ruin over the previous 20 years, and approximately 3000ha of the sprinkler irrigation scheme has been converted to surface irrigation via tube wells. The failed dyke close to the rice area requires immediate attention, as does de-silting of the drainage ditches across gravity fed areas, as it has rendered the drainage ditches indistinguishable from adjacent farm land, causing farmers to use the drainage section for farming operations rather than the primary purpose of removing excess water from the system. Overland flow is increasingly a typical occurrence, which is damaging to crop productivity by keeping the root zone excessively wet for optimal performance (USAID, 2010).

Methods

The research region (Bakalori Dam and surrounding

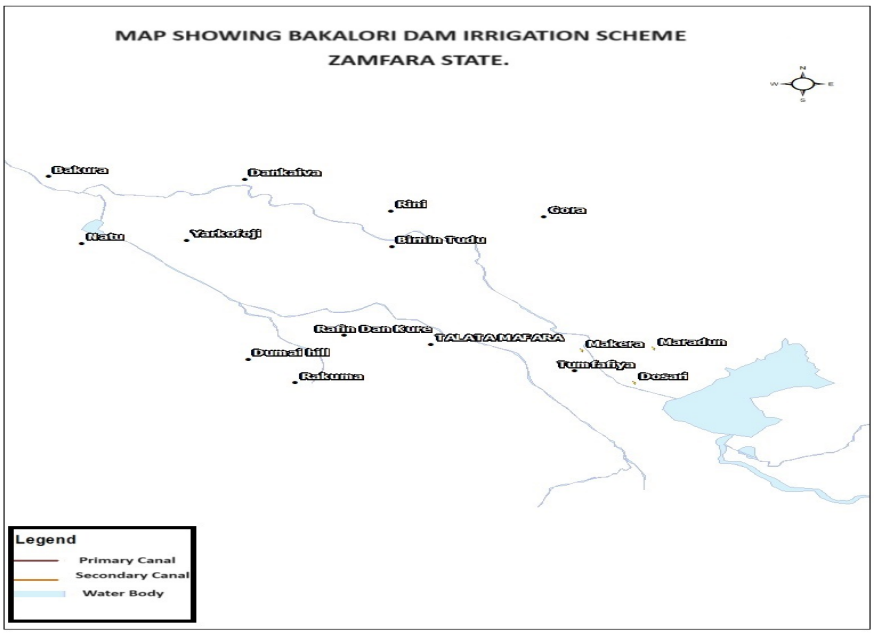

Figure 1: Topographical map showing irrigated communities.

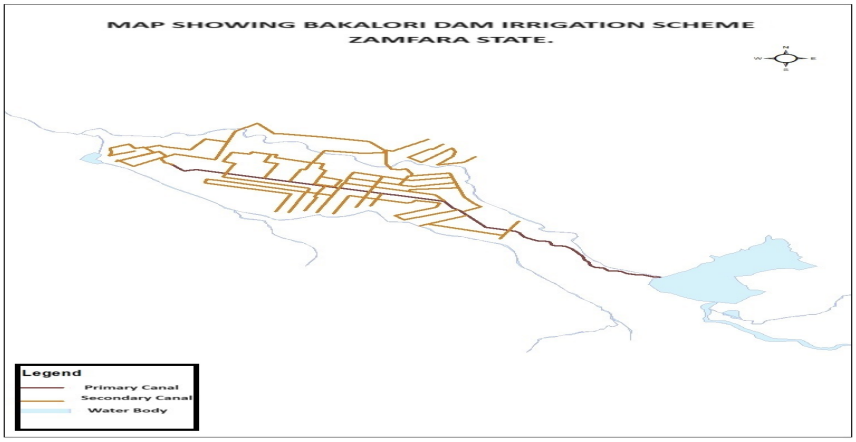

Figure 2: Topographical map shown canals and water way body.

irrigation farms) was surveyed to assess its size, catchment area, reservoir volume, and irrigation activities. The reconnaissance assessment found a mix of young and older irrigators, as well as numerous agrochemical businesses. The questionnaires were utilized in a variety of situations to acquire information about the opinions of agribusiness owners who use the schemes for agricultural objectives. The following steps have been taken.

Preliminary survey

The preparatory study of the area included a visit to the scheme as well as Agripreneurs (users) and comprehensive library research of any resources relevant to the topic of discussion, such as books, journals, papers, and topographical, watershed, and contour maps.

