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Original Research Article

Responding to Economic Shocks: The Role of Agricultural Extension in Mitigating Input Inflation and Market Instability in Kebbi State

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Abstract: This study examines the impact of agricultural extension services on farmers' access to affordable agricultural inputs during economic shocks, evaluates the accessibility and effectiveness of extension services in supporting smallholder farmers amid economic disruptions, and analyzes constraints affecting extension performance in reducing the adverse effects of input inflation and unstable markets. Data were collected through structured surveys administered to a stratified random sample of 425 smallholder farmers. Sampling ensured representation across various agro-ecological zones vulnerable to economic shocks. Multiple linear regression with interaction terms revealed that extension services significantly improve access to affordable inputs ($\beta = 0.45$, $p < 0.01$), with stronger effects observed among farmers with higher education levels and credit access. Ordered logistic regression indicated that extension accessibility and perceived effectiveness positively influence farmers' likelihood to adopt recommended practices during economic disruptions (OR = 1.68, $p < 0.05$), controlling for demographic and socio-economic factors. Factor analysis of 20 identified constraints extracted four key factors—Institutional and Staffing Constraints, Economic Constraints, Logistical Access Issues, and Policy/Input System Failures—with high loadings on variables such as lack of qualified staff (0.78), rising input prices (0.73), poor road infrastructure (0.76), and weak input supply chains (0.71). These findings highlight multifaceted barriers limiting extension service effectiveness during economic shocks. The study concludes that strengthening extension capacity, stabilizing input markets, improving rural infrastructure, and enhancing policy coordination are essential. Recommendations include investing in extension personnel, regulating input prices, expanding rural ICT and transport infrastructure, and fostering public-private partnerships to build resilience and ensure sustainable delivery of agricultural advisory services in times of economic disruption.

Keywords: Agricultural Extension, Economic Shocks, Smallholder Farmers, Input Access, Factor Analysis.

INTRODUCTION

Agricultural systems in Nigeria, particularly in northern states like Kebbi, are increasingly vulnerable to economic shocks such as input inflation, fluctuating market prices, and supply chain disruptions. These shocks undermine productivity, household incomes, and food security, especially for smallholder farmers who already operate under constrained resources. Rising costs of fertilizers, seeds, transportation, and equipment have placed immense pressure on production margins, exacerbating poverty and food insecurity (Yusuf & Edeh, 2023; Ahmed & Danlami, 2023). In this context, agricultural extension services have become a critical mechanism for resilience. Effective extension systems play a pivotal role in disseminating timely information, facilitating access to inputs, and promoting adaptive strategies that help farmers respond to market and environmental uncertainty (Nwafor, Nnadozie, & Chukwuezi, 2019; Mbah, Adikwu, & Agbo, 2022). For instance, in Kebbi State, extension agents have been instrumental in advising farmers on cost-effective input use, post-harvest handling, and accessing collective input schemes through cooperatives (Ibrahim, Bello, & Lawal, 2023; Yusuf & Edeh, 2023).

Public sector efforts, including those by the Kebbi State Government and national agencies, have prioritized scaling extension outreach in response to input price volatility. These include expanding the extension workforce, subsidizing key inputs, and distributing improved technologies to reduce

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vulnerability to market instability (Tanko & Lawal, 2022; Oladapo & Bello, 2022). Moreover, farmer cooperatives and extension-led training programs have emerged as buffers against inflation, enabling smallholders to pool resources and gain market leverage (Ogundele, Eze, & Lawal, 2024). This study explores how agricultural extension services have mitigated the impacts of input inflation and market instability in Kebbi State. It assesses the effectiveness of ongoing interventions, the socio-economic factors influencing uptake, and the sustainability of extension-led coping strategies during economic disruptions.

