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Socio-Economic Determinants of Vegetable Farmers' Perception of Extension Services in Bayelsa State, Nigeria

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ABSTRACT: *This study examines the socioeconomic determinants of vegetable farmers' perception of extension services in Bayelsa State, Nigeria. A multi-stage sampling technique was used to select 90 vegetable farmers across nine communities in three purposively selected Local Government Areas (Ogbia, Sagbama, and Kolokuma/Opokuma). Data were collected using structured questionnaires and analyzed using descriptive statistics and multiple linear regression model. The results reveal that the majority of vegetable farmers are female (65.6%), married (66.7%), and within the age range of 41–50 years (37.8%). Most farmers (76.7%) do not belong to cooperative societies, and their estimated monthly income averages ₦189,588.9. Farmers generally hold a positive perception of extension services, with a grand mean of 3.1, exceeding the decision cut-off point of 2.5. However, several challenges hinder effective extension service delivery, including inadequate extension workers ($\bar{x}$ =3.31), poor road networks ($\bar{x}$ =3.38), and farmers' lack of interest in extension programs ($\bar{x}$ =3.42). The regression analysis identifies gender, age, education level, income, and the source of vegetable farming business as significant determinants of farmers' perception of extension services ($p < 0.05$). The study concludes that while farmers have a favorable perception of extension services, several socio-economic factors influence their level of engagement. Strengthening extension programs through increased training, infrastructural development, and enhanced accessibility could improve farmers' participation and productivity.*

Keywords: *Vegetable farmers, extension services, socio-economic determinants, perception, Bayelsa State.*

I. Introduction

Agricultural extension services play a fundamental role in disseminating improved farming techniques, innovative agricultural practices, and critical information that enhance farm productivity and sustainability (Afolami *et al*., 2021). Despite the recognized importance of these services, their effectiveness is often constrained by socio-economic factors that shape farmers' perceptions and willingness to adopt recommended agricultural innovations. In Bayelsa State, Nigeria, where vegetable farming constitutes a significant part of smallholder agriculture, the perceptions of farmers towards extension services are crucial in determining their adoption of improved farming techniques. However, existing literature suggests that farmers' socioeconomic characteristics significantly affect their engagement with extension services, leading to disparities in agricultural productivity and sustainability (Oluwasegun *et al*., 2022).

One major challenge in agricultural extension delivery in Bayelsa State is the low participation and receptiveness of vegetable farmers to extension services. Socioeconomic variables such as education level, income, farm size, farming experience, household size, and access to credit facilities have been identified as key determinants of farmers' attitudes towards agricultural extension services (Nwankwo *et al*., 2020). For instance,

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farmers with higher education levels are more likely to comprehend and adopt modern agricultural innovations, whereas those with limited formal education may struggle to understand and apply new techniques, thereby limiting the impact of extension programs (Adamu *et al*., 2023). Additionally, low-income farmers often perceive extension services as inaccessible or irrelevant, especially if they lack the financial capacity to implement the recommended farming practices.

Another pressing issue is the inadequacy of agricultural extension agents in terms of number, mobility, and technical knowledge. Studies have shown that farmers in rural areas, such as those in Bayelsa State, often receive limited or irregular extension services due to poor funding, inadequate logistics, and weak institutional support (Ebewore, 2019). This inconsistency in service delivery affects farmers' trust and confidence in extension programs, leading to reduced participation and adoption of modern farming practices. Furthermore, sociocultural factors, such as gender norms and traditional farming methods, also influence farmers' perceptions of extension services. For example, women farmers, who play a significant role in vegetable production, often have limited access to extension services due to gender-related barriers, thereby affecting their ability to benefit from agricultural innovations (Ajani & Igbokwe, 2021).

The lack of farmer participation in extension activities also stems from inadequate financial support and credit facilities. Most vegetable farmers in Bayelsa State operate on a subsistence level and may lack the financial resources needed to implement recommended agronomic practices. Without access to financial support, even well-designed extension programs may have limited impact. According to Wauton *et al*. (2022), the challenges of poor agricultural credit access, weak government policies, and lack of incentives further reduce farmers' willingness to engage with extension services. This highlights the need for a more inclusive and context-specific approach to agricultural extension in Bayelsa State.

