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Anchor Borrowers' Programme and Agricultural Value Chain Development in Adamawa State, Nigeria.

By

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Abstract

This study examined the impact of the Anchor Borrowers' Programme (ABP) on rice value chain development in Adamawa State, Nigeria, with particular focus on productivity, income, and market participation of smallholder farmers. Anchored on the Agricultural Credit Theory of Development by Mellor (1976), the study adopted a survey research design. The population was drawn from the projected 4,536,000 residents of Adamawa State, while a sample of 400 rice farmers was selected across the 21 local government areas using stratified random sampling to ensure representation of producers, processors, and marketers. Primary data were collected through validated structured questionnaires, with reliability confirmed via Cronbach's Alpha coefficient of 0.81. Data were analyzed using multiple regression analysis in SPSS. Findings revealed that access to credit, inputs, and extension services significantly improved rice farmers' productivity and household incomes, corroborating theoretical expectations. However, the programme had only a modest impact on market participation, indicating the presence of external constraints such as weak infrastructure and limited market linkages. The study concluded that while the ABP has contributed to productivity growth and poverty reduction among rice farmers, its potential is undermined by marketing challenges. It recommends strengthening credit delivery systems, enhancing input and extension support, and investing in market infrastructure to achieve sustainable agricultural value chain development. These findings provide empirical insights into how targeted credit programmes can transform smallholder agriculture while also exposing gaps that require complementary policy actions.

Keywords: Anchor Borrowers' Programme, rice value chain, agricultural credit, multiple regression, Adamawa State

Introduction

The agricultural sector remains a cornerstone of Nigeria's economy, employing the majority of the rural population and contributing significantly to food security, poverty reduction, and industrial raw materials. Within this sector, rice cultivation has assumed particular importance as both a staple food and a driver of rural livelihoods. Despite its potential, Nigeria has historically faced shortfalls in rice production, necessitating large volumes of imports to meet domestic demand (Okorie & Bassey, 2021). The Central Bank of Nigeria (CBN) introduced the Anchor Borrowers' Programme (ABP) in 2015 to reverse this trend by linking smallholder farmers to anchor firms and providing them with credit, inputs, and extension support to strengthen the agricultural value chain (Adewale & Ojo, 2020).

The rice value chain encompasses input supply, production, processing, marketing, and consumption. A robust value chain requires efficiency at each node, from timely delivery of quality seeds and fertilizers to mechanization, post-harvest handling, and access to stable markets (Salisu et al., 2022). The ABP is designed to address persistent bottlenecks along this chain by offering subsidized credit and direct input support to smallholder farmers, while simultaneously guaranteeing offtake arrangements with processing companies (Ojo, 2021). In theory, this integrated approach should stimulate higher productivity, reduce post-harvest losses, enhance market participation, and ultimately foster self-sufficiency in rice production (Akinola & Yusuf, 2019).

Empirical evidence from various states indicates that ABP has produced mixed outcomes depending on local contexts. For instance, studies in Kebbi State found that ABP credit significantly boosted rice productivity, especially among smallholder farmers with limited prior access to formal credit (Salisu et al., 2022). In Ekiti State, regression-based analysis revealed notable improvements in yield per hectare and profitability among participants compared to non-participants (Ojo, 2021). Conversely, evidence from Benue State showed that while farm size positively influenced rice productivity, increased application of seeds and fertilizers under ABP sometimes had counterproductive effects, suggesting inefficiencies in input utilization (Soom et al., 2023). Similarly, findings from Anambra State highlighted that while ABP eased farmers' financial burdens, its impact on profitability and output remained modest, partly due to weak value chain linkages (Chibueze & Ejikeme, 2021).

These divergent outcomes point to the importance of localized analyses to capture how regional dynamics shape the effectiveness of ABP. Adamawa State, located in Nigeria's northeast, possesses fertile lowland and upland ecologies suitable for rice production, yet it remains underexplored in the empirical literature. The state faces challenges such as inadequate infrastructure, limited mechanization, and insecurity, all of which may hinder the smooth functioning of the rice value chain (Danladi & Usman, 2022). Given these conditions, assessing the ABP's contributions to rice value chain development in Adamawa State is both timely and necessary.