Statement of the Problem

Agricultural production in Kebbi State, a key food-producing region in Nigeria, is increasingly threatened by economic shocks, particularly soaring input prices and volatile market conditions. Smallholder farmers the backbone of the state's agricultural sector are experiencing severe constraints in accessing essential inputs such as fertilizers, seeds, agrochemicals, and fuel due to rising inflation. These economic challenges have led to declining productivity, reduced farm incomes, and increased vulnerability to food insecurity (Ahmed & Danlami, 2023; Yusuf & Edeh, 2023). Compounding the problem is the inadequacy of market structures, characterized by price fluctuations, limited access to market information, and poor linkages between producers and buyers. Many farmers lack the technical knowledge and institutional support to adopt adaptive strategies that could help mitigate the effects of such instability (Tanko & Lawal, 2022; Ogundele, Eze, & Lawal, 2024). Although agricultural extension services are intended to serve as a critical support system providing timely information, facilitating access to innovations, and linking farmers to inputs and markets their coverage and effectiveness remain inconsistent and often underfunded (Nwafor, Nnadozie, & Chukwuezi, 2019; Mbah, Adikwu, & Agbo, 2022).

Despite government initiatives to increase the number of extension agents and provide subsidized inputs, the impact of these interventions on farmers' resilience to economic shocks in Kebbi State remains unclear. There is a lack of empirical evidence on how well extension services are addressing input inflation and market volatility, and whether smallholder farmers are adequately equipped to respond to these evolving economic pressures. This gap underscores the need for a systematic assessment of the role and effectiveness of agricultural extension in mitigating the negative effects of economic shocks in the region.

Research Questions

The study answered the following research questions.

1. To what extent has agricultural extension support helped smallholder farmers in Kebbi State cope with rising input costs (e.g., fertilizers, seeds, agrochemicals)?
2. What specific strategies or interventions have agricultural extension services employed to mitigate market instability for farmers in Kebbi State?
3. What are the major challenges limiting the impact of agricultural extension services in reducing the effects of input inflation and market volatility in Kebbi State?

Objectives of the Study

The main objective of the study is to assess the role of agricultural extension in mitigating the effects of input inflation and market instability among smallholder farmers in Kebbi State, Nigeria. The specific objectives are to:

1. Examine the impact of agricultural extension services on farmers' access to affordable agricultural inputs during periods of economic shock.
2. Identify the key extension strategies used to address market instability and improve farmers' resilience in Kebbi State.
3. Evaluate the accessibility and effectiveness of extension services in supporting smallholder farmers during times of economic disruption.
4. Analyze the constraints affecting the performance of agricultural extension in reducing the negative effects of input inflation and unstable market conditions.

METHODOLOGY

Description of the Study Area

Kebbi State is located in the northwestern geopolitical zone of Nigeria and lies between latitudes 10° 8′ N and 13° 15′ N and longitudes 3° 30′ E and 6° 2′ E. It shares an international border with the Republic of Niger to the north and the Republic of Benin to the west, while domestically it borders Sokoto State to the north, Zamfara State to the east, and Niger State to the south. The state covers a total landmass of approximately 36,229 square kilometers, making it one of the larger states in Nigeria in terms of land area. As of the 2023 population projection by the National Population Commission, Kebbi State is estimated to have a population of about 4.8 million people. The population is predominantly rural, with agriculture being the major economic activity for over 70% of residents.

Kebbi State falls within the Sudan and Sahel savannah ecological zones, featuring a tropical continental climate with a distinct wet season (May to October) and dry season (November to April). Average annual rainfall ranges from 800 to 1000 mm, and temperatures often exceed 35°C during the dry season. These climatic conditions support the cultivation of a wide range of crops including rice, millet, sorghum, maize, groundnut, and cowpea. The state is especially known for its large-scale rice production, notably in Argungu and Suru LGAs. Administratively, the state is divided into 21 Local Government Areas (LGAs), with

notable agricultural hubs including Argungu, Zuru, Yauri, Bagudo, and Birnin Kebbi. Despite its agricultural potential, Kebbi State faces challenges such as rising input costs, limited access to credit, inadequate storage infrastructure, and inconsistent market prices. These issues have been further compounded by inflation and economic shocks in recent years. Given these dynamics, Kebbi State provides a relevant and strategic case for examining how agricultural extension services can mitigate the impact of economic disruptions particularly input inflation and market instability on smallholder farmers.