Main study

This stage was focused on acquiring data for the study. Data collection entailed the use of standardized questionnaires that were distributed to irrigation entrepreneurs in the area in question, taking into account additional uses such as domestic supply, downstream consumers, and so on.

Data collection

Random sampling was employed in administering the questionnaires to the Agripreneurs who are using the

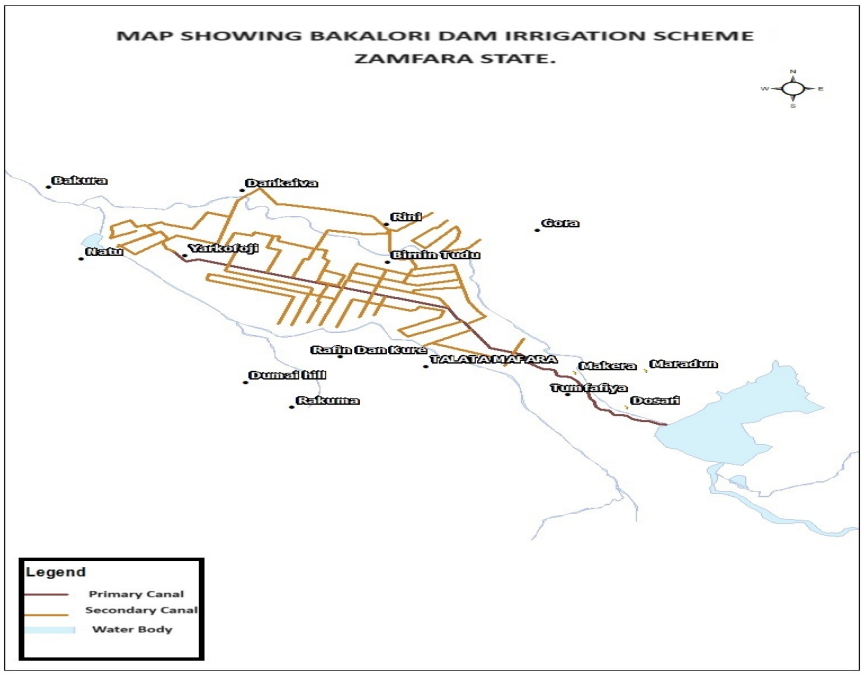

Figure 3: Topographical map shown canals across the irrigated communities.

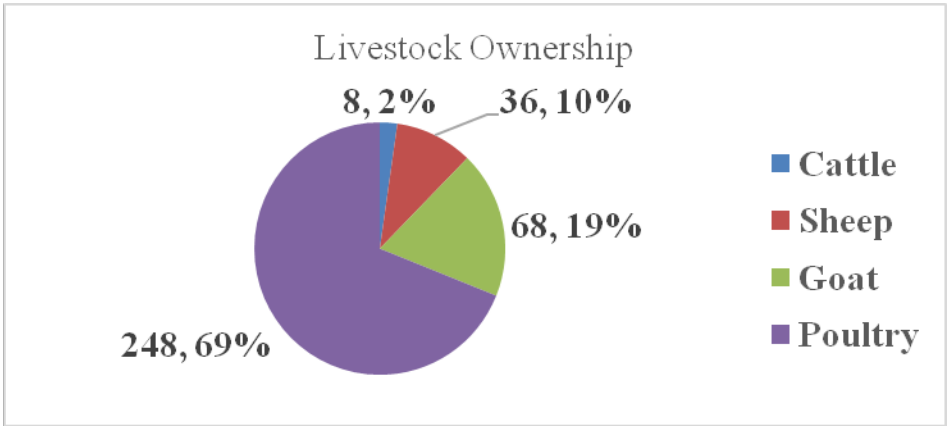

Figure 4: Livestock ownership.

schemes for their agricultural purposes.

RESULTS AND DISCUSSION

The proportion of responses obtained based on the population under consideration for each category was then analyzed and displayed. According to the (Figure 4), irrigators have some animals in their care despite the state's overall security issues; the largest is poultry, and the smallest is cattle (Figure 4). They also use manure as fertilizer, which lowers the cost of irrigation; this is consistent with Makombe et al. (2007), who state that irrigation development encourages economic growth and rural development while also serving as the foundation for food security and poverty alleviation.