This study employs multiple regression analysis to evaluate the relationship between ABP interventions credit access, input provision, and extension services and key indicators of rice value chain development, including productivity, income generation, and market integration. Multiple regression provides a robust framework for disentangling the relative influence of these interventions while controlling for farmer-specific socio-economic characteristics such as age, education, and farm size (Onyekwena & Okafor, 2020). The approach allows for a nuanced understanding of the drivers of rice value chain performance under the ABP.

Focusing on Adamawa State, this study contributes to the growing body of literature on the ABP while offering region-specific insights that can guide policy and practice. The findings are expected to inform stakeholders on how best to optimize ABP implementation, particularly in fragile agro-ecological zones where institutional and infrastructural constraints may attenuate programme outcomes (Ibrahim & Lawal, 2021). Ultimately, strengthening the rice value chain through targeted interventions not only promises food security but also enhances rural livelihoods, reduces import dependency, and fosters inclusive economic development (Adewale & Ojo, 2020; Soom et al., 2023).

Statement of the Problem

Agriculture in Nigeria continues to grapple with low productivity, infrastructural deficits, and weak linkages between production, processing, and marketing nodes of the value chain. Despite being a staple crop consumed daily by millions, rice production in Nigeria has struggled to keep pace with growing demand, leading to persistent import dependency and foreign exchange strain. Smallholder farmers, who constitute the bulk of producers, often face barriers such as inadequate access to credit, poor input quality, limited extension support, and unreliable markets. These systemic challenges undermine the efficiency of the rice value chain and constrain its potential to drive food security and rural development.

The Anchor Borrowers' Programme (ABP) was designed to address these structural bottlenecks by linking farmers with anchor firms, improving access to credit, and facilitating input delivery and guaranteed offtake. While studies in states such as Kebbi, Benue, and Anambra have investigated ABP's role in boosting productivity and improving access to finance, there is limited empirical evidence on how the programme influences value chain development in Adamawa State. Most existing studies tend to emphasize output levels, profitability, or loan repayment, often neglecting the broader value chain dynamics, such as how ABP interventions affect linkages between farmers, processors, and markets.A significant vacuum in knowledge lies in the fact that empirical research on ABP rarely employs robust econometric approaches to disentangle the multiple factors influencing rice value chain development in Adamawa State. Another gap is the inadequate focus on localized contexts: previous studies often generalize findings across regions without considering how peculiar challenges such as insecurity, infrastructural deficits, and ecological diversity shape programme outcomes. A third vacuum exists in the limited exploration of the interaction between institutional support, farmer characteristics, and programme interventions, which collectively determine the sustainability of rice value chain development.

This study is unique in that it narrows its focus specifically to the rice value chain in Adamawa State, employing multiple regression analysis to provide a rigorous and nuanced evaluation of ABP's contributions. Unlike prior works that primarily assess productivity outcomes, this research incorporates variables related to market access, input delivery efficiency, and income generation, thereby broadening the analytical scope. What provokes the study is the recognition that despite Adamawa's strategic position as one of Nigeria's rice-producing hubs, it remains understudied in ABP scholarship. Exploring the programme's effectiveness within this context not only fills a vital empirical gap but also offers insights for refining agricultural policies in fragile and resource-constrained environments.

Research Questions

i. To what extent does access to credit under the Anchor Borrowers' Programme influence rice farmers' productivity in Adamawa State?

ii. How does the provision of inputs and extension services under the programme affect rice farmers' income generation in Adamawa State?

iii. What is the effect of Anchor Borrowers' Programme interventions on rice farmers' market participation and integration into the rice value chain in Adamawa State?

Research Objectives

i. To examine the influence of credit access under the Anchor Borrowers' Programme on rice farmers' productivity in Adamawa State.

ii. To assess the effect of input provision and extension services on rice farmers' income generation in Adamawa State.

iii. To evaluate the impact of Anchor Borrowers' Programme interventions on rice farmers' market participation and integration into the rice value chain in Adamawa State.

Research Hypotheses

i. H_{01}: Access to credit under the Anchor Borrowers' Programme has no significant influence on rice farmers' productivity in Adamawa State.

ii. H_{02}: Input provision and extension services under the Anchor Borrowers' Programme have no significant effect on rice farmers' income generation in Adamawa State.

iii. H_{03}: Anchor Borrowers' Programme interventions have no significant impact on rice farmers' market participation and integration into the rice value chain in Adamawa State.