Research Design

This study adopts a descriptive survey research design, which is suitable for collecting data from a large population to explore current conditions, opinions, and practices related to agricultural extension services in Kebbi State. The primary goal is to assess the role of agricultural extension in mitigating the effects of input inflation and market instability among smallholder farmers. Data for the study will be collected using a structured questionnaire, designed to capture both quantitative and qualitative responses. The questionnaire will consist of closed-ended and a few open-ended items organized into sections covering the following areas: Socio-economic characteristics of respondents (e.g., age, gender, farm size, education level, etc.), access to and use of agricultural extension services, effects of input inflation and market instability on farming activities, perceived effectiveness of extension interventions in managing economic shocks and challenges faced in utilizing extension services.

The questionnaire will be administered to a sample of smallholder farmers selected from various agricultural zones within Kebbi State. A multi-stage sampling technique will be employed, starting with purposive selection of key farming LGAs such as Argungu, Zuru, Yauri, and Bagudo. Within each LGA, simple random sampling will be used to select respondents to ensure representativeness and minimize bias. Prior to full deployment, the questionnaire will undergo pre-testing with a small group of farmers to check for clarity, relevance, and reliability. Necessary adjustments will be made based on feedback. Data collected from the questionnaires will be analyzed using descriptive statistics (frequencies, percentages, and means) to summarize responses, and inferential statistics (such as chi-square tests or regression analysis, if applicable) to examine relationships between key variables. This design ensures systematic data collection and provides a reliable foundation for drawing valid conclusions about the effectiveness of agricultural extension in responding to economic shocks in Kebbi State.

Sampling Procedure and Sample Size

A multi-stage sampling technique will be employed to select respondents for this study to ensure a representative and diverse sample of smallholder farmers across Kebbi State.

Stage 1: Selection of Local Government Areas (LGAs)

Four LGAs with significant agricultural activities will be purposively selected based on their prominence in crop production and extension service coverage. These LGAs are Argungu, Zuru, Yauri, and Bagudo.

Stage 2: Selection of Communities

Within each selected LGA, a simple random sampling method will be used to select several farming communities or villages.

Stage 3: Selection of Farmers

From the list of registered smallholder farmers or through community leaders' assistance, farmers will be randomly selected to participate in the study.

Sample Size Determination

The sample size will be calculated using the Yamane formula:

Sample Size Determination

The sample size is calculated using the Yamane formula:

$n = N / [1 + N (e)^2]$

Where:

n = sample size

N = population size (estimated number of farmers)

e = margin of error (in decimal form)

Assuming:

N = 10,000

e = 0.05 (5%)

Calculation:

$n = 10,000 / [1 + 10,000 \times (0.05)^2]$

$n = 10,000 / [1 + 10,000 \times 0.0025]$

$n = 10,000 / (1 + 25)$

$n = 10,000 / 26 \approx 385$

Adding 10% for non-response:

Adjusted sample size $= 385 + (0.10 \times 385) = 385 + 38.5 = 423.5 \approx 425$

Final Sample Size = 425 Farmers

Method of Data Collection

Primary data for this study will be collected using a structured questionnaire administered to smallholder farmers in Kebbi State. The questionnaire is designed to gather comprehensive information on farmers' socioeconomic characteristics, their access to and utilization of agricultural extension services, the impact of input inflation and market instability on their farming activities, and their perceptions of extension effectiveness. The questionnaire will include both closed-ended questions for easy quantification and open-ended questions to allow respondents to provide more detailed insights. It will be prepared in English and

translated into Hausa, the predominant local language, to ensure clarity and ease of understanding for respondents.

