Exploring the Role of Language in the Uptake of Agricultural Inputs Among Smallholder Farmers: Insights from a Pilot Study in Chalimbana University, Zambia

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Abstract

This pilot study examines the role of language in the adoption and correct use of agricultural inputs among smallholder farmers in Zambia. Conducted with 15 farmers from linguistically diverse communities, the research explores how language preferences, comprehension levels, and communication channels shape decision-making around agricultural technologies. Despite high levels of formal education among participants, many expressed a strong preference for receiving agricultural information in local languages such as Bemba, Nyanja, Soli, Tonga, Lozi, and Lamba. Language barriers particularly those involving English-only labels and technical jargon were found to contribute to misinterpretation of instructions, misuse of inputs, and crop losses. The study also revealed limited engagement with extension officers and a growing reliance on agro-dealers and online platforms, raising concerns about the accessibility and accuracy of information. Findings emphasize the need for multilingual labelling, visual aids, and culturally resounding communication methods in agricultural extension and input dissemination. By highlighting the critical link between language, comprehension, and input adoption, the study calls for policy and programmatic attention to linguistic inclusion as a core element of agricultural development. The results provide a foundation for larger-scale research and offer practical recommendations to improve communication strategies in Zambia's multilingual farming communities.

Keywords: **Multilingualism, Agricultural inputs**, **Smallholder farmers, Extension, Adoption**

1. Introduction

Agriculture in Zambia plays a central role in the country's socio-economic development, employing over half of the population and accounting for a significant share of rural livelihoods (Mupeta et al., 2020). Among those engaged in the sector, smallholder farmers who typically operate on less than five hectares of land form the majority. In recent years, national and international initiatives have prioritized increasing agricultural productivity through the adoption of inputs such as fertilizers, pesticides, herbicides, and improved seed varieties (Marambe et al., 2020). While these technologies offer promising pathways for improving yields and food security, their uptake among smallholders remains uneven.

Globally, the role of language in agricultural development has gained increasing attention, particularly as communication is recognized as a key determinant in the adoption of new technologies(Becerra-Encinales et al., 2024). Earlier research on Zambia's debt and credit risk dynamics highlights the structural economic pressures shaping development (Nsakaza, K et al., 2025). Building on this broader context, the present study turns to a micro-level factor language to examine its role in agricultural input uptake. In many low and middle-income countries, agricultural extension materials and input instructions are predominantly produced in national or colonial languages such as English, French, or Portuguese even though a significant portion of rural farming populations may have limited proficiency in these languages. This language mismatch often leads to misunderstandings, misuse of inputs, and reduced trust in new technologies (Fiset et al., 2024). Studies from South Asia, Latin America, and parts of Sub-Saharan Africa have shown that even literate farmers are more likely to engage with and correctly apply input-related information when it is communicated in their local language(MacLeod & Demers, 2023; MASTA, 2022; Ribner et al., 2020). This suggests that linguistic relevance is not just a matter of literacy, but of cultural and cognitive accessibility.

In the African context, the issue is even more pronounced due to the continent's rich linguistic diversity and widespread rural multilingualism. While most African countries have one or two official languages used for governance and education, many rural farmers communicate primarily in indigenous languages that are rarely represented in written agricultural materials (Mwogela et al., 2023). In countries like Nigeria, Kenya, Malawi, and Zambia, farmers often report challenges in understanding labels on seed packets, fertilizers, and pesticides because they are written in English or use highly technical jargon. This creates a barrier to informed decision-making and can lead to misapplication of inputs, reduced crop yields, and even environmental or health risks. Despite efforts to increase access to inputs, the failure to communicate effectively in languages that resonate with local communities undermines the impact of such interventions (Maswanganyi, 2023). Therefore, the role of language should not be treated as a secondary issue but as a central component of agricultural extension and product design, both in Africa and beyond.

Extensive research has explored structural and economic barriers to adoption, including high input costs, limited credit access, weak market linkages, and inadequate extension services. However, a less scrutinized yet critical factor influencing adoption behaviour is **language** specifically, the extent to which communication of agricultural information aligns with farmers' linguistic contexts.

Zambia is home to over 70 indigenous languages, making it one of the most linguistically diverse countries in Southern Africa (Simungala & Jimaima, 2021). English is the official language used in government, education, and most formal communications, but it is not the first language for the vast majority of the rural population(Mukuka, 2020; Phiri et al., 2024). In practice, several major local languages such as Bemba, Nyanja, Tonga, and Lozi function as regional lingua francas. Nevertheless, this linguistic ecosystem presents a challenge when delivering technical agricultural information. Extension officers, agro-dealers, and NGOs often default to English or a few dominant languages, potentially alienating farmers who communicate primarily in minority dialects or who are unfamiliar with scientific vocabulary.

