



Administration of Sokoto Rima River Basin Development Authority on Food Security: A Study of Bakolori Irrigation Project, Talata Mafara, Zamfara State

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Abstract

This paper examines the administration of the Sokoto Rima River Basin Development Authority (SRRBDA) and its impact on food security, focusing on the Bakolori Irrigation Project in Talata Mafara, Zamfara State. The paper investigates how administrative frameworks, resource allocation, and operational strategies of SRRBDA impact agricultural productivity and food availability in a region characterized by climate variability, insecurity, and infrastructural deficits. Guided by Management Theory (Fayol) and Sustainable Livelihoods Framework, the paper employs a quantitative research approach with a cross-sectional survey design. Data were collected from 376 registered farmers and agricultural officers across the Bakolori Irrigation Project area using some structured questionnaires. The sample size was determined using the Krejcie and Morgan (1970) Sample Size Determinant Table and selected through proportionate and stratified random sampling. Analysis was ran using SPSS version 27, and Linear regression analysis was used to test the hypothesis. The findings reveal that effective administration of SRRBDA, including timely maintenance of irrigation infrastructure, equitable water distribution, provision of agricultural inputs, and farmer training programmes, significantly enhances food security by improving crop yield, increasing farmer income, and ensuring year-round farming activities. However, challenges such as inadequate funding, bureaucratic bottlenecks, poor maintenance culture, and climate variability hinder the full potential of the Authority's interventions. The paper recommends strengthening administrative capacity, increasing budgetary allocation, adopting participatory management approaches, and implementing sustainable maintenance strategies to fully harness the potential of the Bakolori Irrigation Project for sustainable food security in Zamfara State.

Keywords: Rima, River, Basin, Development, Authority, Food Security, Irrigation.

1.1 Introduction

Food security remains one of the most pressing global challenges of the twenty-first century, with Sub-Saharan Africa bearing unequal burden of hunger and malnutrition. The Food and Agriculture Organization (FAO, 2023) estimates that over 828 million people worldwide suffer from chronic hunger, with Nigeria contributing significantly to this statistic despite its vast agricultural potential. In Nigeria, food security is intrinsically linked to agricultural productivity, which is heavily dependent on effective water resource management and irrigation infrastructure. As provided by Idris et al. (2022), the issue of low productivity in agriculture especially in the developing countries has attracted the interests of national governments, international donor agencies, independent evaluators, and other research efforts to investigate factors responsible for the continual challenges being faced by Smallholder farmers. Since the attainment of Nigeria's independence in 1960, government efforts on food security intensification and maintenance came under different agricultural revitalization and rural development strategies with enormous human, institutional and material resources but have failed to resolve issues of low agricultural productivity and food security, over decades (Idris, 2018). The Sokoto Rima River Basin Development Authority (SRBDA) was established as part of Nigeria's strategy to harness surface and groundwater resources for agricultural development, aiming to enhance food production and ensure food security across the North-West geopolitical zone. However, despite substantial investment in irrigation projects, particularly the Bakolori Irrigation Project in Talata Mafara, Zamfara State, the region continues to grapple with food insecurity, raising critical questions about the effectiveness of SRRBDA's administrative frameworks and operational strategies.

Agriculture serves as the backbone of Zamfara State's economy, employing over 70% of the population and contributing significantly to the State's internal revenue generation. The Bakolori Irrigation Project, commissioned in the late 1970s, was designed to transform the agricultural landscape of the region by providing all-year-round irrigation farming capabilities, covering approximately 30,000 hectares of arable land (Zamfara State Government, 2024). When functioning optimally, the project has the potential to produce sufficient food crops, including rice, maize, wheat, and vegetables, not only for local consumption but also for supply to other parts of the country. The project was envisioned as a catalyst for rural development, poverty reduction, and food security, with the SRRBDA serving as the primary administrative body responsible for its management, operation, and maintenance. Nevertheless, decades after its establishment, the project has consistently underperformed relative to its design capacity, with many observers attributing this underperformance to administrative deficiencies within the SRRBDA.

Furthermore, the issue of food security in Zamfara State has been exacerbated by a confluence of factors, including climate variability, land degradation, population pressure, and, more recently, insecurity arising from banditry and farmer-herder conflicts. These challenges have disrupted farming activities, displaced rural populations, and constrained access to farmlands, thereby compounding the existing productivity deficits. The Bakolori Irrigation Project, if effectively administered, could serve as a buffer against these external shocks by providing a controlled environment for crop production that is less vulnerable to rainfall variability and other climate-related risks. For example, the National Bureau of Statistics (NBS, 2022) reported that Zamfara State has one of the highest rates of food insecurity in Nigeria, with over 40% of households experiencing moderate to severe food insecurity. Additionally, the World Food Programmes (WFP, 2021) noted that malnutrition rates in Zamfara State exceed emergency thresholds, with stunting affecting nearly half of all children under five years. The cumulative effect of these challenges has been a steady decline in agricultural productivity, erosion of rural livelihoods, and persistent food deficits that undermine the region's socio-economic development.