Given the critical role that socio-economic factors play in shaping farmers' perceptions, it is imperative to investigate these determinants in order to enhance the effectiveness of extension services. Without a clear understanding of the barriers that hinder farmers from utilizing extension services, efforts to promote sustainable agricultural practices may remain ineffective. This study is anchored on the diffusion of innovations theory (Rogers, 1962). This theory explains how new ideas, practices, or technologies are adopted within a social system. According to Rogers, the adoption process involves five stages: knowledge, persuasion, decision, implementation, and confirmation. The theory posits that socioeconomic factors such as education, income, and social networks can significantly influence individuals' openness to adopting innovations.

In the context of this study, the diffusion of innovations theory is relevant as it helps explain how vegetable farmers in Bayelsa State perceive and adopt agricultural extension services. These services serve as a conduit for new agricultural knowledge and practices. Farmers' socioeconomic characteristics, such as education and income levels, influence their exposure to, interpretation of, and willingness to adopt the innovations promoted through extension services. For example, farmers with higher educational attainment may have greater cognitive skills to comprehend and apply new agricultural techniques, as reflected in the positive relationship between education level and perception of extension services in this study.

Moreover, the theory underscores the role of change agents here, the extension workers who bridge the gap between agricultural research and the farming community. However, challenges such as inadequate extension worker-to-farmer ratios and poor infrastructure, identified in this study, can impede these agents' effectiveness, thus slowing the diffusion process.

The broad of this study is to analyse the socio-economic determinants of vegetable farmers' perception of extension services and specific objectives are to;

i. describe the socio-economic characteristics of vegetable farmers in Bayelsa State
ii. examine vegetable farmer's perception on extension service
iii. identify the challenges to effective extension service delivery among farmers among vegetable farmers

The study hypothesized that there is no significant relationship between the socio-economic characteristics of vegetable farmers and vegetable farmer's perception on extension service in the study area

II. METHODOLOGY

Bayelsa State is situated in the southern part of Nigeria, at the core of the Niger Delta region. It spans latitudes 4°15'N to 5°23'N and longitudes 5°22'E to 6°45'E, encompassing an extensive network of rivers, creeks, and mangrove swamps (National Population Commission, 2006). Its geographical position along the Atlantic Ocean and within a deltaic environment makes it one of Nigeria's most ecologically vital areas. The state shares boundaries with Delta and Rivers States to the north, Delta State to the west, Rivers State to the east and south, and the Atlantic Ocean to the south. These neighboring regions significantly influence Bayelsa's economy and social structure, particularly in the oil and gas industry, due to the state's substantial crude oil and natural gas reserves (National Population Commission, 2006).

Based on the World Bank's estimated population growth from the 2006 census figure of 1,704,515, Bayelsa's population in 2023 is projected to be approximately 2.6 million (Tskok, 2023). The state is predominantly occupied by the Ijaw ethnic group, who consider it their ancestral homeland. Various Ijaw dialects, including Ogbia, Nembe, Epie, and Ijaw, are widely spoken, along with Isoko and Urhobo. Additionally, Sagbama Local Government Area is recognized as the ancestral home of the Urhobo people (Wikipedia, 2023).

A multi-stage sampling technique was employed in this study. Bayelsa State comprises eight Local Government Areas (LGAs): Brass, Ekeremor, Kolokuma/Opokuma, Nembe, Ogbia, Sagbama, Southern Ijaw, and Yenagoa. To ensure adequate representation of different agricultural zones, three LGAs Ogbia, Sagbama, and Kolokuma/Opokuma were deliberately chosen. From each of these LGAs, three communities were randomly selected, yielding a total of nine communities. Within each community, ten vegetable samples were randomly picked, resulting in an overall sample size of 90 vegetables.

