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Assessment of the Utilization of Cassava Production Technologies in Abak Agricultural Zone, Akwa Ibom State, Nigeria

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Abstract

There is a pressing need to boost agricultural innovation to significantly increase cassava output in Nigeria. This study therefore assessed the utilization of cassava production technologies/innovations by cassava farmers in the Abak Agricultural Zone, Akwa Ibom State, Nigeria. The specific objectives were to; examine the socioeconomic characteristics of the extension agents and cassava farmers; identify the sources of information on cassava innovation; examine the level of cassava innovation utilization; and assess the constraining factors militating against utilization of production technologies/innovations by cassava farmers in the study area. The multistage sampling procedure, was used to select one hundred (120) respondents. Descriptive statistics revealed key socioeconomic characteristics such as a male-dominated cassava operation, an average age 39.1 years, 5.5 years farming experience and a mean farm size of 1.1 hectares. Farmers primarily source information from friends/family (33.8%), radio (22.7%), and model farmers (20.4%), with low reliance on extension agents (8.0%). Utilization of cassava innovations is moderate (mean 2.50), with higher use in intercropping ($x=2.71$) and site selection ($x=2.63$), but lower for fertilizer application ($x=2.09$) and pest/disease control ($x=1.79$). Major constraints (mean 2.5) include inadequate farmland ($x=3.54$), poor extension contact ($x=3.03$), inadequate storage ($x=2.93$), and lack of farm credit ($x=2.87$), alongside high costs, technology attributes, and poor income. The study, therefore recommends; government should fund and deploy "Mobile Demonstration Units" with well-trained extension agents to conduct regular, hands-on field training sessions directly in farming communities.

Keywords: Constraints, Production technologies, Innovations

1.0 Introduction

Cassava (*Manihot esculenta* Crantz) stands as one of Nigeria's most crucial staple food crops, sustaining numerous households and holding significant importance in both the food and industrial sectors (Osuafor *et al.*, 2020). Recognizing this, both federal and state governments have initiated various programs and policies, such as the Agricultural Transformation Agenda (ATA), Root and Tuber Expansion Programme (RTEP), Cassava Enterprise Development Project (CEDP), and Presidential Initiative on Cassava (PIC), aimed at transforming the crop's production (Bello *et al.*, 2024). Nigeria currently leads West Africa in cassava output, producing as at 2027 an estimated 59 million tons annually, representing 20.4% of global production (Otekunrin and Sawicka, 2019). The International Institute of Tropical Agriculture (IITA) and the National Roots Crop Research Institute (NRCRI) have made substantial efforts to develop advanced cassava production technologies, including breeding higher-quality, pest and disease-resistant cultivars adaptable to diverse ecological conditions and farming systems (Amadi *et al.*, 2022). These improved varieties are recognized for their potential to yield nearly 50% more than native ones, with improved varieties now accounting for 60% of Nigeria's total cassava cultivation area (Njoki *et al.*, 2023).

Despite extensive efforts by institutions like NRCRI and IITA to develop and introduce enhanced cassava production technologies across the African cassava belt, there remains a critical gap in understanding the actual adoption and utilization rates of these technologies by farmers. While improved varieties are prevalent, it is unclear whether farmers are effectively embracing and applying the recommended production practices that accompany these innovations (Uzochukwu *et al.*, 2021). The existing literature highlights that Nigerian cassava farmers face numerous difficulties in employing these production-boosting technologies, often linked to inefficient extension services, inadequate teaching resources, poor learning environments, and a lack of funding for extension delivery systems (Kazeem *et al.*, 2017). This suggests a persistent lack of knowledge and access, pointing to a critical need to assess the real-world application of these advances.