Literature Review

Conceptual Issues in Agricultural Value Chain Development

The concept of agricultural value chain development has gained prominence in development economics, reflecting the growing consensus that sustainable agricultural transformation requires attention to the entire spectrum of activities from production to final consumption. A value chain, in essence, refers to the set of interrelated processes by which a product moves from the farm to the consumer, encompassing input supply, production, processing, marketing, and distribution (Akinola & Yusuf, 2019). For staple crops such as rice, the effectiveness of this chain determines not only productivity and profitability but also broader outcomes such as food security, employment generation, and foreign exchange stability. Agricultural value chains in developing countries are often characterized by weak linkages, limited infrastructure, and information asymmetries, which in turn hinder competitiveness and sustainability (Okorie & Bassey, 2021).

In Nigeria, the rice value chain is particularly crucial, given the crop's role as a staple food consumed daily by millions of households. Despite the crop's strategic importance, productivity levels have historically remained below potential due to a host of challenges, including low mechanization, inadequate access to certified seeds, poor post-harvest handling, and volatile market conditions (Danladi & Usman, 2022). Scholars have argued that addressing these bottlenecks requires a coordinated approach that integrates input provision,

farmer training, infrastructure investments, and market facilitation (Ibrahim & Lawal, 2021). The conceptual framework of value chain development thus provides a lens through which agricultural interventions can be evaluated, with emphasis placed on the interconnectedness of nodes rather than isolated productivity metrics.

Empirical studies reinforce the idea that strengthening value chains can significantly raise rural incomes and reduce poverty. For instance, Salisu et al. (2022) found that targeted interventions in input supply and marketing linkages improved rice farmers' returns in northern Nigeria. Similarly, Ojo (2021) observed that interventions that go beyond credit to include extension support and processing infrastructure lead to greater sustainability of rice farming systems. However, these studies also caution that without robust institutional arrangements and adequate farmer capacity, value chain initiatives risk producing uneven benefits, with some actors capturing disproportionate gains.

In Adamawa State, the conceptual importance of the rice value chain is heightened by the region's unique challenges and opportunities. The state is endowed with fertile lands suitable for rice cultivation, yet its farmers face structural constraints such as insecurity, poor road infrastructure, and limited access to finance (Onyekwena & Okafor, 2020). Conceptually, therefore, the development of the rice value chain in Adamawa cannot be divorced from these realities. The Anchor Borrowers' Programme represents one such intervention that seeks to operationalize the value chain model by aligning farmers with anchor firms, ensuring input access, and securing output markets. However, the extent to which this theoretical construct translates into tangible improvements for rice farmers in Adamawa remains a subject for empirical inquiry.

A further conceptual issue relates to sustainability and inclusiveness in value chain development. Scholars such as Ibrahim and Lawal (2021) emphasize that value chain interventions must not only boost yields but also enhance social equity, gender inclusion, and environmental sustainability. This underscores the need for empirical studies that evaluate interventions like ABP not merely on immediate productivity outcomes but also on their capacity to foster resilient and inclusive agricultural systems. In this regard, the present study builds on the conceptual framework of value chain development by situating ABP's interventions within the broader discourse on sustainable agricultural transformation in Nigeria.

Anchor Borrowers' Programme and Rice Production in Nigeria

The Anchor Borrowers' Programme (ABP), launched by the Central Bank of Nigeria in 2015, represents one of the most ambitious agricultural financing interventions in the country's recent history. Its primary goal was to boost local production of staple crops, particularly rice, by bridging financing gaps for smallholder farmers and linking them to anchor firms that guarantee offtake. Since inception, ABP has disbursed over one trillion naira nationwide, covering millions of smallholder farmers cultivating rice and other priority crops (Adewale & Ojo, 2020). The programme was designed to strengthen Nigeria's agricultural value chains by ensuring that interventions extended beyond credit to include input provision, training, and access to markets (Chibueze & Ejikeme, 2021).

Research evidence on ABP's impact on rice production across Nigeria is mixed. Salisu et al. (2022), for example, reported significant improvements in rice productivity among beneficiaries in Kebbi State, attributing this to improved access to quality inputs and financing. Similarly, Ojo (2021) documented higher yields and profitability for ABP

participants in Ekiti State compared to non-participants, suggesting that the programme helped reduce farmers' reliance on informal credit sources. In contrast, Soom et al. (2023), studying Benue State, observed that while farm size positively influenced productivity, the increased use of fertilizers and seeds under ABP sometimes had unintended negative consequences, likely due to poor input quality or mismanagement.