Data collection was carried out using a structured questionnaire, and the analysis was conducted through descriptive statistics, including mean and standard deviation. To test the hypothesis, an multiple linear regression model was applied. The questionnaire utilized a four-point Likert scale, with response options: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD), assigned values of 4, 3, 2, and 1, respectively. The total score of 10 was averaged, yielding a mean of 2.50. A threshold of 2.55 was set as the upper limit to determine a positive response (i.e., 2.50 + 0.005 = 2.55).

Model specification

HO_1: There is no significant relationship between the socio-economic characteristics of vegetable farmers and vegetable farmer's perception on extension service in the study area

$Y=\beta 0+\beta_1 X_1+\beta_2 X_2+...+\beta nXn+\epsilon$

Where

Y = Vegetable farmer's perception on extension service (measure on a 4-point rating scale)

X_1 = Gender , (Dummy; Male = 1, Female = 0)

X_2= Age, (Number of years)

X_3= Membership of cooperative (Number of social organizations belonged to)

X_4= Educational level, (Number of years in formal schooling)

X_5 = Marital status, (Dummy; Married = 1, Single = 0)

X_6 = Farming experience, (Number of years into farming)

X_7 = Household size, (Number of persons under the same roof)

X_8 = Monthly income, (Amount of Naira earned from farming/month)

X_9 = Income earned

X_{10} = Source of Vegetable Farming Business

e = Error term.

III. RESULT AND DISCUSSION

Socio-economic Characteristics of vegetable farmers

Result presented in Table 1 revealed the socio-economic characteristics of vegetable farmers in Bayelsa State reveal key insights into their demographics and potential influence on their perception of extension services. The majority of farmers (37.8%) fall within the 41–50 age group, with an average age of 47.5 years, suggesting a relatively experienced farming population. Women (65.6%) dominate vegetable farming, consistent with findings by Ovwigho (2014) that women are actively involved in agricultural production in Nigeria. A significant portion of farmers (76.7%) do not belong to cooperatives, which may limit access to collective resources and extension services (Afolami *et a*l., 2015). Education levels are moderate, with 50% attaining secondary education, a factor that can enhance the adoption of improved farming practices (Ibrahim et al., 2022). Most farmers (66.7%) are married, which could contribute to household labor availability.

Farmers have considerable experience, averaging 29.4 years, which aligns with previous research linking experience with productivity and innovation adoption (Ogunleye *et al.*, 2021). Household sizes are relatively large, with 47.7% having 11–15 members, which may influence labor availability and economic dependency. Income distribution shows that most farmers earn below ₦300,000 monthly, indicating modest financial capacity, which could affect their ability to access extension services (Adebayo & Idowu, 2020).

Table 1: Socio-economic Characteristics of vegetable farmers

Variables	Frequency	Percentage (%)	Mean
Age (years)			
21 – 30	9	10.0	
31 – 40	23	25.6	
41 – 50	34	37.8	
Above 50	24	26.6	47.5 ±13.6
Gender			
Male	31	34.4	
Female	59	65.6	
membership of cooperative			
Yes	21	23.3	
No	69	76.7	1.76
Level of Education			
Primary	25	27.8	
Secondary	45	50.0	
Tertiary	20	22.2	
Marital status			
Single	26	28.9	
Married	60	66.7	
Divorced	4	4.4	1.8±1.21
Years of experience			
1 – 5	15	16.7	
6 – 10	25	27.8	
11 – 15	30	33.3	
16 – 20	20	22.2	29.4±11.180
Household size			
1 – 5	27	30.0	
6 – 10	20	22.3	
11 – 15	43	47.7	
Estimated monthly income			
< 100000	20	22.2	

100000 – 200000	16	17.8	
201000 – 300000	22	24.4	
301000 – 400000	15	16.7	
401000 – 500000	12	13.3	
Above 500000	5	5.6	189588.9±90646.5

Source: Field Survey Data (2024).

Vegetable farmer's perception on extension service

The results presented in Table 2 provide a comprehensive overview of vegetable farmers' perception of extension services in Bayelsa State, Nigeria. The grand mean score of 3.1, which is above the decision mean cut-off point of 2.5, indicates an overall positive perception of extension services among vegetable farmers. This suggests that extension services play a significant role in the agricultural activities of these farmers.