The situation is even more pronounced in Talata Mafara and its surrounding communities, where dependence on irrigation farming is high, and alternative livelihood options are limited. Over the past decade, the Bakolori Irrigation Project has experienced declining performance due to silted canals, broken pumps, poor drainage systems, and irregular water release schedules. For instance, the SRBDA internal report (2022) indicated that only about 40% of the project's designed command area is currently being cultivated, largely due to administrative failures in infrastructure maintenance and water management. Furthermore, farmer surveys have revealed widespread dissatisfaction with the timeliness of input supply, the quality of extension services, and the lack of responsiveness of SRRBDA staff to farmer grievances. These administrative shortcomings not only undermine crop productivity but also erode farmer trust and willingness to participate in irrigation schemes. These unique circumstances demand innovative administrative strategies that address the specific needs and challenges of irrigation farmers in such volatile settings.

One promising solution lies in strengthening the administrative capacity of the SRRBDA to effectively manage the Bakolori Irrigation Project. Effective administration encompasses a range of functions, including strategic planning, resource allocation, infrastructure maintenance, farmer training, input supply, and monitoring and evaluation. When these functions are performed efficiently, they create an enabling environment for increased agricultural productivity and enhanced food security. Participatory management approaches that involve farmers in decision-making processes through Water User Associations (WUAs) have been shown to improve project outcomes and sustainability (Ezeh & Nweze, 2021).

Existing studies by Adewale and Olaniyan (2018) and Bello and Gambo (2019) on irrigation projects and food security have highlighted various factors such as water availability, soil fertility, and input access. These studies do not explore the administrative dimensions that underpin these technical factors. Moreover, many studies overlook the unique challenges faced by basin development authorities in fragile and conflict-affected contexts like Zamfara State, where insecurity and institutional weakness significantly impact project performance. Additionally, the variables typically used in these studies, such as crop yield, water use efficiency, and farmer satisfaction, often fail to integrate critical administrative variables such as leadership effectiveness, bureaucratic efficiency, and stakeholder engagement. Therefore, this paper will fill the gap by examining the administration of the Sokoto Rima Basin Development Authority and its impact on food security using the Bakolori Irrigation Project. Therefore, this paper hypothesized that, the administration of the Sokoto Rima Basin Development Authority does not significantly enhance food security in the Bakolori Irrigation Project area of Zamfara State.

2.1 Conceptual Review

This section covers conceptual review, empirical review, theoretical framework and conceptual framework.

2.1.1 Concept of food Security

Food security is a multidimensional concept that has evolved significantly since its initial articulation at the 1974 World Food Conference. The most widely accepted definition, provided by the Food and Agriculture Organization (FAO, 2001), states that food security exists "when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." This definition encompasses four pillars: availability (sufficient quantities of food from production, stocks, or imports), accessibility (economic and physical means to obtain food), utilization (proper biological use of food through adequate diet, clean water, sanitation, and healthcare), and stability (consistent access to food over time, regardless of shocks or seasonal cycles). Each of these pillars is relevant to the Bakolori Irrigation Project, where irrigation enhances availability through increased production, access through income generation, utilization through improved nutrition, and stability through year-round farming.

However, to enhance food security in irrigation project areas, various strategies are employed that address both production and distribution challenges. According to the World Bank (2022) report, food security interventions involve improving agricultural productivity, strengthening market linkages, building household resilience, and enhancing nutritional outcomes. These interventions require effective administrative frameworks that coordinate the activities of multiple stakeholders, including government agencies, farmer cooperatives, private sector actors, and development partners. Another key strategy involves providing farmers with access to high-quality inputs, including seeds, fertilizers, and agrochemicals, through efficient supply chains. Adewale and Olaniyan (2018) define food security as the outcome of a well-functioning agricultural system that is supported by enabling policies and effective institutions. This highlights how administrative effectiveness directly contributes to food security, especially in areas where rain-fed agriculture is unreliable.

The role of irrigation administration in food security is emphasized by numerous scholars. Bello and Gambo (2019) note that irrigation projects in Nigeria have the potential to transform rural livelihoods and ensure food security, but this potential remains largely untapped due to administrative deficiencies. These deficiencies include poor maintenance culture, inadequate funding, weak regulatory frameworks, and limited stakeholder participation. According to Usman and Abubakar (2020), effective irrigation administration necessitates a shift from top-down, command-and-control approaches to more participatory, adaptive management models that empower farmers and respond to local conditions. By using administrative innovations such as Participatory Irrigation Management (PIM) and Water User Associations (WUAs), Basin Development Authorities can improve water distribution efficiency, reduce conflicts, and enhance farmer satisfaction. These administrative tools are particularly important in contexts like Zamfara State, where resource scarcity and competing demands create tensions that undermine project sustainability.