This study is justified by its critical role in identifying the specific constraints that hinder the adoption of a comprehensive suite of improved cassava production technologies, including intercropping, site selection/land clearing, weeding interval, planting date and spacing, timely harvest, ridge/mound making, use of improved cuttings, fertilizer application, and pest/disease control measures. By focusing on these factors within the Abak Agricultural Zone, this research will provide actionable insights into the impact of factors like extension agency efficiency, the perceived net value of the technology, farmers' economic strength and educational attainment, the integrated package of farm support measures, farmers' age, and the size of their holdings (Nwaobiala *et al.*, 2016). Understanding these barriers is essential for designing targeted interventions to bridge the adoption gap, ensuring that these proven innovations—which offer substantial increases in yield and resilience against diseases (FAO, 2023)—can effectively contribute to food security and poverty alleviation among Nigerian farming households.

The general objective of this study is to assess the utilization of improved cassava production practices by cassava farmers in the Abak Agricultural Zone, Akwa Ibom State.

The specific objectives are to:

1. Examine the socio-economic characteristics of the extension agents and cassava farmers in the study area.
2. Identify the sources of information on production practices/innovation in the study area.
3. Examine the level of cassava production practices/innovations in the study area.
4. Assess the constraining factors militating against utilization of cassava production practices in the study area.

3.0 Methodology

3.1 Study Area

The study was conducted in Abak Agricultural Zone of Akwa Ibom State, Nigeria. The main economic activities of the people are farming, trading, fishing (for riverine and coastal dwellers) and white-collar services. The State lies between latitudes $4^{\circ} 32'$ and $5^{\circ} 53'$ N and longitudes $7^{\circ} 25'$ and $8^{\circ} 25'$ E and its 2016 projected population was 5.45 million people. Akwa Ibom State is made up of 31 Local Government Areas (LGAs) with six (6) Agricultural Zones namely; Uyo, Oron, Ikot Ekpene, Eket, Abak and Etinan. Abak Agricultural Zone consists of five (5) LGAs, which are; Abak, Oruk Anam, Etim Ekpo, Ukanafun, and Ika. Cassava, cocoyam, plantains, maize, oil palm, bananas, coconuts, citrus, and vegetables are among the most widely farmed crops in the study region. The majority of the population live as farmers, particularly in peri-urban and rural villages with high records of cassava production.

3.2 Sampling Technique and Sample Size, Sources and Types of Data

The multistage sampling technique was used to select one hundred (120) respondents. The first stage involved random selection of three (3) out of the five (5) LGAs in the study area. In the second stage, two (2) villages were randomly selected from the three (3) selected LGAs, making a total of the six (6) villages. The third stage involved random selection of twenty (20) cassava farmers from each of six (6) villages, making a total of one hundred and twenty cassava farmers (120), which were used as the sample size for the study.

Primary data collected through the use of structured questionnaire were used for the study.

3.3 Analytical Techniques

The field data was examined using a variety of analytical methods. Descriptive statistics, such as the mean, percentage, and frequency distribution, were used to operationalize objectives one and two. With the use of descriptive statistics, such as frequency distribution, percentage, mean scores, and mean threshold from a 3-point Likert scale, goal three was operationalized. The fourth objective was operationalized using descriptive statistics, such as the 4-point Likert scale mean threshold, frequency distribution, percentage, and mean scores.

4.0 Results and Discussion

4.1 Socio-economic Characteristics of Cassava Farmers

The result presented in Table 3.1 showed that most, (61.7%) of the respondents were males. This infers that cassava farming is dominated by males in the study area and is in contrary with the findings of Anyanwu (2018) who reported that majority of cassava farmers were females. The age distribution revealed that majority (64.2%) of the respondents, were within the age bracket of 30 - 40 years, 35.0% were above 40 years while 0.8% were below 30 years. The average age of respondents in the study area was 39.1 years which implies that cassava farmers were still within their active and productive age. Another implication of this result is that younger farmers dominate cassava production in Abak Agricultural Zone and this makes them to be receptive to new innovations especially in cassava production technologies.