The findings show that a majority of the farmers have heard of extension services before ($\bar{x}$ = 3.32). This aligns with previous studies indicating that awareness of extension services is critical in ensuring farmers' participation in agricultural innovations (Adebayo *et al*., 2023). The mean score of 3.08 for being assisted by an extension agent before further affirms the active role played by extension workers in the dissemination of agricultural knowledge (Oluwaseun & Akinwale, 2022).

Similarly, the result shows that many farmers have consulted agricultural agents before ($\bar{x}$ = 2.94), suggesting a reliance on professional guidance in agricultural activities. This aligns with findings by Umeh *et al*. (2021), who emphasized the importance of agricultural extension services in improving farmers' decision-making. The adoption of innovation recorded a mean score of 3.02, indicating that farmers are willing to implement new agricultural techniques recommended by extension agents. Studies have shown that adoption of agricultural innovations enhances productivity and sustainability (Eze *et al*., 2020).

Farmers' perception of the responsiveness of extension services was also positive ($\bar{x}$ = 3.09), supporting the assertion that effective communication between farmers and extension agents fosters trust and increases participation (Ajayi & Ogunleye, 2023). Moreover, the results suggest that extension information significantly contributes to increased yield ($\bar{x}$ = 3.18) and income ($\bar{x}$ = 3.25). This is consistent with research by Nwachukwu *et al*. (2022), which found a strong correlation between access to extension services and improved farm productivity and profitability.

Interestingly, the mean score for discontinuing adoption of an innovation was 2.63, indicating that some farmers might have faced challenges in sustaining the use of new agricultural practices. Previous studies have highlighted those constraints such as lack of financial support, inadequate extension follow-up, and unfavorable market conditions can hinder sustained adoption (Bello *et al*., 2021). However, the high mean score of 3.13 for encouraging others to adopt innovations suggests a positive outlook towards knowledge-sharing among farmers, which can enhance agricultural development in the region (Yusuf & Adewale, 2023).

Table 2: Vegetable farmer's perception on extension service

S/no.	Variables	Mean	SD	Remark
1.	Heard extension service before	3.32	0.70	Positive
2.	Assisted by extension agent before	3.08	0.61	Positive
3.	Consulted Agric. agent before	2.94	0.79	Positive
4.	Adopted any innovation	3.02	0.74	Positive
5.	Do they respond well	3.09	0.73	Positive
6.	Extension information help to increase my yield	3.18	0.54	Positive
7.	Help to increase income	3.25	0.68	Positive
8.	Discontinue the adoption	2.63	1.01	Positive
9.	Encourage others to adopt	3.13	0.91	Positive
	Grand mean	**3.1**		
	Decision mean cut-off point	**2.5**		

Source: Field Survey Data (2024). SD: Standard deviation.

The challenges to effective extension service delivery among farmers among vegetable farmers

Table 3 presents various challenges faced by vegetable farmers in accessing effective agricultural extension services. The grand mean of 3.2, which is above the decision mean cut-off point of 2.5, confirms that all the variables listed are significant challenges. These findings align with previous studies indicating that multiple barriers hinder effective extension service delivery to farmers (Adekunle & Fatunbi, 2021; Mbo'o-Tchouawou & Colverson, 2016).

One of the primary challenges identified is the attitude of farmers toward extension services ($\bar{x}$ = 2.50). This issue can stem from a lack of awareness or past negative experiences with extension agents, which influences their willingness to engage with extension programs (Aker, 2020). Transparency and accountability in service provision ($\bar{x}$ = 3.09) were also identified as major concerns. Farmers may perceive extension agents as biased or inefficient in delivering agricultural innovations, which could limit trust and adoption of recommended practices (Davis & Sulaiman, 2019).

Training and retraining of extension agents ($\bar{x}$ = 3.26) were found to be inconsistent, leading to ineffective and invisible extension services ($\bar{x}$ = 3.11). Studies have shown that regular capacity-building programs for extension workers enhance service quality and ensure that agents provide up-to-date and relevant information to farmers (Rivera *et al*., 2020). Additionally, inadequate extension workers to reach all farmers ($\bar{x}$ = 3.31) exacerbates the problem, as a high farmer-to-extension agent ratio limit personalized advisory services (Swanson & Rajalahti, 2018).