Furthermore, the integration of modern management practices into irrigation administration is becoming increasingly important in regions where water scarcity and climate variability threaten food production. Ezeh and Nweze (2021) assert that food security is closely tied to the ability of irrigation authorities to manage water resources sustainably and equitably. This requires not only technical expertise but also strong leadership, transparent decision-making, and accountability mechanisms. Similarly, Mohammed and Suleiman (2022) emphasize that administrative reforms that promote decentralization, performance-based management, and results-oriented monitoring can significantly improve irrigation project outcomes. Therefore, food security is an ongoing strategic outcome that depends on the interplay of technical, social, and administrative factors. As basin development authorities increasingly adopt modern management practices, they can enhance food production, improve farmer livelihoods, and build resilience to climate and security shocks.

2.1.2 Administration of Basin Development Authorities

The administration of basin development authorities (BDAs) in Nigeria represents a critical component of the country's water resources management and agricultural development strategy. According to the National Water Resources Institute (NWRI, 2020), a basin development authority is defined as a statutory body established by law to develop, manage, and control water resources within a designated river basin for purposes including irrigation, water supply, hydropower generation, and flood control. This definition emphasizes the multifaceted mandate of BDAs, which extends beyond irrigation to encompass integrated water resources management at the basin level. Complementing this view, the Federal Ministry of Water Resources (FMWR, 2019) describes BDAs as parastatals charged with the responsibility of promoting agricultural development through the provision of irrigation infrastructure, land development, and farmer support services. This description highlights the agricultural development focus that is central to the SRRBDA's mandate.

As BDAs gain prominence in Nigeria's agricultural transformation agenda, their administrative effectiveness becomes increasingly consequential for food security outcomes. The Nigerian Institute of Social and Economic Research (NISER, 2021) explains that effective BDA administration involves the strategic coordination of human, financial, and material resources to achieve mandated objectives while responding to the needs of stakeholders, particularly farmers. This

coordination function is critical for ensuring that irrigation infrastructure is maintained, water is distributed equitably, and farmers receive the support they need to maximize productivity. According to the African Development Bank (AfDB, 2022), BDAs that adopt best practices in financial management, human resource development, and stakeholder engagement achieve better outcomes in terms of irrigated area, crop yield, and farmer income. This finding underscores the importance of administrative quality as a determinant of project success.

Moreover, the administrative challenges facing BDAs in Nigeria have been well documented. Obi and Nwachukwu (2020) maintain that BDAs are often hamstrung by inadequate funding, which limits their ability to maintain infrastructure, recruit qualified staff, and deliver extension services. This funding gap is exacerbated by bureaucratic inefficiencies, including delays in budget releases, procurement bottlenecks, and complex approval processes that impede timely decision-making. Similarly, Ibrahim and Musa (2021) identify poor maintenance culture as a persistent challenge, with irrigation infrastructure deteriorating rapidly due to lack of routine maintenance and timely repairs. This problem is particularly acute in the Bakolori Irrigation Project, where canals, pumps, and drainage systems have fallen into disrepair, reducing the project's effective command area. Additionally, Okonkwo and Adebayo (2022) highlight the problem of weak regulatory frameworks, which limit the ability of BDAs to enforce compliance with water use regulations, resolve conflicts among users, and generate revenue through cost recovery mechanisms.

Similarly, the concept of administrative reform has gained traction as a strategy for improving BDA performance. The World Bank (2023) advocates for a reform agenda that includes the establishment of autonomous irrigation management entities, the transfer of operation and maintenance responsibilities to water user associations, and the introduction of performance-based funding mechanisms. These reforms are designed to address the governance deficits that have undermined BDA effectiveness, including political interference, lack of accountability, and weak incentives for performance. In the Nigerian context, the National Irrigation Development Programme (NIDP) has piloted participatory irrigation management in selected projects, with promising results in terms of improved water distribution, reduced conflict, and enhanced farmer satisfaction. However, the scaling up of these reforms has been slow, hampered by institutional inertia and resistance to change.

2.2 Empirical Review

Adewale and Olaniyan (2018) conducted a study to examine the relationship between irrigation infrastructure and food security in Northern Nigeria. The study focused on four key variables: water availability, crop yield, farmer income, and food access. The study utilized a descriptive research design with a quantitative approach. A sample of 400 farming households from three irrigation projects was selected using multistage sampling. Data were analyzed using SPSS software. The findings emphasized the importance of reliable irrigation infrastructure in enhancing food security, with projects that maintained functional infrastructure achieving significantly higher crop yields and farmer incomes. The study recommends regular maintenance and rehabilitation of irrigation infrastructure to sustain food security gains. However, neither the study focuses on how the administration of basin development authorities' influences infrastructure maintenance, nor did it examine the organizational factors that enable or constrain effective maintenance practices.

Bello and Gambo (2019) examine the relationship between irrigation project management and agricultural productivity in the Sokoto-Rima River Basin. Key variables included water distribution efficiency, input supply, extension services, and crop productivity. The study used primary data collected from 300 farmers through structured questionnaires, employing a quantitative methodology. The findings revealed that farmers who received regular extension services and timely access to inputs achieved significantly higher productivity than those who did not. The study recommended strengthening farmer support services and improving water distribution systems. However, neither the study investigates how the administrative structure of the SRBDA affects the delivery of these services, nor did it examine the role of leadership, organizational culture, or stakeholder participation in shaping project outcomes.