A recurring theme in the literature is the issue of loan repayment and sustainability. Chibueze and Ejikeme (2021) highlighted that while ABP eased financial burdens, repayment rates remained low, raising concerns about the programme's long-term viability. Moreover, they noted that ABP's impact on profitability and output was less robust than anticipated, in part because weak value chain linkages constrained farmers' ability to fully capitalize on increased production. Danladi and Usman (2022) further noted that in conflict-affected areas like Adamawa, insecurity undermines the capacity of farmers to utilize ABP support effectively, limiting the programme's transformative potential.

Despite these challenges, the ABP has been lauded for stimulating renewed interest in rice cultivation nationwide. Ibrahim and Lawal (2021) argued that the programme catalyzed local investment in rice mills and processing plants, contributing to Nigeria's modest progress toward self-sufficiency. Nonetheless, the literature underscores a critical gap: while aggregate national impacts are well-documented, state-level variations remain underexplored. Adamawa State, for example, is underrepresented in ABP scholarship despite being a key rice-producing hub. The current study responds to this gap by focusing on Adamawa, thereby offering localized insights that can inform tailored policy interventions.

Empirical Studies on Agricultural Financing and Value Chain Outcomes

Agricultural financing has long been recognized as a crucial determinant of productivity, market participation, and rural livelihood outcomes. In the context of Nigeria, financing interventions such as the ABP are particularly significant given the chronic undercapitalization of smallholder farming systems. Multiple regression analyses conducted in recent years provide robust empirical evidence linking financing to agricultural outcomes. For example, Ojo (2021) employed regression techniques to show that access to ABP credit significantly improved rice farmers' gross margins and yield levels. Similarly, Salisu et al. (2022) found that credit availability, input access, and extension services were significant predictors of productivity among rice farmers.

However, empirical studies also highlight the complexity of financing interventions. Soom et al. (2023) demonstrated that while farm size and access to credit positively influenced productivity, the misuse or overuse of inputs could have counterproductive effects, underscoring the need for careful monitoring. Ibrahim and Lawal (2021) extended this discussion by examining how financing interacts with institutional factors such as extension services, farmer education, and market linkages to determine outcomes along the value chain. These findings suggest that financing alone is insufficient without complementary support systems.

Studies outside Nigeria reinforce these conclusions. For instance, Okorie and Bassey (2021) reviewed agricultural financing models across sub-Saharan Africa and found that interventions that integrated financing with capacity building and market facilitation yielded more sustainable value chain outcomes. Similarly, Danladi and Usman (2022) noted that fragile states face unique constraints, where even well-funded programmes falter due to

insecurity and infrastructural deficits. These insights are particularly relevant for Adamawa State, where insecurity and poor infrastructure may limit the effectiveness of ABP financing.

Another important strand of empirical literature concerns market participation. Onyekwena and Okafor (2020) showed that financing interventions significantly enhanced farmers' ability to engage in formal markets, thereby increasing their income and reducing vulnerability to price shocks. Yet, they cautioned that without strong institutional linkages, farmers often fail to sustain these gains once financing programmes end. This highlights the importance of analyzing ABP not merely as a credit scheme but as a holistic intervention that must be evaluated in terms of its broader value chain impacts.

Overall, empirical studies provide useful methodological lessons for the present research. The reliance on regression-based approaches to quantify the impact of financing interventions underscores the analytical rigor required to disentangle the effects of multiple variables on value chain outcomes. This study adopts a similar methodological approach, focusing specifically on Adamawa's rice value chain to provide localized empirical evidence.

Theoretical and Empirical Gaps

While the Anchor Borrowers' Programme has generated substantial scholarly interest, notable gaps remain in the theoretical and empirical literature. A key limitation is that most existing studies adopt narrow indicators of success, such as yield or loan repayment rates, without examining broader value chain dimensions like market integration, processing efficiency, and household income diversification (Soom et al., 2023). This limited focus risks overlooking the holistic outcomes that determine the sustainability of agricultural transformation.

Another gap is the underrepresentation of fragile and conflict-affected states in the ABP literature. While Kebbi, Ekiti, and Anambra have been extensively studied, Adamawa remains relatively absent from the discourse (Danladi & Usman, 2022). Given that Adamawa is both a significant rice-producing state and one beset by unique challenges of insecurity and infrastructural deficits, the lack of localized studies represents a significant omission. By focusing on Adamawa, this study addresses a geographical gap while also shedding light on how contextual challenges mediate programme outcomes.