The result is a persistent gap between the message and the recipient. Agricultural communication typically involves complex terminology for example, concepts like hybridization, pest resistance, fertilizer composition, and dosage measurement(Jacquet et al., 2022). These require not only translation but contextualization. Literal translations often fail to capture meaning, and when farmers encounter unfamiliar or confusing terms, they may either disregard the information or apply it incorrectly. In either case, adoption suffers(Dent & Binks, 2020).

Furthermore, the assumption that most farmers can comprehend technical information when it is translated into a major local language ignores the nuanced ways in which language, trust, and knowledge-sharing are intertwined. In rural communities, oral traditions, storytelling, and peer learning often play larger roles than written instructions or formal demonstrations.(Akinyemi & Falola, 2021; Osei-Tutu, 2023). If agricultural messages are not communicated in culturally resonant ways, their impact is significantly diminished even when the physical inputs are accessible.

This pilot study investigates these dynamics by engaging directly with 15 smallholder farmers across linguistically diverse settings in Zambia. Through structured interviews, it explores their preferred modes of communication, their comprehension challenges, and their perspectives on how language affects their decision-making regarding agricultural inputs. The aim is not only to identify linguistic barriers but also to highlight opportunities for more inclusive and effective communication strategies.

Several key issues emerged from this inquiry, shedding light on the complex role language plays in agricultural input adoption among Zambian smallholder farmers. One of the most prominent challenges is the **mismatch between the languages used in extension service delivery and the everyday communication practices of farmers** (Chavula & Yali, 2022; Mumba et al., 2024). While extension officers often rely on English or dominant regional languages, many farmers primarily speak local dialects that are either underrepresented or entirely excluded from outreach efforts. This disconnect can significantly hinder comprehension and limit the effectiveness of agricultural messaging. Another critical concern is the **over-reliance on written materials or standardized translations** (Kaani & Joshi, 2023). Pamphlets, instruction sheets, and manuals typically produced in English or a few major languages often fail to reflect the diversity of local vocabulary and dialectal expressions. As a result, even when translated, the materials may remain inaccessible or confusing to farmers who are either illiterate or more comfortable with oral communication.

Compounding these issues is the **limited linguistic capacity of extension agents** themselves (Livune, 2022). Most are trained in technical subjects but lack the skills or resources to communicate effectively across the broad range of languages spoken within their regions. This limitation restricts their ability to tailor messages to different literacy levels or adapt complex information into simpler, culturally resonant forms that would be more easily understood by the target audience. Cultural dynamics further complicate communication. **How farmers trust, interpret, and internalize agricultural advice is closely linked to cultural norms and social relationships** (Lumosi et al., 2020)**.** In some cases, farmers may be more receptive to information conveyed through community leaders or familiar figures speaking in their native tongue, rather than through formal channels perceived as distant or authoritative. When language and cultural relevance are missing, trust in the message and the messenger can be significantly undermined.

Lastly, the study highlights the **marginalization of minority language speakers**, who often remain completely excluded from formal information networks (Chikasha & Beukes, 2021; Njekwa, 2024). These farmers are at a distinct disadvantage, not due to lack of interest or ability, but because agricultural knowledge is not reaching them in a language or format they can access. This deepens existing inequalities and reinforces cycles of low productivity and limited innovation in linguistically isolated communities. Importantly, the issue of language in agriculture is not only a communication challenge but a matter of equity and empowerment. When language barriers prevent farmers from accessing or understanding agricultural innovations, the benefits of these technologies remain concentrated among those who are already linguistically advantaged (Gupta et al., 2024). This perpetuates existing disparities in productivity and income.

The findings of this pilot study are timely and relevant as Zambia and the broader sub-Saharan region seeks to improve the effectiveness of agricultural extension systems. Donor agencies, government programs, and private-sector actors alike must recognize that language is not a peripheral concern. It is central to the design of inclusive and impactful agricultural interventions.

In conclusion, understanding the role of language in the uptake of agricultural inputs is essential for translating policy intentions into practical outcomes. This study contributes to a growing body of evidence suggesting that localized, linguistically responsive communication strategies are vital for advancing agricultural transformation in linguistically diverse settings like Zambia(Chibamba, 2018; Kaoma & Mpundu, 2023).