Infrastructure-related challenges such as poor road networks ($\bar{x}$ = 3.38) and low popularity of extension services ($\bar{x}$ = 3.41) further hinder effective service delivery. In regions where transportation is a major constraint, extension workers struggle to reach remote farming communities, limiting the impact of extension interventions (Anderson & Feder, 2017). Language and cultural barriers ($\bar{x}$= 3.08, $\bar{x}$ = 3.02) also affect communication between extension agents and farmers, particularly in multilingual and culturally diverse regions (Tambo & Wünscher, 2017).

Educational barriers, including poor literacy levels among farmers ($\bar{x}$ = 3.23), contribute to limited adoption of extension messages. Farmers with low levels of education may find it difficult to interpret extension advice or apply new technologies effectively (Ogunlela & Mukhtar, 2009). Similarly, the high cost of inputs ($\bar{x}$ = 3.23) poses a challenge, as farmers struggle to afford recommended agricultural inputs, thereby limiting the effectiveness of extension interventions (Fischer *et al*., 2018).

Another major issue is irregular supervision by extension agents ($\bar{x}$ = 3.30), which affects the consistency of knowledge transfer and feedback mechanisms (Birner *et al.*, 2009). Inadequate training materials ($\bar{x}$ = 3.10) further hampers service delivery, as extension agents require up-to-date tools and materials to enhance the learning experience for farmers (Faure et al., 2019).

Untimely visits by extension workers ($\bar{x}$ = 3.19) and farmers' reluctance to seek extension services ($\bar{x}$ = 3.33) also emerged as critical issues. Timeliness is crucial in agricultural extension, as information provided at the wrong time may be irrelevant or impractical for farmers (Davis, 2008). Similarly, the lack of cooperation between farmers and extension workers ($\bar{x}$ = 3.06) affects knowledge dissemination and adoption rates (Swanson & Rajalahti, 2018).

Poor training of extension personnel ($\bar{x}$= 3.24) and farmers' limited access to research institutions ($\bar{x}$ = 3.17) limit the potential of agricultural innovations reaching the farmers. Research institutions play a crucial role in generating and disseminating improved agricultural technologies, and limited access prevents farmers from benefiting from these advancements (Ragasa et al., 2016). Additionally, inadequate information and communication technology (ICT) tools ($\bar{x}$ = 3.21) further constrain service delivery, as modern agricultural extension increasingly relies on ICT for effective communication and training (Aker, 2020).

Finally, farmers' lack of interest in participating in extension programs ($\bar{x}$ = 3.42) presents a significant challenge. A study by Rivera *et al*. (2020) suggests that extension services need to be demand-driven and tailored to farmers' needs to enhance participation and impact.

Table 3: The challenges to effective extension service delivery among farmers among vegetable farmers

S/no.	Variables	Mean	SD	Remark
1.	Attitude toward extension service by farmers	2.50	0.87	Challenge
2.	Transparency and accountability by extension agents by service provided	3.09	0.55	Challenge
3.	Inconsistency in training and retraining EAs	3.26	0.84	Challenge
4.	Ineffective and invisibility of extension service	3.11	0.82	Challenge
5.	Inadequate extension workers to go round the farmers	3.31	0.77	Challenge
6.	Poor road networks	3.38	0.69	Challenge
7.	Poor popularity of extension services in the area	3.41	0.73	Challenge
8.	Language barrier	3.08	0.70	Challenge
9.	Poor education of farmers	3.23	0.67	Challenge
10.	High rates of inputs to farmers	3.23	0.68	Challenge
11.	Irregular supervision of farmers by extension agents	3.30	0.75	Challenge
12.	Inadequate training materials	3.10	0.84	Challenge
13.	Cultural barrier	3.02	0.81	Challenge
14.	Untimely of visit of extension workers to farmers	3.19	0.76	Challenge
15.	Inertia to travel to seek extension services	3.33	0.65	Challenge
16.	Lack of cooperation of farmers with extension workers	3.06	0.81	Challenge
17.	Poorly trained extension personnel	3.24	0.76	Challenge
18.	Farmers not having access to research institute.	3.17	0.70	Challenge
19.	Inadequate information and communication Technologies by farmers	3.21	0.75	Challenge
20.	Farmers lack of interest in participating in Extension programmes	3.42	0.70	Challenge
	Grand mean	**3.2**		
	Decision mean cut-off point	**2.5**		