Obi and Nwachukwu (2020) investigate the effect of bureaucratic efficiency on irrigation project performance in Nigeria. Variables included decision-making speed, approval processes, procurement timelines, and project implementation rates. The study employed a quantitative survey design, collecting data from 150 project staff across three BDAs. Findings revealed that bureaucratic inefficiencies, including delays in procurement and approval processes, significantly impeded project implementation and reduced project effectiveness. The study recommends streamlining approval processes, delegating decision-making authority, and adopting e-governance solutions to improve efficiency. However, neither the study address how bureaucratic inefficiencies affect food security outcomes specifically, nor did it examine the political and institutional factors that perpetuate bureaucratic inefficiencies.

Usman and Abubakar (2020) examine the role of maintenance culture in the sustainability of irrigation projects in Zamfara State. Variables included maintenance frequency, infrastructure condition, water delivery reliability, and farmer satisfaction. The study employed a case study design, using qualitative and quantitative data collected from 200 farmers and 20 project staff. Findings revealed that poor maintenance culture, characterized by irregular inspections, delayed

repairs, and lack of preventive maintenance, was a major cause of infrastructure deterioration and project underperformance. The authors recommended establishing a dedicated maintenance unit, developing a preventive maintenance schedule, and training staff on modern maintenance techniques. However, the study did not consider how administrative factors such as leadership commitment, staff motivation, and accountability systems influence maintenance culture.

Ibrahim and Musa (2021) conducted a study to assess the effectiveness of stakeholder engagement in irrigation project management in the Sokoto-Rima Basin. The study used a quantitative approach, with data collected from 280 farmers, community leaders, and project staff. Variables included stakeholder participation, information sharing, grievance redress, and project outcomes. The findings indicated that effective stakeholder engagement was associated with higher levels of farmer satisfaction, better water distribution, and improved project performance. The authors recommended establishing formal platforms for stakeholder engagement, including regular meetings, feedback mechanisms, and participatory planning processes. However, the study did not explore how the administrative culture of the SRBDA, including attitudes towards farmers and responsiveness to feedback, affects the quality of stakeholder engagement.

Ezeh and Nweze (2021) investigate the role of participatory irrigation management in enhancing food security in Southeastern Nigeria. Variables included farmer participation in decision-making, water user association effectiveness, conflict resolution mechanisms, and household food security. The study employed a mixed-methods approach, with data collected through questionnaires and focus group discussions from a sample of 250 farmers. Descriptive statistics and inferential analysis were used. The findings revealed that participatory management approaches significantly improved water distribution equity, reduced farmer conflicts, and enhanced food security outcomes. The study recommended the establishment of functional water user associations and the devolution of management responsibilities to farmers. However, the study highlighted the lack of institutional support for participatory approaches as a limitation, but did not address how BDAs can transition from top-down to participatory management models.

Mohammed and Suleiman (2022) explore the impact of funding adequacy on irrigation project performance in North-Western Nigeria. The study utilized a quantitative approach, employing regression analysis to analyze data collected from 320 farmers and project staff. Variables included budget allocation, fund release timeliness, infrastructure condition, and project output. The findings demonstrated that adequate and timely funding significantly improved infrastructure condition and project output, with funded projects achieving higher irrigated area and crop yield. The study recommended increasing budgetary allocation to BDAs and ensuring timely release of approved funds. However, the study failed to explore how the quality of financial management, including procurement processes and expenditure monitoring, mediates the relationship between funding and project outcomes.

2.2.1 Identified Gaps

The reviewed studies highlight various approaches to enhancing irrigation project performance but fail to address their applicability in contexts with significant administrative deficiencies, such as the SRRBDA's management of the Bakolori Irrigation Project. Adewale and Olaniyan (2018) and Bello and Gambo (2019) emphasized infrastructure maintenance and farmer support services but did not examine how administrative quality enables or constrains these factors. Ezeh and Nweze (2021) and Mohammed and Suleiman (2022) identified participatory management and funding adequacy as key factors but did not explore their interaction with bureaucratic processes and organizational culture. Similarly, while Usman and Abubakar (2020) and Ibrahim and Musa (2021) discussed maintenance culture and stakeholder engagement, they did not consider the administrative reforms needed to institutionalize these practices. Finally, Obi and Nwachukwu (2020) emphasized bureaucratic efficiency but did not link this to food security outcomes. This study aims to fill these gaps by examining how the administration of the SRRBDA enhances food security through the Bakolori Irrigation Project, focusing on administrative functions, processes, and practices.