According to Pie-chat, hoes have the most value, followed by watering cans, ploughs, sprayers, and cars (Figure 5). Considering the values of the plough, watering can, and sprayer demonstrates how the irrigation network benefits the community's economy. It is crucial to emphasize that irrigation farming provides huge socioeconomic development benefits, including increased regional income, production, employment, and income distribution (Hagos et al., 2009), as well as the attraction of physical, social, and economic infrastructure. Figure 6 shows that the source of their input supply and veterinary

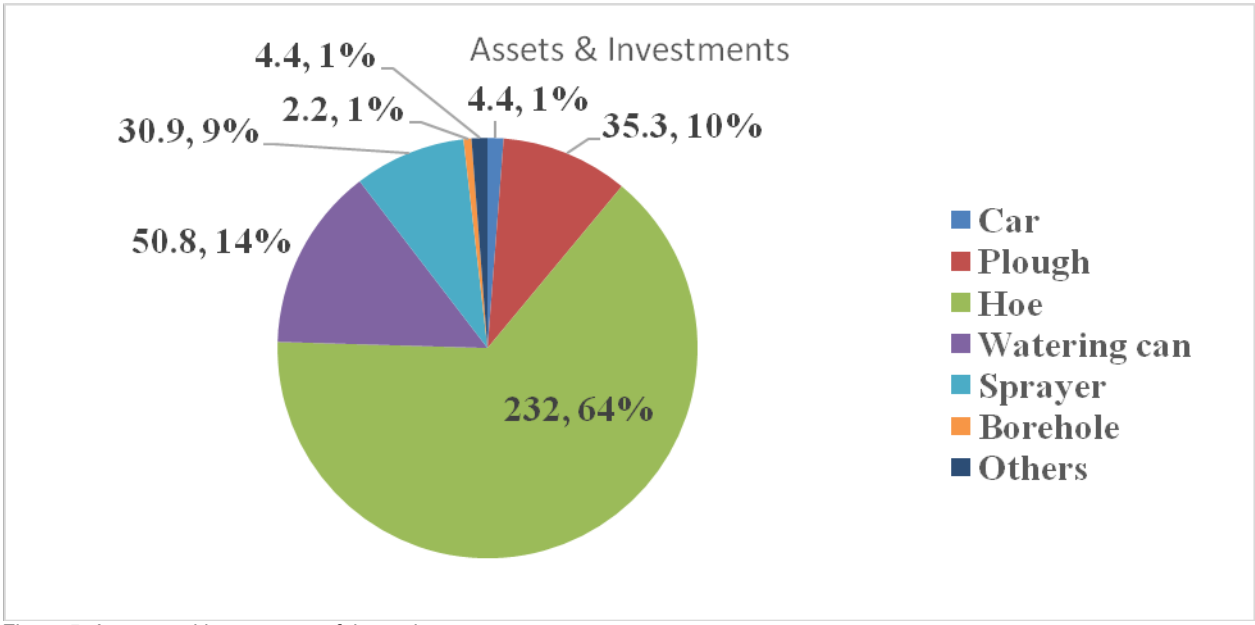

Figure 5: Assets and investments of the agripreneurs

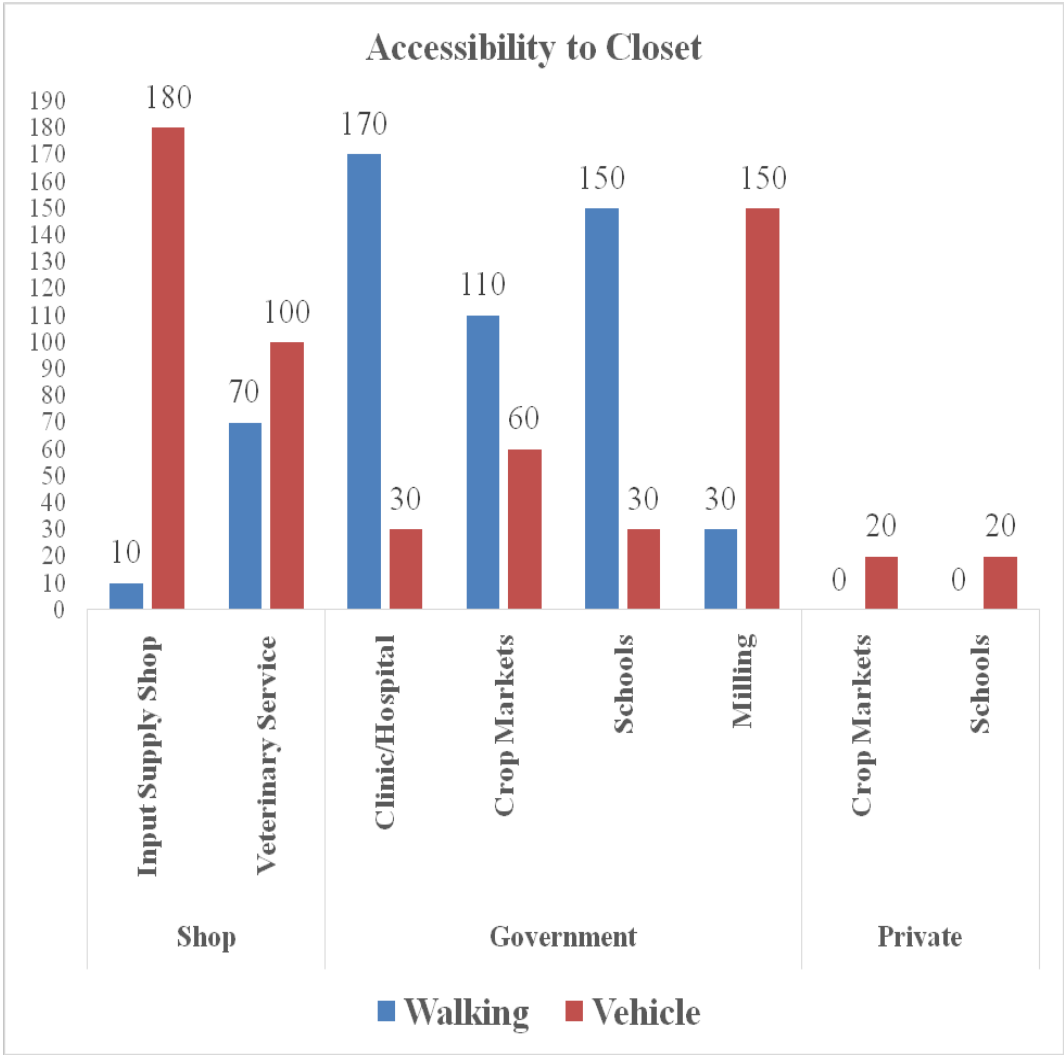

Figure 6: Accessibility to closet

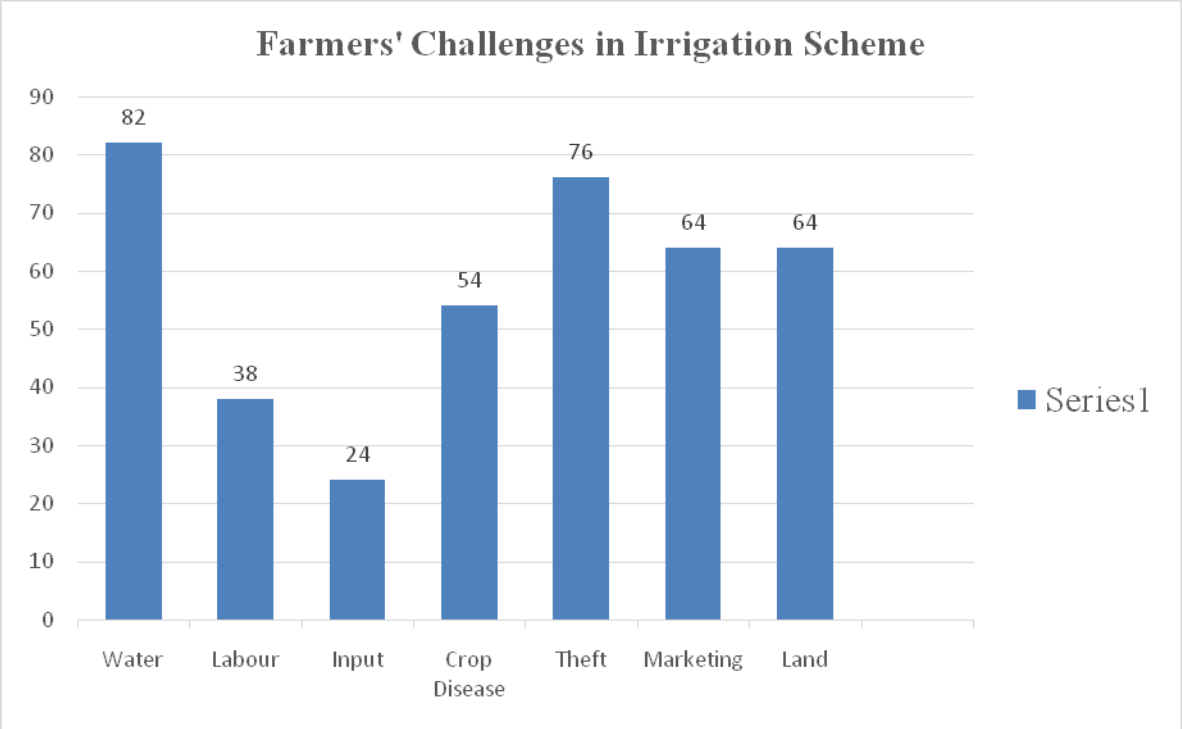

Figure 7: Farmers challenges in irrigation scheme

Table 1: Household Education and Occupation

Number	Education		Occupation	
0	Illiterate	210		
1	Formal School	270	Farmer	420
2	Primary	380	Trader	10
3	Secondary	280	House Wife	140
4	Tertiary	200		
5			Craft Work	10
6			Students	620
7			Domestic Work	140
8			Civil Servant	30

Source: Nakazalle and Magaji 2024

services are shops and the majority of these shops are far away from them which make them to used vehicles in accessing them. While the crop market, clinical and school are both provided by government and private but the higher percentage were provided by government and located very close to them, also with respect to milling site it is provided by government too but located far away from them. Since they can be able to afford the input, milling and veterinary service at far distances using vehicles is an indication of their improvement in economic-social development, it is consistent with (Ibrahim at el., 2018).