Source: Field Survey Data (2024). SD: Standard deviation.

There is no significant relationship between the socio-economic characteristics of vegetable farmers and vegetable farmer's perception on extension service in the study area

Four functional forms – linear, exponential, semi-log and double-log were tried for choice of a lead equation. Based on the magnitude of the coefficient of multiple determinations (R^2), the significance of the regression coefficients, the number of significant variables and the signs of the significant variables as they conforms to *a priori* theoretical expectations as well as the significant of the entire model as shown by the F- statistic, the linear model was chosen as the lead equation. The value of the coefficient of multiple determinations (R^2) was 0.732, implying that about 73.20% of the variations in the vegetable farmer's perception on extension service in the study area was explained by the independent variables (socioeconomic characteristics) included in the model while the remaining 26.80% was as a result of error beyond the control of the farmers. The F-statistics (21.563) was significant at 1% level of significance which implies that the predictor variables influenced vegetable farmer's perception on extension service in the study area, this formed the basis for the rejection of the null hypothesis that socioeconomic variable does not influence vegetable farmer's perception on extension service.

Gender demonstrates a consistently negative and significant influence across all models, with coefficients ranging from -1.943 in the linear model to -0.027 in the double-log model, all significant at the 1% level. This suggests that female farmers are less likely to have favourable perceptions of extension services than their male counterparts. This disparity may arise from sociocultural norms, unequal access to resources, or limited participation in decision-making processes (Adamu *et al*., 2023). Addressing gender-specific barriers is critical for improving extension service delivery.

Age also shows a significant and negative effect on perception, particularly in the linear, semi-log, and double-log models, with coefficients of -0.001, -8.094, and -0.123, respectively, all significant at the 1% level. These findings indicate that older farmers may be less receptive to extension services, potentially due to reliance on traditional practices or skepticism toward modern agricultural techniques (Nwachukwu & Akpan, 2023). Tailoring extension approaches to the needs of older farmers may enhance their engagement and perception.

Educational level has a positive and significant effect on farmers' perceptions in the linear and semi-log models (coefficients of 0.691 and 3.590, respectively), with significance at the 5% level. This result highlights the role of education in shaping farmers' receptiveness to agricultural innovations and extension services. Farmers with higher educational attainment are more likely to understand and adopt extension recommendations, reinforcing the need for educational interventions to boost agricultural productivity (Eze *et al*., 2022).

Interestingly, marital status, farming experience, and household size show no significant effects across the models. This suggests that these factors do not substantially shape perceptions of extension services, likely because they do not directly influence farmers' interactions with extension agents or the perceived benefits of the services.

Income reveals a complex relationship. Monthly income shows no significant effect, but income earned from farming is negatively associated with perceptions, particularly in the linear (-1.241) and double-log (-0.120) models, significant at 5% and 10%, respectively. This counterintuitive result may suggest that higher-income farmers are either less reliant on extension services or critical of their effectiveness due to unmet expectations (Onyeka *et al*., 2024). Further investigation is necessary to understand this dynamic.

Finally, the source of vegetable farming business income positively affects perceptions, with coefficients of 0.968 (linear) and 0.015 (exponential) significant at the 5% level. Farmers whose primary livelihood depends on vegetable farming are more likely to value extension services, as they directly impact their productivity and income stability.

Table 4: Socioeconomic characteristics influence on vegetable farmer's perception on extension service in the study area.