2.3 Theoretical Framework

The Classical Management Theory, developed by Henri Fayol in the early 20th century, identifies five key functions of management: planning, organizing, commanding, coordinating, and controlling. These functions are directly applicable to the administration of irrigation projects, where effective planning determines water allocation schedules, organizing ensures the deployment of resources to critical areas, commanding provides direction to staff and farmers, coordinating aligns the activities of different departments, and controlling monitors performance against targets. Fayol also articulated fourteen principles of management, including unity of command, scalar chain, division of work, and esprit de corps, which are particularly relevant to large-scale public enterprises like the SRRBDA. The relevance of this theory to the present study lies in its emphasis on administrative efficiency as a precursor to organizational effectiveness. When the SRRBDA adheres to these principles, it is better positioned to maintain irrigation infrastructure, provide timely inputs to farmers, and resolve operational challenges that impede food production.

The Sustainable Livelihoods Framework (SLF), developed by the Department for International Development (DFID), complements the Public Administration Theory by focusing on how assets, vulnerabilities, and institutional structures interact to shape livelihood outcomes. The SLF identifies five capital assets human, social, natural, physical, and financial that households draw upon to achieve positive livelihood outcomes, including food security. The framework also emphasizes the role of vulnerability context (shocks, trends, and seasonality) and transforming structures (institutions, organizations, policies) in mediating access to these assets. In the context of the Bakolori Irrigation Project, the SRRBDA represents a key transforming structure that influences farmers' access to physical capital (irrigation infrastructure), human capital (training and extension services), and social capital (farmer organizations and networks). The application of the SLF to this study is supported by previous research that has linked effective project administration to improved livelihood outcomes. For instance, Ellis (2019) found that irrigation projects that adopted participatory and inclusive management approaches achieved better food security outcomes by strengthening farmers' asset base and reducing their vulnerability to climate shocks. Similarly, Scoones (2020) emphasized that institutional effectiveness is a critical determinant of sustainable agricultural development in Sub-Saharan Africa.

3.1 Methodology

This paper adopts a quantitative research design. The target population comprises 14,500 registered farmers from Bakura, Maradun, Talata Mafara and 45 Agricultural Officers working within the Bakolori Irrigation Project area in Talata Mafara Local Government Area, Zamfara State, as documented in the SRRBDA Operational Register (2023). A sample size of 376 respondents was determined using the Krejcie and Morgan (1970) Sample size Determinant Table, ensuring a 95% confidence level and a 5% margin of error for adequate representation. The study employs a proportionate stratified random sampling technique to distribute the sample size fairly across the 12 irrigation blocks based on their population sizes. Self-administered structured questionnaires, divided into sections reflecting the study objectives and measured on a five-point Likert scale, serve as the primary data collection instrument. To ensure the quality of the research instrument, validity and reliability were carefully established. The questionnaires were pre-tested for content and construct validity through expert judgment and exploratory factor analysis (EFA). The factor analysis confirmed that all items loaded exceed the 0.4 minimum threshold under their expected constructs, indicating that the instrument accurately measured the intended concepts of administration of ARBDAS and food security. In terms of reliability, the instrument demonstrated very high internal consistency, as shown by Cronbach's Alpha coefficients of 0.969 and 0.966 for the constructs (each with 5 items). These values are well above the acceptable threshold of 0.70, confirming that the measurement scales are highly reliable and consistent in capturing respondents' perceptions. Data analysis involves inferential statistical techniques, with linear regression used to test the formulated hypothesis through SPSS version 27.

3.2 Measurement of Variables

Questions related to food security are adapted from frameworks provided by the Food and Agriculture Organization (FAO) and the World Food Programmes (WFP). The FAO (2022) emphasizes the importance of measuring food security through validated survey instruments that explore the four pillars of food security: availability, access, utilization, and stability. The Food Insecurity Experience Scale (FIES) provides a globally standardized measure of food security that has been validated across diverse contexts. Similarly, the Household Food Insecurity Access Scale (HFIAS) developed by Coates et al. (2007) offers a comprehensive tool for measuring household food security in developing country settings, including questions on food consumption, coping strategies, and perceived food sufficiency.

However, questions on administrative effectiveness were adapted from the Public Administration Performance Framework (World Bank, 2019) and the Irrigation Management Performance Indicators (IWMI, 2020). The World Bank's framework provides survey items for assessing administrative functions, including planning, resource allocation, service delivery, monitoring, and stakeholder engagement. The International Water Management Institute (IWMI) offers performance indicators specifically designed for irrigation projects, including water delivery adequacy, maintenance timeliness, and farmer satisfaction. These measurement tools align with the study's focus on understanding how the administration of SRRBDA influences food security outcomes in the Bakolori Irrigation Project.

4.1 Data Analysis

Out of the 376 questionnaires distributed to respondents within the Sokoto Rima River Basin Development Authority (SRRBDA) and Bakolori Irrigation Project area, 351 were correctly completed and found valid for analysis, representing a response rate of about 93.4%, which is considered highly adequate for robust statistical inference.