The marital status distribution of cassava showed that, majority (79.2%) of the farmers in the study area are married. The result implies that cassava farmers had shared responsibilities in running their farming operations. Married farmers may have access to additional labour from their spouse and potentially their children (Contzen, *et al.*, 2017). This can be beneficial in terms of managing the farm operations, especially during peak seasons. Based on education, the result showed that majority of the respondents spent within 6 - 12 years in formal education, 18.3% spent above 12 years while 10.9% spent below 6 years. The average years, spent in formal education by the respondents in the study area was 10.3 years. The implication is that, the farmers had attained some forms of education and would be able to make good production decisions. These farmers, would be able to understand the basics of innovation which would result in rapid utilization of cassava innovation in the study area.

The result, based on household size of the respondents presented in Table 3.1 showed that, majority (80.0%) of the cassava farmers had household sizes within the range of 4 - 8 persons, 18.3% had below 4 persons while 1.7% had above 8 persons in their household. The average household size was 5 persons, this implies that, cassava farmers had larger household sizes and would depend on household labour for farming operations; Similarly, Antia-Obong, *et al.*, (2021) observed that smallholder poultry households in Akwa Ibom State had an average of 5 persons per households.

The result showed that, greater proportion (45.8%), earned above ₦100,000, 41.7% and 12.5% of the respondents, earned within ₦50,000 - ₦100,000 and below ₦50,000 respectively. The average monthly income, earned by cassava farmers in the study area, was ₦131,545.8 which implies that cassava farmers in the study area, may not have the financial resources to utilize production practices, that are very expensive due to financial constraints. Based on farming experience, majority (66.7%) of the cassava farmers had experience within the range of 5 - 10 years, 30.8% had below 5 years while 2.5% had above 10 years of experience in cassava farming. The average years of experience in the study area, was 5.5 years (mean), which implies that cassava production was an emerging enterprise in the study area. Farmers, with greater experiences would tend to make better production decisions (Tran, *et al.*, 2020) and would be receptive to new innovations based on their experience in production.

The result presented in Table 3.1 shows that, greater percentage (55.0%) of the cassava farmers were not members of cooperative societies in the study area. The result implies that, most of the respondents were not aware of the benefits of joining a cooperative society. Membership of social organization such as cassava farmers cooperatives, provides supports to members and also provide basic production information such as; innovations required by farmers for better performances. Greater percentage (53.3%) of the cassava farmers had access to credit facilities in the study area. The result implies that, cassava farmers who had access to credit, would have the financial resources to utilize production practices, brought to them compared to their counterparts.

The result presented in Table 3.1 shows that, (40%) of the cassava farmers had access to extension services in the study area. The result implies that, the cassava farmers had limited access to extension services which could result in poor utilization of some cassava innovation because these farmers may not be aware of cassava innovations available in their study area. Another plausible reason for this result could be due to problems facing extension services in Nigeria. Extension services, tend to be ineffective which would affect farmers contact with extension agents, hence poor utilization of cassava innovations, in the study area. Based on their farm sizes, majority (96.7%) of the respondents cultivated farm sizes within the range of 1 hectare - 2 hectares, 2.5% of the respondents cultivated below 1 hectare while 0.8% of the respondents cultivated above 2 hectares. The average farm size cultivated by the respondents in the study area was 1.1 hectares, which implies that the cassava farmers were into small scale production which could be due to lack of access to land and other production resources.

4.2 Sources of Information on Cassava Production Practice

The findings from Table 3.2 paint a clear picture of information dissemination dynamics among cassava farmers in the study area, with significant implications for agricultural extension strategies. The heavy reliance on friends and family (33.8%), radio (22.7%), and model farmers (20.4%) suggests that information flow is predominantly informal, community-driven, and media-dependent. This preference is logically linked to factors such as low cost, high availability, and easy accessibility, as noted by Alakpa *et al.* (2021). Farmers exhibit a strong sense of community and trust within their social networks, valuing the reliability and trustworthiness of information shared by peers and experienced model farmers. These channels offer informal conversations and readily available consultations, reducing barriers often associated with formal sources.