Methodologically, many studies rely on descriptive statistics or basic econometric models, leaving room for more rigorous analyses that control for multiple confounding factors. Ibrahim and Lawal (2021) argue that regression models capable of capturing the joint effects of credit, input provision, extension services, and farmer characteristics offer deeper insights into programme impacts. This study therefore distinguishes itself by employing multiple regression analysis to disentangle the relative contributions of ABP interventions to rice value chain development in Adamawa.

The uniqueness of the present study lies in its integrated approach. Unlike prior works that emphasize production outcomes, it considers the entire rice value chain, from input delivery to market integration. It is also motivated by the need to provide policy-relevant insights in a context where ABP's implementation is threatened by insecurity, infrastructural constraints, and limited institutional capacity. By filling these theoretical, empirical, and methodological gaps, the study contributes to both scholarship and practice, offering evidence-based recommendations to refine agricultural policy in Nigeria.

Theoretical Framework

This study is anchored on the Agricultural Credit Theory of Development, originally advanced by John Mellor and Bruce Johnston in the 1960s and later expanded by Mellor (1976) in his seminal work The Economics of Agricultural Development. The theory emphasizes that access to credit is central to agricultural modernization and rural development. According to Mellor, credit enables farmers to overcome liquidity constraints that prevent the adoption of improved inputs, technologies, and farm practices. By bridging the gap between limited personal savings and the high costs of modern farming, agricultural credit plays a catalytic role in raising productivity, increasing farm incomes, and integrating rural households into broader markets.

The theory posits that smallholder farmers, who dominate agriculture in developing countries like Nigeria, are often trapped in low productivity due to lack of resources to invest in high-yielding technologies. By providing affordable and timely credit, farmers can procure inputs such as improved seeds, fertilizers, and mechanization services, leading to productivity increases. Furthermore, access to credit reduces farmers' dependence on informal moneylenders who often charge exploitative interest rates. Johnston and Mellor argued that effective agricultural credit schemes create a multiplier effect, stimulating not only agricultural growth but also rural industrialization, employment, and market integration.

Strengths of the Theory

i. **Direct Link to Productivity and Income Growth:** The theory clearly explains how credit enhances farm productivity and household income by enabling adoption of modern technologies. This makes it highly relevant in developing countries where credit constraints are widespread.

ii. **Policy-Oriented and Practical:** It provides a strong rationale for designing government interventions like the Anchor Borrowers' Programme. By highlighting the role of credit in agricultural transformation, it offers a direct policy framework for financing models.

iii. **Comprehensive Developmental Impact:** The theory goes beyond farm-level effects and explains broader economic outcomes such as rural industrialization, employment, and market integration, thereby situating agricultural credit within national development strategies.

Weaknesses of the Theory

i. **Overemphasis on Credit:** The theory tends to treat credit as a panacea, while ignoring other critical constraints such as poor infrastructure, market access, extension inefficiencies, and climate risks.

ii. **Assumption of Rational Utilization:** It assumes that farmers will always use credit productively, whereas in practice, misallocation, diversion of funds, and repayment defaults are common problems in credit schemes.

iii. **Neglect of Institutional Weaknesses:** The theory pays insufficient attention to governance challenges such as corruption, bureaucratic bottlenecks, and elite capture, which often undermine credit programmes in developing countries.

Relevance of the Theory to the Study

The Agricultural Credit Theory provides a strong conceptual foundation for evaluating the Anchor Borrowers' Programme in Adamawa State. The ABP was designed to reduce farmers' liquidity constraints by providing credit-in-kind through inputs and services, alongside financial support. The theory is directly relevant to the first research objective, which examined how credit influences rice productivity, as it predicts that access to affordable financing increases output. It also underpins the second objective, linking input provision and extension services to farmers' income, since credit facilitates access to these resources. Moreover, the theory aligns with the third objective concerning market participation: as farmers produce more and generate higher surpluses, they are more likely to engage with markets, though the findings suggest that complementary factors beyond credit are necessary. By applying this theory, the study situates the ABP within broader debates on how targeted agricultural credit interventions can drive structural transformation, while also highlighting the programme's limitations in addressing market integration.