Socioeconomic variables	Linear+	Exponential	Semi-log	Double-log
Gender	-1.943 (-3.212)***	-0.030 (-2.965)***	-1.822 (-2.534)***	-0.027 (-2.235)**
Age of farmer	-0.001 (-3.488)***	--0.080 (-0.316)	-8.094 (-3.530)***	-0.123 (-3.183)***
Membership of cooperative	-1.087 (-1.672)	-0.014 (-1.265)	-3.082 (-1.368)	-0.040 (-1.069)
Educational level	0.691 (2.082)**	0.009 (1.695)	3.590 (2.184)**	0.053 (1.938)*
Marital status	0.004 (0.019)	-0.001 (-0.160)	0.006 (0.006)	-0.001 (-0.084)
Farming experience	0.012 (0.577)	0.000 (1.249)	1.859 (1.450)	0.033 (1.553)
Household size	0.428 (1.080)	0.007 (1.021)	2.267 (1.418)	0.037 (1.374)

Estimated monthly income (₦)	2.791E-6 (0.959)	3.991E-8 (0.820)	1.604 (1.137)	0.024 (1.012)
Income earned (₦)	-1.241 (-2.275)**	-0.022 (-2.457)**	-6.344 (-1.652)	-0.120 (-1.860)*
Source of vegetable farming business	0.968 (2.075)**	0.015 (2.173)**	4.082 (1.275)	0.070 (1.309)
Constant	34.270 (13.687)***	1.539 (37.031)***	32.044 (3.441)***	1.505 (9.653)***
Diagnostic tools				
F-statistic	21.563***	17.444***	20.325***	16.258***
R-squared	0.732	0.688	0.720	0.673
Adjusted R-squared	0.698	0.649	0.685	0.632
Observation	90	90	90	90

Source: Field survey data (2024). **Note:** ***, **, and * indicates statistically significant at 1%, 5 % and 10 % levels, respectively. + stand for the lead equation.

IV. Conclusion

The study examined the socio-economic determinants of vegetable farmers' perception of extension services in Bayelsa State, Nigeria. The findings revealed that the majority of the farmers were female (65.6%), married (66.7%), and had secondary education (50%). The average age of the respondents was 47.5 years, with an average household size of 11–15 members. The estimated monthly income of the farmers was ₦189,588.9, indicating a relatively moderate-income level.

The perception of vegetable farmers regarding extension services was generally positive, with a grand mean score of 3.1, above the decision mean cut-off point of 2.5. This suggests that farmers acknowledge the relevance of extension services in improving their productivity and income.

However, several challenges to effective extension service delivery were identified. The major challenges included poor popularity of extension services, inadequate extension workers, poor road networks, irregular supervision, and high input costs. The grand mean of the identified challenges was 3.2, highlighting their significance in limiting the effectiveness of extension service delivery.

The regression analysis indicated that gender, age, educational level, income earned, and the source of vegetable farming business significantly influenced farmers' perception of extension services at varying levels of significance. The lead equation (linear regression) showed an R-squared value of 0.732, indicating that approximately 73.2% of the variations in farmers' perception could be explained by their socio-economic characteristics.

In conclusion, while vegetable farmers in Bayelsa State perceive extension services positively, socio-economic factors significantly shape their perceptions. Addressing the identified challenges, particularly by improving extension coverage, infrastructure, and farmer education, would enhance the effectiveness of extension services and ultimately improve vegetable farming productivity in the state.

V. Recommendations

Based on the finding of the study. The following recommendations are made;

1. Efforts should be made to encourage more farmers to join cooperatives as cooperative membership can improve access to agricultural training, resources, and financial support.
2. Farmers may need more sustained support and follow-up to ensure the continued adoption of innovations. Strengthening the responsiveness and follow-through by extension agents can further enhance the farmers'

trust and effectiveness in applying new agricultural techniques, ultimately improving their yields and income.

3. The government and relevant agricultural bodies should prioritize the recruitment and training of more extension agents, ensuring that they are adequately distributed across farming communities. This would help improve access to extension services, facilitate regular and timely visits, and strengthen the relationship between farmers and extension personnel, ultimately promoting agricultural productivity in the region.

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