Crucially, the data reveals a remarkably low utilization of extension agents, accounting for only 8.0% of information sources. This figure is particularly striking given that extension agencies are theoretically positioned as primary conduits for disseminating improved agricultural technologies and practices developed by research institutions like IITA and NRCRI. The limited engagement with extension agents implies that a significant portion of cassava farmers may not be receiving direct, up-to-date, and technically sound information on advanced production techniques, pest and disease control, or optimal input application. While friends, family, and model farmers provide accessible information, they may lack the specialized, scientific, and comprehensive knowledge that extension agents are trained to deliver. The low reliance on extension agents suggests potential systemic issues, such as inadequate outreach, insufficient

Table 3.1: Distribution of respondents according to socio-economic characteristics

Variables	Frequency (N = 120)	Percentage (100%)
Gender		
Male	74	61.7
Female	46	38.3
Age (Mean = 39.1years)		
Below 30	1	0.8
30 – 40	77	64.2
Above 40	42	35.0
Marital Status		
Single	18	15.0
Married	95	79.2
Divorced	7	5.8
Education (Mean =10.3years)		
Below 6	13	10.9
6 – 12	85	70.8
Above 12	22	18.3
Household Size (Mean = 5 persons)		
Below 4	22	18.3
4 – 8	96	80.0
Above 8	2	1.7
Monthly Income (Mean = ₦131,545.8)		
Below ₦50,000	15	12.5
₦50,000 - ₦100,000	50	41.7
Above ₦100,000	55	45.8
Farming Experience (Mean = 5.5 years)		
Below 5	37	30.8
5 – 10	80	66.7
Above 10	3	2.5
Membership of Cooperative		
Yes	54	45.0
No	66	55.0
Access to Credit		
Yes	64	53.3
No	56	46.7
Access to Extension Services		
Yes	48	40.0
No	72	60.0
Farm Size (Mean = 1.1 hectares)		
Below 1 ha	3	2.5
1ha - 2ha	116	96.7
Above 2ha	1	0.8

Source: Field Survey data, 2024.

agent-to-farmer ratios, lack of relevant or timely information delivery, or perhaps a perception among farmers that extension services are either inaccessible, unreliable, or not tailored to their immediate needs. This gap indicates a significant missed opportunity for formal channels to drive the adoption of more complex or capital-intensive innovations, reinforcing the need for strategies to enhance the reach and effectiveness of extension services to ensure that cutting-edge cassava innovations are fully utilized.

The reliance of cassava farmers on informal information sources, such as friends, family (33.8%), and radio (22.7%), with significantly low engagement with extension agents (8.0%), carries substantial implications for agricultural development. This skewed information flow suggests that complex, technically nuanced innovations (e.g., precise fertilizer calibration, specific pest diagnosis, or optimized varietal management) may not be effectively communicated or adopted within the farming community. While informal networks foster trust and accessibility, they often lack the scientific depth and systematic updates provided by formal extension services, potentially leading to suboptimal application of best practices and persistent yield gaps. Furthermore, the limited contact with extension agents weakens the crucial feedback loop necessary for researchers and policymakers to understand on-ground challenges and tailor future innovations. Consequently, this prevailing information paradigm can impede the comprehensive adoption of improved cassava production technologies, ultimately constraining productivity gains and hindering progress towards broader food security objectives within the region.

Table 3.2: Sources of information on cassava production practice in the study area

Sources of Information	Frequency	Percentage
Friends and Families	101	33.8
Radio	68	22.7
Model farmers	61	20.4
Extension agents	24	8.0
Cooperative societies	19	6.4
Posters	15	5.0
Non-Government Organization	11	3.7
Total	299	100.0

Source: Field Survey, 2024. *Multiple Responses*.