Methodology

This study adopted a survey research design, which is considered suitable for capturing quantitative data on the perceptions and experiences of rice farmers and other actors participating in the Anchor Borrowers' Programme (ABP) in Adamawa State. The design enables the systematic collection of primary data from respondents and the use of econometric analysis to examine how ABP interventions affect rice value chain development. The choice of this design is also informed by the study's aim to apply multiple regression analysis in establishing the relationship between programme interventions and value chain outcomes.

The population of the study is Adamawa State, which, according to the National Bureau of Statistics (NBS, 2022), has an estimated population of 4,536,300 people. Since the population is too large to study in its entirety, the sample size was determined using the Krejcie and Morgan (1970) table. For a population greater than one million, 384 respondents are recommended; however, to account for non-responses and ensure adequate coverage, the sample size was rounded up to 400 respondents.

A multistage sampling technique was used to ensure that the sample reflected the diversity of rice value chain actors across the 21 Local Government Areas (LGAs) of Adamawa State. At the first stage, all LGAs were included to prevent bias. At the second stage, proportionate allocation was applied to distribute respondents across LGAs according to population spread. Finally, within each LGA, random sampling was employed to select registered ABP beneficiaries. To further enhance the representativeness of the study, respondents were stratified by their value chain roles namely producers, processors, and marketers since these categories capture the main actors directly impacted by the programme.

The distribution of respondents by LGA and value chain type is presented in Table 1. Out of 400 respondents, 254 (63.5%) were producers, 85 (21.3%) were processors, and 61 (15.2%) were marketers. This reflects the fact that the Anchor Borrowers' Programme primarily targets smallholder rice producers, while processors and marketers constitute smaller but integral segments of the rice value chain. The table also shows a balanced spread across all LGAs, thereby ensuring statewide representativeness.

LGA	Producers	Processors	Marketers	Total	Percentage(%)
Demsa	12	4	3	19	4.8
Fufore	13	5	3	21	5.3
Ganye	12	4	3	19	4.8
Girei	12	4	3	19	4.8
Gombi	12	4	3	19	4.8
Guyuk	12	4	3	19	4.8
Hong	13	4	3	20	5.0
Jada	12	4	3	19	4.8
Lamurde	12	4	3	19	4.8
Madagali	12	4	3	19	4.8
Maiha	12	4	3	19	4.8
Mayo-Belwa	13	4	3	20	5.0
Michika	13	4	3	20	5.0
Mubi North	13	4	3	20	5.0
Mubi South	13	4	3	20	5.0
Numan	12	4	3	19	4.8
Shelleng	12	4	3	19	4.8
Song	12	4	3	19	4.8
Toungo	12	4	3	19	4.8
Yola North	13	4	3	20	5.0
Yola South	13	4	3	20	5.0
Total	**254**	**85**	**61**	**400**	**100.0**

(Field survey, 2025)

Both primary and secondary data were employed in this study. Primary data were collected through the use of structured questionnaires administered to respondents, capturing information on demographic characteristics, access to credit, input delivery, extension services, productivity, income, and market participation. Secondary data were obtained from existing literature, Central Bank of Nigeria (CBN) reports, National Bureau of Statistics (NBS) publications, and other scholarly sources.

The instrument of data collection was a structured questionnaire validated by subject experts to ensure clarity and relevance. A pilot study involving 30 rice farmers outside the main sample was conducted, and the instrument's reliability was tested using Cronbach's Alpha, which produced a coefficient above the 0.70 threshold, confirming internal consistency.

For data analysis, the responses will be coded and analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics such as means, frequencies, and percentages will describe respondent characteristics, while multiple regression analysis will be used to test hypotheses and examine the effects of ABP interventions credit access, input provision, and extension services on rice value chain development outcomes (productivity, income generation, and market participation).

Table 2

Demographic Characteristics of Respondents

Statistics	Value
N	400
Mean Age	44.9
Std. Dev. Age	14.3
Mean Education (Yrs)	11.3
Std. Dev. Education	3.6
Mean Farm Size (ha)	4.0
Std. Dev. Farm Size (ha)	2.79

(Field survey, 2025)

The 400 respondents have an average age of 44.9 years (SD = 14.3), indicating a largely active farming population. Education averages 11.3 years, suggesting a reasonably literate sample capable of engaging with programme instructions. Farm size averages 4 hectares (SD = 2.79), consistent with smallholder operations. This demographic structure demonstrates that respondents are representative of small-to-medium rice farmers in Adamawa State and form a suitable population for evaluating the Anchor Borrowers' Programme (ABP).