Data collectors, trained on the objectives of the study and the administration of the questionnaire, will conduct face-to-face interviews with farmers to assist those who may have difficulty reading or writing. This approach helps to minimize misunderstanding and ensures higher response rates and data quality. Before the main survey, the questionnaire will be pre-tested on a small sample of farmers in a non-study area with similar characteristics. Feedback from the pre-test will be used to refine the questionnaire, enhancing its validity and reliability. The collected data will be checked daily for completeness and consistency by the research team to address any gaps or errors promptly.

Method of data Analysis

Data were analyzed using inferential statistics such as multiple linear regression with interaction term, ordinary least square regression and factor analysis to analyze objectives 1, 2 and 3.

Multiple Linear Regression with interaction Term

Input Access = $\beta_0 + \beta_1 + \beta_2 + \beta_3 + \beta_4 X + \varepsilon$

Where:

X_1: Access to affordable agricultural inputs (1 for access, 0 otherwise)

X_2: Agricultural extension service access (1 = Yes, 0 = No)

X_3: Economic shock experience (1 = Yes, 0 = No)

X_4: Interaction term

X: Vector of control variables (e.g., age, farm size)

ε: Error term

k: All possible categories

Ordered Logistic Regression

Logit [Pr (Y ≤ j)] = α ($\beta_1 + \beta_2 + \beta_3$)

Where:

Y: Effectiveness level (ordinal: low, medium, high)

X_1: Accessibility to extension services (1 for access, 0 otherwise)

X_2: Exposure to economic disruption (1 for exposed, otherwise)

X: Control variables

α: Threshold for category j

Factor Analysis

Factor Analysis (extract constraint factors)

Constraints = λ1*F1 + λ2*F2 + ... + λn*Fn + ε

Where:

F1, F2, ..., Fn: Factor scores representing latent constraints

Performance: Performance index of extension services

X Control variables

ε: Error term

RESULTS AND DISCUSSION

Table 1: Regression Results of the impact of agricultural extension services on farmers' access to affordable agricultural inputs during periods of economic shock (n = 425

Variable	Coefficient (β)	Std. Error	t-Statistic	p-Value	Interpretation
Intercept	2.046	0.742	2.76	0.006**	Baseline input access without extension/shock
Extension Services	1.582***	0.231	6.85	<0.001	Positive effect on input access
Economic Shock	-2.016***	0.273	-7.39	<0.001	Reduces access to affordable inputs
Interaction Term	2.591***	0.338	7.67	<0.001	Buffers negative effect of economic shock
Education	0.193***	0.022	8.66	<0.001	More education increases input access
Farm Size	0.531**	0.168	3.16	0.002	Larger farms have more access
Household Income	0.010***	0.001	8.39	<0.001	Higher income improves access
Market Distance	-0.096***	0.028	-3.43	<0.001	Greater distance reduces access
Age	-0.049***	0.011	-4.51	<0.001	Older farmers have slightly lower access

Source: Field Survey, 2025 * p < 0.05, ** p < 0.01, *** p < 0.001

The regression analysis in table 1 reveals critical insights into the role of agricultural extension services in shaping farmers' access to affordable inputs during periods of economic shock. The coefficient for access to extension services is positive and highly significant (β = 1.582), indicating that farmers who receive extension support have substantially improved access to affordable agricultural inputs. This finding is consistent with prior studies, such as Danso-Abbeam *et al*., (2018), which emphasize that extension participation enhances knowledge dissemination, technology adoption, and access to production resources, ultimately improving agricultural outcomes. Conversely, the presence of an economic shock exerts a significantly negative influence on access to inputs (β = –2.016). This result suggests that during adverse economic events such as inflation, currency depreciation, or supply chain disruptions farmers' ability to obtain inputs at affordable rates declines markedly. Such findings are supported by broader literature indicating that economic volatility often leads to rising input costs, constrained liquidity, and reduced market access for rural producers (Adjognon *et al*., 2021).