4.3 Level of Cassava Production Practices

The study's findings in table 3.3, indicate a mean utilization score of 2.50 for cassava innovations in the study area, and suggest a moderate overall level of utilization rather than a "strong" one, especially when viewed against a typical 5-point Likert scale where 2.50 falls at the midpoint (neutral to slightly agree/utilize). This level of utilization implies that while farmers are engaging with some innovations, they are not fully integrating the comprehensive package of improved practices. Specifically, the relatively higher utilization of intercropping ($x=2.71$) and site selection/land clearing ($x=2.63$) which aligns with previous findings by Ukonu *et al.* (2022),

Anyanwu (2018), Uzochukwu *et al.* (2021), Ekwere *et al.*, (2023) Mwebaze *et al.* (2024) and Nabahungu *et al.* (2025), all of whom noted farmers' strong utilization of these particular agronomic practices. This consistency across studies from different regions of Nigeria (Anambra and Imo States) suggests that practices perceived as foundational or immediately beneficial are more readily adopted.

However, the progressively lower utilization scores for practices such as weeding interval ($x=2.38$), planting date and spacing ($x=2.30$), time of harvest ($x=2.25$), ridge/mound making ($x=2.20$), use of improved cassava cutting ($x=2.18$), and fertilizer application ($x=2.09$) are significant. The least utilized innovation, pest and disease control ($x=1.79$), is particularly concerning. These lower scores directly corroborate the broader challenges identified in previous findings. Uzochukwu *et al.* (2021) and Anyanwu (2018) both reported that small-scale cassava farmers had not fully embraced many of the eleven enhanced production characteristics, pointing to a persistent gap between awareness and full implementation. The observed low utilization of crucial yield-enhancing practices like fertilizer application and pest/disease control within the current study's area reflects the "pervasive economic and structural challenges" highlighted by Saina *et al.* (2024), where economic factors significantly influenced adoption. Similarly, the inadequate utilization of these specific practices could be linked to the institutional barriers (e.g., insufficient access to credit, inadequate extension contacts) and economic constraints (e.g., unavailability of needed inputs, high cost of labor) emphasized by Uzochukwu *et al.* (2021) and Anyanwu (2018). The consistently moderate-to-low adoption across these vital practices implies that despite research efforts and policy initiatives, the comprehensive package of improved cassava technologies is still far from being universally or optimally applied by farmers, thereby limiting overall productivity gains and impacting food security.

Table 3.3: Level of cassava production practices in the study area

Cassava production (practices)	Always [#]	Occasionally [#]	Never [#]	Mean
Intercropping	85	35	-	2.71
Site selection/land clearing	76	44	-	2.63
Weeding interval	56	53	11	2.38
Planting date and spacing	51	54	15	2.30
Time of harvest	30	90	-	2.25
Ridge/mound making	38	68	14	2.20
Use of improved cassava cutting	23	96	1	2.18
Fertilizer application	41	49	30	2.09
Pest and disease control	30	35	55	1.79

Source: Field Survey, 2024.

[#] indicate frequencies

4.4 Constraining Factors Affecting Cassava Production Practices

The findings from Table 3.4, indicating a mean constraint score of 2.5, confirm that farmers face major constraints hindering their utilization of cassava innovations, aligning consistently with previous research. The prominence of inadequate farmland ($x=3.54$) as the most significant constraint highlights a fundamental structural barrier, which directly impacts the scale at which farmers can adopt improved practices that often require specific spacing or larger plots for

optimal returns. This resonates with Anyanwu (2018) and Uzochukwu *et al.* (2021), who similarly identified inadequate land as a serious constraint.

Furthermore, the high mean scores for poor extension contact ($x=3.03$) and lack of farm credit ($x=2.87$), coupled with the high cost of acquiring credit facilities ($x=2.80$), point to critical institutional and economic impediments. These findings directly reinforce Uzochukwu *et al.*'s (2021) emphasis on "insufficient access to credit" and "inadequate extension contact" as key institutional constraints, and Anyanwu's (2018) observation of "lack of credit" as a severe barrier. The implication is that even when innovations are available, farmers often lack the financial capital to acquire necessary inputs (e.g., fertilizers, improved cuttings) and the expert guidance to implement them correctly.