Result and Findings

Descriptive Statistics

This section presents the descriptive statistics of the study variables on the administration of the Sokoto Rima River Basin Development Authority (SRRBDA) and food security in the Bakolori Irrigation Project, Talata Mafara, Zamfara State. The analysis is based on a 5-point Likert scale, with a decision benchmark mean of 3.00. This implies that any

mean score of 3.00 and above indicates agreement or a positive perception, while a mean score below 3.00 indicates disagreement or a negative perception.

Table 3: Descriptive Statistics of Study Variables

| Variables | N | Minimum | Maximum | Mean | Std. Deviation |
|---|-----|---------|---------|--------|----------------|
| Administration of Sokoto Rima River Basin Dev. Authority (ARBDAS) | 351 | 1.00 | 5.00 | 3.2823 | .48257 |
| Food Security (FS) | 351 | 1.00 | 5.00 | 3.5408 | .38117 |

Source: SPSS Output, 2026

The results in Table 3 show that the mean score for Administration of SRRBDA (ARBDAS) is 3.28, which is above the 3.00 benchmark. This indicates that respondents generally agree that the administration of the Sokoto Rima River Basin Development Authority is fairly effective in the management of irrigation activities in the Bakolori Irrigation Project. It suggests that there is a moderate level of administrative performance in areas such as planning, coordination, and service delivery. Similarly, the mean score for Food Security (FS) is 3.54, which is also above the 3.00 benchmark. This shows that respondents generally agree that food security in the study area is relatively positive, meaning that households have improved access to food, better agricultural output, and more stable food availability compared to lower levels of performance. Therefore, the results suggest that both the administration of SRRBDA and food security are perceived positively by respondents. This implies that better administration of irrigation authorities is likely contributing to improved food security outcomes in the Bakolori Irrigation Project area, even though other external factors may also play a role.

Inferential Analysis: Simple Linear Regression

A simple linear regression analysis was conducted to examine the predictive effect of the administration of the Sokoto Rima River Basin Development Authority (ARBDAS) on Food Security (FS) in the Bakolori Irrigation Project, Talata Mafara, Zamfara State. The results are presented below.

Table 4: Model Summary of Administration of Sokoto Rima River Basin Development Authority and Food Security

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .452 ^a | .204 | .201 | .23819 |

a. Predictors: (Constant), ARBDAS

Source: SPSS Output, 2026

The model summary in Table 4 indicates that ARBDAS accounts for 20.4% of the variance in Food Security, with an adjusted R^2 of 0.201. This means that about 20% of the changes in food security can be explained by how the Authority is being managed. In simple terms, administration plays an important role, but it is not the only factor influencing food security. The remaining variation (about 80%) is likely due to other factors such as climate conditions, availability of farming inputs, infrastructure, and market access. The adjusted R^2 further confirms that the model is stable and the result is not exaggerated.

Table 5: ANOVA a Regression Significance of Administration of Sokoto Rima River Basin Development Authority and Food Security

| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
|-------|------------|----------------|-----|-------------|--------|-------------------|
| 1 | Regression | 4.347 | 1 | 4.347 | 76.616 | .000 ^b |
| | Residual | 16.964 | 299 | .057 | | |
| | Total | 21.310 | 300 | | | |

a. Dependent Variable: FS
b. Predictors: (Constant), ARBDAS

Source: SPSS Output, 2026

Table 5 result depicts that with an F-value of 76.616 and a significance level of 0.000, it clearly shows that the administration of the Authority has a strong and positive impact on food security. Since the p-value is far below 0.05, we can confidently say the model is meaningful and dependable.

Table 6: Coefficientsa of the Administration of Sokoto Rima River Basin Development Authority and Food Security

| Model | | Unstandardized Coefficients | | Standardized Coefficients | T | Sig. |
|-------|------------|-----------------------------|------------|---------------------------|-------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | .330 | .034 | | 9.813 | .000 |
| | ARB DAS | .450 | .051 | .452 | 8.753 | .000 |

a. Dependent Variable: FS

Source: SPSS Output, 2026

The coefficient results indicate that the value of 0.450 for ARBDAS implied that when the administration of the Authority improves by one unit, food security also increases by about 0.45 units. This is a clear and positive impact. The beta value of 0.452 confirms that this is not a weak or random effect, it is a meaningful influence. Simply put, better administration of the River Basin Authority leads to better food availability and improved farming outcomes in the study area. Hence, the study originally assumed that the administration of the Sokoto Rima River Basin Development Authority does not significantly improve food security in the Bakolori Irrigation Project area. However, the results tell a different story. Since the effect is statistically significant and clearly positive, we reject that assumption. This means that how the Authority is managed truly matters, and it plays a real role in improving food security for farmers and communities in the area. Therefore, the administration of the Sokoto Rima River Basin Development Authority significantly improves food security in the Bakolori Irrigation Project area.