The lower the values the higher the challenges, therefore it shows that the input is the main challenges they are facing followed by labor, crop disease, marketing, theft and lastly water. It is in line with Rosenberg *et al*. (2000) reported that despite the significant contributions of irrigation to increasing food production and to overall socio-economic development, irrigation has come under increasing criticisms over the past decades for concerns such as socio-economic inequity, social disruptions and environmental changes that are attributed to irrigation development and reservoir construction

From (Table 1) it shows that the number of illiterate is very few compared to the other categories of education and it is an indication that the irrigation scheme has contributed significantly in getting education as we all know that even if it is Government schools you must use your money in one way or the other and they are getting most of their income from irrigation. Therefore, irrigation has contributed a lot for their social-economic development. Therefore, the irrigation farmers in the study area were literate to varying degrees. It further indicates that a significant proportion of respondents had primary and secondary and even tertiary education.

This implies that information on innovative irrigation practices can be easily disseminated and adopted with little effort, compared to people without formal education. Kim and Muhammad (2014) who noted that education makes farmers flexible to agricultural innovations that would result to intensive and improved production techniques strengthen the forgoing assertion. Stevens (2006) further supported the position that farmers with relatively high education levels in general understand the agriculture marketing environment and challenges better than farmers with relative low level of education.

In terms of other occupations aside from irrigation farming, the respondents are also engaged in animal husbandry, trading, craft work and civil servant, an explanation for these results is the necessity to diversify livelihood activities and support income from irrigation farming, cope with increasing family needs and climate variability impacts. These results are in accordance with Frank (1999) indicating that a diverse portfolio of activities contributes to the sustainability of a rural livelihood because it improves its long-run resilience in the face of adverse trends or sudden shocks.

Conclusion

Based on the findings of this research, it has concluded that, there is significant improvement for the producing of both food and cash crops which in turn make the people to become food secured and also provide employment opportunities to the teaming population in the rural areas. This will also help in reducing rate of unemployment, crimes and rural-urban migration and hence boost the economy of the communities and nation at large.

Recommendations

1 Government has to provide improvement on the areas of inputs and chemicals supply.
2 Government should provide mechanical farm equipment and sale them to farmers at affordable price and issues them also for hire purchased at minimal cost, these will bring better output of the farm product and the farmers will earn more fund.
3 Government should also improve veterinary services so that the Animals husbandry will become easy to the farmers and lead to better production of the Animals.

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