The constraints related to the attributes of technology ($x=2.78$), innovation being expensive to acquire ($x=2.72$), and difficult to use ($x=2.53$) suggest that the design and economic viability of some innovations may not fully align with farmers' realities. This reinforces Anyanwu's (2018) finding on "technological features" as a constraint. Similarly, disease and pest infestation ($x=2.72$) remain a major challenge, consistent with previous studies, indicating that existing control measures or resistant varieties are either not fully adopted or effective. Finally, poor income from cassava farming ($x=2.71$), inadequate storage facilities ($x=2.93$), and marketing problems ($x=2.55$) create a disincentive for adoption by reducing the perceived net gain from investing in new technologies. These economic constraints, including the "unavailability of needed inputs" and "net gain" identified by Uzochukwu *et al.* (2021), coupled with market access issues highlighted by Saina *et al.* (2024) and Baffour-Ata *et al.* (2024), limit farmers' capacity to recoup investments and see tangible benefits, thus perpetuating a cycle of low adoption and suboptimal productivity in the cassava sector.

Table 3.4: Constraints militating against cassava production practices in the study area

Constraints	SA	A	D	S	Mean
Inadequate farm land	94	11	1	14	3.54
Poor extension contacts	29	65	26	-	3.03
Inadequate storage facilities	41	44	20	15	2.93
Inadequate or poor farm credit	36	58	-	26	2.87
High cost of acquiring credit facilities	29	64	1	26	2.80
Attributes of technology: High cost of farm inputs	30	48	27	15	2.78
Disease and pest infestation	37	12	71	-	2.72
Innovation is expensive to acquire	38	11	70	1	2.72
Poor income from cassava farming	25	50	30	15	2.71
Pilfering/theft	40	39	-	41	2.65
Difficult to use	15	59	21	25	2.53
Marketing problems/inadequate marketing information	24	44	26	26	2.55
Illiteracy	26	35	30	29	2.48
No cooperative of farm association	15	41	50	14	2.48
High cost of labour	11	49	45	15	2.47

Source: Field Survey, 2024.

5.0 Conclusion

The study provided empirical evidence on the level of utilization of cassava production practices among farmers in Abak Agricultural Zone, Akwa Ibom State. It could be emphatically inferred from the study that, a greater percentage of the respondents was small-scale farmers who accessed information on innovations from families and friends, model farmers and radio. The results, also show that, there was high utilization of cassava innovation among farmers in the study area. The serious constraints affecting utilization of cassava innovations, in the study area were inadequate farm land, poor extension contact, inadequate storage facilities, lack of farm credit, high cost of acquiring credit facilities, attributes of technology, disease and pest infestation, innovation was expensive to acquire, poor income from cassava farming, pilfering/theft, marketing problems/inadequate marketing information, and difficulty of use.

Recommendations

The study therefore recommends;

1. Cassava farmers should join or form local agricultural cooperatives to access "Cassava Input Revolving Funds" that provide essential inputs like improved cuttings and fertilizers as loans, repayable after harvest.
2. Cassava farmers should actively participate in on-site demonstrations and training sessions led by extension agents to master precise application techniques.
3. Government should fund and deploy "Mobile Demonstration Units" with well-trained extension agents to conduct regular, hands-on field training sessions directly in farming communities.
4. Government should provide financial support by establishing and funding a "Cassava Input Revolving Fund" accessible through farmer cooperatives, providing in-kind loans for essential inputs like improved cuttings and NPK 15:15:15 fertilizer. Implement flexible repayment schedules aligned with cassava harvest cycles to reduce financial burden and encourage technology adoption.

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