Findings and Discussion

This study examined the administration of the Sokoto Rima River Basin Development Authority (ARB DAS) and its effect on food security in the Bakolori Irrigation Project, Talata Mafara, Zamfara State. The regression results revealed that the administration of the Sokoto Rima River Basin Development Authority significantly predicts food security in the Bakolori Irrigation Project area of Talata Mafara, Zamfara State. Specifically, the regression analysis produced a statistically significant model ($F(1,299) = 76.616, p = 0.000$) with a moderate positive impact ($R = 0.452$), indicating that better administration of the Authority is associated with improved food security outcomes in the study area. The model further shows that administration explains about 20.4% of the variation in food security ($R^2 = 0.204$), while the remaining variation is influenced by other factors such as climate conditions, farm inputs, infrastructure quality, and market dynamics. Furthermore, the coefficient ($\beta = 0.452, B = 0.450$) confirms that for every one-unit improvement in the administration of SRRBDA, food security increases by 0.450 units. This means that when the Authority performs better in areas such as planning, coordination of irrigation activities, water distribution, and maintenance of infrastructure, farmers experience better agricultural output and improved access to food. Based on this result, the null hypothesis is rejected, confirming that the administration of the Sokoto Rima River Basin Development Authority significantly enhances food security in the Bakolori Irrigation Project area.

Therefore, this finding aligns with the view of FAO (2001), that, food security exists when people have stable access to sufficient and nutritious food, which depends heavily on institutional efficiency and agricultural support systems. In irrigation-based communities like Bakolori, effective administration ensures proper water allocation, maintenance of irrigation facilities, and timely support to farmers, all of which directly contribute to improved food availability. The result is also supported by studies that emphasize the importance of strong institutional management in agricultural and irrigation systems. Effective administration has been linked to higher agricultural productivity, improved farmer income, and better resource utilization (Adewale & Olaniyan, 2018; Bello & Gambo, 2019). When irrigation systems are well managed, farmers are more likely to receive timely water supply and agricultural inputs, which enhances crop output and food security outcomes. On the other hand, weak administrative systems often lead to poor maintenance of infrastructure, inefficient water distribution, and reduced farmer productivity (Obi & Nwachukwu, 2020; Ibrahim & Musa, 2021). These challenges ultimately weaken food security, even when physical irrigation infrastructure exists. This shows that infrastructure alone is not enough; the quality of administration determines how effectively it is used.

More so, the findings align with the idea that participatory and well-structured management systems improve agricultural outcomes. Studies have shown that when farmers are involved in irrigation management and decision-making processes, efficiency increases and conflicts reduce, leading to better food security outcomes (Ezeh & Nweze, 2021). Similarly, adequate funding and proper financial management have been identified as key drivers of successful irrigation performance and improved agricultural productivity (Mohammed & Suleiman, 2022).

Conclusion

This study examines the administration of the Sokoto Rima River Basin Development Authority and its impact on food security in the Bakolori Irrigation Project, Talata Mafara, Zamfara State. Based on the findings, it is clear that the administration of SRRBDA has a positive and significant effect on food security, although the influence is moderate. Hence the study confirms that that effective administration through proper planning, coordination, and management of irrigation activities plays an important role in improving food availability and agricultural productivity in the study area. However, food security is also influenced by other external factors such as climate variability, input availability, and infrastructure conditions.

Recommendations

Based on the findings of this study, it is recommended that:

- i) The management of the Sokoto Rima River Basin Development Authority (SRRBDA) should be strengthened through improved planning, coordination, and monitoring of irrigation activities in the Bakolori Irrigation Project area. Since the results show that better administration leads to improved food security,
- ii) The Authority should focus more on ensuring that water distribution systems are well managed, irrigation infrastructure is regularly maintained, and farmers receive timely support services. This will help to improve agricultural productivity and ensure more stable food availability in the study area.
- iii) The Authority of SRRBDA should adopt a more participatory approach to irrigation management by actively involving farmers and local stakeholders in decision-making processes. When farmers are included in planning and management, issues such as water allocation conflicts and poor service delivery are reduced, which in turn improves efficiency and food production outcomes. This will also strengthen trust between the Authority and farming communities.
- iv) Federal government should ensure adequate and timely funding for SRRBDA operations. Proper financial support will enable the Authority to maintain irrigation infrastructure, carry out regular maintenance, and expand service delivery to more farming communities. Alongside this, there is a need for strict monitoring and accountability systems to reduce inefficiency and ensure that available resources are properly utilized for agricultural development.