The interaction term between extension services and economic shocks is both positive and statistically

significant (β = 2.591), suggesting that extension services effectively moderate the negative effects of economic shocks on input access. This moderating effect implies that farmers who benefit from extension services are better equipped to adapt to external shocks. Such services may provide farmers with alternative input channels, advisory support on cost-effective practices, or early information about market and climatic risks. This result aligns with the resilience framework in agricultural development, which posits that institutional mechanisms such as extension systems can enhance farmers' adaptive capacity (Fisher *et al*., 2019). Among the control variables, education displays a significant positive association with access to inputs (β = 0.193), indicating that more educated farmers are better positioned to understand, evaluate, and utilize agricultural services and input markets. Farm size (β = 0.531) and household income (β = 0.010) also positively influence input access, reflecting the role of wealth and resource endowments in enabling production investments. On the contrary, greater distance to markets is associated with reduced input access (β = –0.096), reinforcing the importance of rural infrastructure and proximity in shaping agricultural opportunities. Age is negatively associated with input access (β = –0.049), which may be due to older farmers' reduced mobility, lower risk tolerance, or greater reliance on traditional practices.

These findings collectively underscore the central role of extension services in stabilizing agricultural input systems during economic uncertainty. As such, extension programs should be prioritized in policy frameworks, not only for their productivity enhancing potential but also for their capacity to buffer vulnerable rural populations against shocks. Recent evidence from Ghana and Zambia supports this conclusion, indicating that effective, demand-driven extension systems can significantly enhance household resilience and agricultural sustainability (Abdulai & Huffman, 2021; Chowa *et al*., 2022). Additionally, during crisis periods such as inflationary shocks or climate-induced disruptions, governments and development agencies should ensure that extension programs are well-resourced, strategically deployed, and integrated with other rural support mechanisms such as credit access and input subsidies. In conclusion, this study reinforces the notion that extension services are more than just information delivery tools they are strategic interventions that promote equitable and sustained access to production resources. Their role is particularly vital in contexts characterized by volatility, where farmers' livelihoods and food security are most at risk. Future research could explore the heterogeneity of these effects across gender, region, and farm type to better inform targeted extension strategies.

Table 2: Ordered Logistic Regression Results of the extension strategies used to address market instability and improve farmers' resilience in Kebbi State (n = 425)

Predictor	Coefficient (β)	Std. Error	z-value	p-value	Odds Ratio (exp(β))	Significance
Extension Access	1.10	0.25	4.40	<0.001	3.00	***
Economic Disruption	–0.95	0.28	–3.39	0.001	0.39	**
Extension × Disruption	0.85	0.30	2.83	0.005	2.34	**
Education (yrs)	0.12	0.04	3.00	0.003	1.13	**
Farm Size (ha)	0.30	0.12	2.50	0.013	1.35	*
Household Income	0.008	0.003	2.67	0.008	1.008	**
Market Distance (km)	–0.10	0.05	–2.00	0.046	0.90	*
Age	–0.02	0.01	–1.75	0.080	0.98	

Source: Field Survey, 2025 * p < 0.05, ** p < 0.01, *** p < 0.001

The results of the ordered logistic regression analysis in table 2 provide clear evidence on the accessibility and perceived effectiveness of agricultural extension services during periods of economic disruption. The significant positive coefficient for extension access (β = 1.10, $p < 0.001$) indicates that smallholder farmers with access to extension services are considerably more likely to perceive them as effective, even under adverse economic conditions. This aligns with the findings of Danso-Abbeam *et al*., (2018), who reported that farmers participating in extension programs in Ghana experienced increased knowledge acquisition and improved adoption of productivity-enhancing practices, which contributed to greater satisfaction with such services. In contrast, the negative and significant coefficient for economic disruption (β = –0.95, p = 0.001) suggests that periods of economic volatility substantially reduce farmers' perception of the effectiveness of extension services. This may reflect broader institutional constraints and delivery challenges under crisis conditions. As noted by Fisher *et al*., (2019), economic shocks tend to exacerbate logistical and financial barriers in service provision, diminishing trust and uptake among rural populations.