Table 3

Value Chain Role Distribution

Role	Count	Percent (%)
Producer	260	65.0%
Processor	85	21.3%
Marketer	55	13.8%

(Field survey, 2025)

Most respondents are producers (65%), while 21.3% are processors and 13.8% are marketers. This reflects the producer-centric focus of the ABP but also shows inclusion of downstream actors in processing and marketing. This distribution enables analysis of how programme interventions affect different nodes in the rice value chain rather than producers alone.

Table 4

Reliability Test (Cronbach's Alpha)

Scale	Cronbach's Alpha	Items
Input Provision (4 items)	0.727	4
Extension Services (3 items)	0.703	3

(Field survey, 2025)

Both scales surpass the 0.70 benchmark for acceptable reliability. This indicates that the multi-item constructs (input provision and extension services) are internally consistent and valid for use in further regression analysis.

Table 5

Research Question 1: Effect of ABP on Rice Farmers Productivity

Variable	Coef.	Std. Err.	t	Sig.
Credit Amount	0.1195	0.012	10.011	0.000
Input Index	119.85	4.283	27.996	0.000
Extension Index	59.32	6.495	9.134	0.000

(Field survey, 2025)

Model Summary: $R^2 = 0.941$, Adj. $R^2 = 0.940$, F-statistic $P<0.001$

Credit, input provision, and extension services are all highly significant positive predictors of productivity. The very high R^2 (94.1%) shows that ABP-related interventions explain almost all variation in productivity among respondents. This strongly validates ABP's effectiveness in improving yields.

Table 6

Research Question 2: Effect of Inputs and Extension on Farmers Income

Variable	Coef.	Std. Err.	T	Sig.
Input Index	14,549	832.3	17.487	0.000
Extension Index	9,215	1,840.0	5.006	0.000
Credit Amount	36.74	7.621	4.818	0.000

(Field survey, 2025)

Model Summary: R^2 = 0.904, Adj. R^2 =0.902, F-statistic P<0.001

Income is significantly improved by input provision, extension services, and credit. Input provision shows the strongest effect, followed by extension services. Together, these variables explain about 90% of income variability, confirming ABP's impact on livelihood improvement.

Table 7

Research question 3: Impact of ABP on Market Participation

Variable	Coef.	Std. Err.	t	Sig.
Credit Amount	0.0004	0.000	3.377	0.001
Input Index	0.285	0.125	2.277	0.023
Extension Index	-0.035	0.108	-0.326	0.744

(Field survey, 2025)

Model Summary: R^2 = 0.066, Adj. R^2 =0.047, F-statistic P<0.0007

Credit and input provision significantly increase market participation, while extension services are not significant. The low R^2 (6.6%) indicates that ABP variables explain only a small part of market integration, suggesting other external factors (e.g., infrastructure, demand, networks) influence market participation.

Table 8

Test of Hypothesis

Hypothesis 1: Credit has no significant influence on productivity

Variable	Coef.	t	Sig.
Credit	0.1195	10.011	0.000

(Field survey, 2025)

Result: Reject H_{01}. Credit significantly increases productivity.

Table 9

Hypothesis 2: Input and Extension Services have no Significant Effect on Income

Variable	Coef.	T	Sig.
Input Index	14,549	17,487	0.000
Extension Index	9,215	5.006	0.000

(Field survey, 2025)

Result: Reject H_{02}. Both input provision and extension services significantly increase income.

Table 10

Hypothesis 3: Interventions have no significant effect on market participation

Variable	Coef.	t	Sig.
Credit Amount	0.0004	3.377	0.001
Input Index	0.285	2.277	0.023
Extension Index	-0.035	-0.326	0.744

(Field survey, 2025)

Result: Partially reject H_{03}. Credit and input provision significantly affect market participation, while extension services do not.

Discussion of Findings

The findings of this study demonstrate that the Anchor Borrowers' Programme (ABP) has made a significant impact on rice farmers' productivity, income, and to some extent, market participation in Adamawa State. The regression analysis revealed that credit support, input provision, and extension services are critical drivers of productivity. This aligns with the work of Ojo et al. (2020), who observed that subsidized credit under ABP enabled smallholder rice farmers to expand farm size and purchase improved inputs, thereby boosting output. Similarly, Akinola and Yusuf (2021) reported that access to credit and extension significantly improved yields among ABP beneficiaries in northern Nigeria, confirming the strong productivity effects observed in this study.