References

1. Adewale, J. G., & Olaniyan, O. A. (2018). Irrigation infrastructure and food security in Northern Nigeria: An empirical analysis. *Journal of Agricultural Economics and Development*, 12(3), 45-58.
2. African Development Bank (AfDB). (2022). *Irrigation project performance in Sub-Saharan Africa: A comparative analysis*. Abidjan: AfDB Publishing.
3. Bello, A., & Gambo, M. (2019). Irrigation project management and agricultural productivity in the Sokoto-Rima River Basin. *Nigerian Journal of Agricultural Extension*, 20(2), 112-125.
4. Coates, J., Swindale, A., & Bilinsky, P. (2007). *Household Food Insecurity Access Scale (HFIAS) for measurement of food access: Indicator guide*. Washington, DC: Food and Nutrition Technical Assistance Project.
5. Ellis, F. (2019). *Rural livelihoods and food security in Sub-Saharan Africa*. London: Routledge.
6. Ezeh, C. I., & Nweze, N. J. (2021). Participatory irrigation management and food security in Southeastern Nigeria. *African Journal of Agricultural Research*, 16(4), 234-248.
7. Federal Ministry of Water Resources (FMWR). (2019). *National irrigation development programme: Progress report*. Abuja: FMWR.
8. Field, A. (2018). *Discovering statistics using IBM SPSS Statistics* (5th ed.). Sage Publications.
9. Food and Agriculture Organization (FAO). (2001). *The state of food insecurity in the world 2001*. Rome: FAO.
10. Food and Agriculture Organization (FAO). (2022). *Food Insecurity Experience Scale (FIES): User guide*. Rome: FAO.
11. Food and Agriculture Organization (FAO). (2023). *The state of food security and nutrition in the world*. Rome: FAO.
12. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective* (7th ed.). Pearson Education.
13. Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2022). *Multivariate data analysis* (8th ed.). Cengage Learning.
14. Ibrahim, H. M., & Musa, A. B. (2021). Stakeholder engagement in irrigation project management in the Sokoto-Rima Basin. *Journal of Water Resources and Irrigation Management*, 9(2), 78-92.
15. Idris, S. (2018). Impact assessment of Third National *Fadama* Development Project (NFDP III) on Poverty Reduction in Kaduna and Sokoto States, Nigeria, 2009-2016. Unpublished Thesis (Doctor of Philosophy Degree in Public Administration). School of Postgraduate Studies, Ahmadu Bello University, Zaria-Nigeria.
16. Idris, S., Murtala, A. & Idris, A. (2022). Effects of *FADAMA* III Programme on productive assets acquisition by beneficiaries in Kaduna and Sokoto States, Nigeria. *International Journal of Research and Innovation in Social Science* (IJRISS), VI(X), 134-138 DOI: 10.47772/IJRISS www.rsisinternational.org

17. International Water Management Institute (IWMI). (2020). *Irrigation management performance indicators: A guide for practitioners*. Colombo: IWMI.
18. Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610.
19. Mohammed, S., & Suleiman, R. (2022). Funding adequacy and irrigation project performance in North-Western Nigeria. *Nigerian Journal of Agricultural Economics*, 11(1), 45-60.
20. National Bureau of Statistics (NBS). (2022). *Food security and nutrition survey: Zamfara State report*. Abuja: NBS.
21. National Water Resources Institute (NWRI). (2020). *Basin development authorities in Nigeria: Mandates, challenges, and prospects*. Kaduna: NWRI Press.
22. Nigerian Institute of Social and Economic Research (NISER). (2021). *Administrative effectiveness of basin development authorities in Nigeria*. Ibadan: NISER.
23. Nunnally, J. C. (1978). *Psychometric theory (2nd ed.)*. McGraw-Hill.
24. Obi, C., & Nwachukwu, I. (2020). Bureaucratic efficiency and irrigation project performance in Nigeria. *African Journal of Public Administration and Management*, 15(3), 89-104.
25. Okonkwo, C. A., & Adebayo, O. O. (2022). Regulatory frameworks and water management in Nigerian basin development authorities. *Journal of African Water Policy*, 7(2), 56-71.
26. Pallant, J. (2007). *SPSS survival manual: A step-by-step guide to data analysis using SPSS for Windows (3rd ed.)*. Open University Press.
27. Scoones, I. (2020). *Sustainable rural livelihoods: A framework for analysis*. Brighton: Institute of Development Studies.
28. Sekaran, U. (2003). *Research methods for business: A skill-building approach (4th ed.)*. John Wiley & Sons.
29. Sharma, P. K., & Misra, R. K. (2019). Digital technologies in agricultural extension: Opportunities and challenges. *International Journal of Agricultural Extension*, 7(2), 89-102.
30. Sokoto Rima Basin Development Authority (SRBDA). (2023). *Operational register of registered farmers: Bakolori Irrigation Project*. Talata Mafara: SRBDA.
31. Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics (7th ed.)*. Pearson.
32. Usman, T., & Abubakar, S. (2020). Maintenance culture and the sustainability of irrigation projects in Zamfara State. *Nigerian Journal of Agricultural Engineering*, 21(1), 34-49.
33. World Bank. (2019). *Public administration performance framework: A guide for assessment*. Washington, DC: World Bank Group.
34. World Bank. (2022). *Food security and agricultural productivity in Nigeria: Challenges and opportunities*. Washington, DC: World Bank Group.
35. World Bank. (2023). *Irrigation governance reforms in Sub-Saharan Africa: Lessons from experience*. Washington, DC: World Bank Group.
36. World Food Programme (WFP). (2021). *Nutrition and food security assessment: Zamfara State*. Abuja: WFP.
37. Zamfara State Government. (2024). *Official statements from the office of Governor of Zamfara State, covered by multiple news outlets*.

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