Notably, the positive and significant interaction term between extension access and economic disruption (β = 0.85, p = 0.005) illustrates that access to extension services mitigates the negative impact of economic disruptions. This finding is consistent with the work of Tessema *et al*., (2024), who demonstrated in Eastern Ethiopia that extension services significantly increased the adoption of adaptive practices among farmers affected by climatic and economic stressors. These results highlight the crucial buffering role played by extension systems in enhancing farmers' resilience and maintaining service utility under challenging circumstances. Control variables further contextualize

these findings. Education (β = 0.12, p = 0.003) and farm size (β = 0.30, p = 0.013) positively influence perceived effectiveness, supporting the argument made by Ragasa and Niu (2017) that better-educated and better-resourced farmers are more likely to understand, demand, and benefit from extension support. Similarly, household income exhibits a small but statistically significant positive effect (β = 0.008, p = 0.008), suggesting that financial security enhances farmers' capacity to implement advice received through extension programs.

Conversely, market distance is negatively associated with perceived effectiveness (β = –0.10, p = 0.046), reflecting the common infrastructural barriers faced by farmers in remote areas. As observed by Doss and Morris (2001), long distances reduce farmers' physical access to extension agents and inputs, thereby weakening the reach and reliability of services. Although age shows a slight negative effect (β = –0.02), it is not statistically significant at the conventional 5% level. This may indicate mixed preferences among older farmers, who may rely more on traditional knowledge and have differing levels of trust in modern advisory services. These findings have important policy implications. The consistent significance of extension access even during economic shocks emphasizes the need for stable investment in rural extension infrastructure. As noted by Davis *et al*., (2021), strengthening the institutional capacity and operational continuity of extension systems is essential to ensure uninterrupted support to smallholders, particularly in times of macroeconomic instability. Additionally, the effectiveness of extension services under disruption can be further improved by integrating digital and ICT-enabled models. Aker *et al*., (2016) found that mobile-based extension in sub-Saharan Africa led to substantial improvements in information dissemination and farm-level decision-making, particularly in contexts where face-to-face services were constrained.

Table 3: Factor analysis results of the constraints affecting the performance of agricultural extension in reducing the negative effects of input inflation and unstable market conditions (n = 425)

Variable	Factor 1: Institutional & Staffing	Factor 2: Economic Constraints	Factor 3: Logistical Access	Factor 4: Policy & Input Systems
Lack of qualified extension staff	0.78			
Irregular extension visits	0.72			
Limited training for agents	0.68			
Inadequate extension funding	0.65			
Poor coordination with input dealers		0.73		
Rising input prices		0.69		
Market price volatility		0.66		
Lack of credit access		0.61		
Poor road infrastructure			0.76	
Long distance to markets			0.72	
Weak ICT/information infrastructure			0.64	
Transportation bottlenecks			0.61	
Weak input supply chain				0.71
Delays in subsidy delivery				0.67
Inconsistent agricultural policies				0.65
Limited private sector involvement				0.58

Source: *Field Survey, 2025*
Note: *Loadings below 0.50 are omitted for clarity.*

The factor analysis of 20 constraint variables in table 3 related to the performance of agricultural extension services during periods of input inflation and unstable market conditions revealed four distinct underlying factors. These factors represent key domains constraining extension effectiveness: institutional and staffing limitations, economic constraints, logistical access issues, and policy/input system weaknesses. The first factor, labeled Institutional and Staffing Constraints, captured variables such as lack of qualified extension staff (loading = 0.78), irregular extension visits (0.72), limited training for agents (0.68), and inadequate funding (0.65). These high loadings indicate that deficiencies in human resources and organizational capacity are major barriers. This aligns with Davis *et al*., (2021), who highlight that underfunded and understaffed extension systems struggle to support farmers effectively, particularly during economic shocks when advisory needs intensify.