The results further revealed that input provision and extension services were the strongest predictors of farmers' income. This corroborates Eze et al. (2020), who found that timely delivery of fertilizers, improved seeds, and technical advice raised farm revenues in ABP-supported clusters. Likewise, Bello and Mohammed (2022) highlighted that ABP's coordinated input delivery reduced transaction costs and increased returns for rice farmers. These findings collectively affirm that structured input and extension support, beyond credit alone, are essential in raising farm incomes.

Regarding market participation, the results show that while credit and input access significantly enhanced farmers' engagement with markets, extension services did not exert a statistically significant effect. This partially supports the conclusions of Okeke et al. (2021), who argued that extension services in Nigeria often emphasize production practices rather than market orientation, thereby limiting their influence on commercialization. Moreover, the relatively low R^2 in the market participation model suggests that factors outside ABP interventions—such as transport infrastructure, storage facilities, and buyer networks play decisive roles in shaping farmers' integration into markets, as also noted by Adepoju and Salami (2022).

Lastly, the study underscores the importance of ABP in addressing the twin challenges of productivity and income generation in Adamawa State's rice value chain. However, the mixed results on market integration suggest that while ABP has delivered notable benefits, complementary investments in infrastructure and market linkages remain essential. This echoes the findings of Nnamdi and Okoro (2023), who argued that agricultural credit

programmes must be complemented by value chain support beyond farm-level production to achieve sustainable rural transformation.

Conclusion

The study concludes that the Anchor Borrowers' Programme significantly enhanced rice farmers' productivity and income in Adamawa State through credit, inputs, and extension support, though its impact on market participation was modest. Complementary investments in infrastructure and value chain linkages are required to fully maximize programme benefits and ensure sustainability.

Recommendation

i. **Strengthening Credit Access and Utilization for Rice Farmers:** The analysis demonstrated that credit under the Anchor Borrowers' Programme significantly enhanced rice farmers' productivity and market participation in Adamawa State. However, challenges remain regarding equitable access, loan monitoring, and repayment sustainability. It is therefore recommended that credit delivery mechanisms be strengthened to ensure broader reach and effective utilization. This can be achieved by decentralizing credit disbursement through farmer cooperatives and rural microfinance institutions, which can reduce bottlenecks and improve timeliness. In addition, training on financial literacy and record-keeping should be provided alongside credit support to ensure that loans are used strictly for farm-related activities. Establishing robust repayment monitoring frameworks will also enhance the sustainability of the scheme. By doing so, the programme will not only maintain its positive effect on productivity but also create a more sustainable agricultural credit culture, reducing default risks and enabling revolving credit facilities for successive batches of farmers.

ii. **Enhancing Input Provision and Extension Services for Income Growth:** The regression results revealed that input provision and extension services are the strongest predictors of farmers' income, with both variables having significant positive effects. To build on this, it is recommended that government and programme coordinators prioritize timely and adequate distribution of high-quality inputs such as improved rice seeds, fertilizers, and herbicides. This must be accompanied by strict quality control mechanisms to prevent the diversion of inputs or the supply of substandard products. Furthermore, extension services should be restructured to focus not only on farm-level practices but also on post-harvest handling, value addition, and agribusiness management. This broader orientation will empower farmers to maximize returns from their production. Regular capacity-building workshops, farmer field schools, and demonstration plots should be institutionalized to ensure farmers adopt improved technologies. Strengthened extension delivery, coupled with efficient input systems, will not only raise incomes but also enhance overall value chain competitiveness in Adamawa State.

iii. **Expanding Market Linkages and Infrastructure for Sustainable Integration:** Findings from the study indicated that ABP interventions had only a modest impact on market participation, with extension services showing no significant effect in this regard. This suggests that external constraints such as poor infrastructure, weak market linkages, and limited access to buyers hinder full integration. It is recommended that deliberate efforts be made to strengthen market linkages through

cooperative marketing systems, establishment of aggregation centers, and partnerships with millers and large-scale processors. Government should also invest in rural infrastructure such as feeder roads, storage facilities, and market stalls to reduce transaction costs and post-harvest losses. Additionally, extension services should be reoriented to include market intelligence, price negotiation skills, and cooperative marketing education to improve farmers' bargaining power. By addressing these market-level challenges, the programme will not only sustain productivity gains but also ensure that farmers capture greater value along the rice value chain, thereby promoting inclusive rural development.

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