The second factor, Economic Constraints, was characterized by high loadings on rising input prices (0.69), market price volatility (0.66), poor coordination with input dealers (0.73), and lack of credit access (0.61). These variables emphasize that economic instability directly limits farmers' ability to apply extension advice. As Tessema *et al*., (2024) observed, even when extension agents provide guidance, the affordability of inputs and

fluctuating market conditions remain critical impediments to adoption. The third factor, Logistical Access, reflected infrastructure-related challenges with strong loadings on poor road infrastructure (0.76), long distances to markets (0.72), weak ICT infrastructure (0.64), and transportation bottlenecks (0.61). These constraints hinder the physical and informational reach of extension services, corroborating findings by Aker *et al*., (2016) on how infrastructural deficiencies limit the timely delivery of agricultural information, particularly in remote areas.

The final factor, Policy and Input System Failures, included weak input supply chains (0.71), delays in subsidy delivery (0.67), inconsistent agricultural policies (0.65), and limited private sector involvement (0.58). These results suggest that systemic failures in policy implementation and input provision undermine extension efforts. Birner *et al*., (2009) and Chowa *et al*., (2022) underscore that fragmented policy environments and unreliable subsidy programs reduce farmer trust and extension credibility. These findings demonstrate that the performance of agricultural extension during periods of inflation and market volatility is not constrained by a single factor but by a complex interplay of institutional weaknesses, economic barriers, infrastructural deficits, and policy inefficiencies. The high loadings (>0.65) on critical variables within each factor highlight priority areas for intervention.

Addressing these multifaceted constraints requires integrated strategies. Investment in extension staffing and capacity building must be paired with efforts to stabilize input prices, improve rural infrastructure, and enhance coordination within input supply chains. The literature stresses that without such systemic improvements, extension services cannot fully mitigate the negative effects of input inflation and market instability on smallholder farmers (Davis *et al*., 2021; Ragasa & Niu, 2017; Tessema *et al*., 2024). Given the rising global challenges of economic shocks and supply disruptions, it is imperative that extension reforms adopt a holistic approach encompassing not only knowledge transfer but also structural support to address the economic, logistical, and policy constraints identified through this analysis.

CONCLUSION

This study examined the constraints affecting the performance of agricultural extension services in mitigating the adverse impacts of input inflation and unstable market conditions. The factor analysis identified four key domains limiting extension effectiveness: institutional and staffing inadequacies, economic constraints, logistical access challenges, and policy and input system weaknesses. High factor loadings on variables such as lack of qualified staff, rising input prices, poor infrastructure, and inconsistent policies underscore the multifaceted nature of these constraints. The findings reveal that while extension services are critical for supporting smallholder farmers, their impact is severely undermined by systemic barriers that extend beyond knowledge transfer alone. To enhance the resilience and effectiveness of agricultural extension during periods of economic disruption, a comprehensive and integrated approach is necessary one that addresses human resource capacity, market stability, infrastructure development, and policy coherence.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Governments and development agencies should increase investment in recruiting, training, and retaining qualified extension personnel to ensure frequent and high-quality farmer engagement, particularly during economic shocks.
2. Policymakers should implement mechanisms to regulate input prices and improve farmers' access to affordable credit, enabling smallholders to acquire necessary inputs despite inflationary pressures.
3. Prioritize the development of rural roads, transportation networks, and digital infrastructure to enhance logistical connectivity and timely delivery of extension services and market information.
4. Strengthen coordination among agricultural extension agencies, input suppliers, and policymakers to ensure consistent subsidy delivery, reliable input supply chains, and policy stability.

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