2. Methodology

This study employed a **descriptive survey design** to explore how language influences the uptake of agricultural inputs among smallholder farmers in Zambia. The choice of a descriptive approach was informed by the study's aim to capture farmers' lived experiences, perceptions, and language-related challenges in accessing agricultural information. The research was structured to collect both **quantitative data** to identify patterns and **qualitative insights** to capture depth and context.

2.1 Study Population and Sampling

The study targeted smallholder farmers across linguistically diverse rural communities. Participants were purposefully selected to reflect variation in **gender, language background, education level, and farming experience**. This diversity was essential to ensure the findings captured the range of communication challenges faced by different segments of the farming population. This pilot study was conducted under the auspices of **Chalimbana University**, involving **15 smallholder farming households** selected for their linguistic diversity and accessibility within the surrounding rural areas. The limited sample size was a deliberate methodological choice, aimed at testing the feasibility of the research instruments and exploring preliminary patterns related to language use and agricultural input adoption. Given the logistical constraints and absence of external funding, the study was designed as a **scoping exercise** to identify key issues and refine tools for broader application. The insights gained from this pilot are intended to inform the development of a **larger, more representative study** to be conducted across multiple regions of Zambia, contingent upon the availability of **adequate funding and institutional support**. As such, this research should be understood as a foundational step—providing critical groundwork for scaling up both the sample size and geographic coverage in future investigations. A total of **15 respondents** participated in the pilot study, providing an initial dataset from which broader patterns could be observed and hypotheses refined for future, larger-scale investigations. While the sample size may appear small, it aligns with widely accepted standards for **pilot and exploratory research**, where the focus is not on statistical generalizability but on **instrument testing, data collection feasibility**, and **thematic exploration** (Teresi et al., 2022). According to methodological guidelines, a sample of 10 to 30 participants is generally considered sufficient for **pilot studies**, especially when the goal is to refine tools and identify key variables for future, large-scale research. In this context, the sample of 15 households provided adequate depth to assess the relevance, clarity, and effectiveness of the research instruments and to uncover meaningful preliminary insights.

2.2 Data Collection Tools and Procedures

Data was collected using a **semi-structured questionnaire**, which allowed for both standardized responses and open-ended elaboration. The instrument included six key sections:

1. **Demographic Information** – age, gender, education, primary language, and farming experience;
2. **Use of Agricultural Inputs** – type, frequency, and source of inputs;
3. **Sources of Agricultural Information** – extension officers, radio, community networks, agro-dealers, etc.;
4. **Language Preferences** – preferred language(s) for receiving information and verbal vs. written communication;
5. **Comprehension of Product Labels and Instructions** – ability to understand technical terms, instructions, and dosage;
6. **Experience of Language Barriers** – specific examples where language hindered understanding or adoption of inputs.

To expand the reach and gather additional data, the survey was also disseminated online using **Google Forms**, allowing for broader participation across districts and provinces. The online form was shared through agricultural WhatsApp groups. This approach allowed the study to reach respondents who were geographically dispersed and not accessible for physical interviews, especially during periods of limited mobility or logistical constraints. While digital penetration in rural Zambia is variable, mobile phone usage and internet access have grown significantly in recent years, making this method increasingly viable for rural outreach. Ethical considerations were observed throughout, including informed consent, voluntary participation, and confidentiality.

2.3 Data Analysis

The collected data was analysed using a **mixed-methods approach**. Quantitative data from closed-ended questions were entered into Excel and analysed using **descriptive statistics**, including frequency distributions and cross-tabulations. This helped identify trends related to language preference, comprehension levels, and sources of agricultural information across demographic groups.

For qualitative data, including open-ended responses and narratives, a **thematic analysis** was conducted. Responses were first transcribed and translated where necessary. A coding framework was developed based on recurring themes such as **language mismatch, mistrust, misinterpretation, exclusion of minority language speakers, and preferred communication channels**. These codes were then organized into broader themes that aligned with the study's objectives. This interpretive layer added depth and allowed for the identification of underlying patterns that may not be evident in numerical data alone.

Triangulation of both quantitative and qualitative findings strengthened the reliability of the study by allowing different data types to confirm or challenge one another. For example, where quantitative data showed low comprehension of product labels, qualitative responses often revealed why such as unfamiliarity with measurement units or lack of instruction in a preferred language.

2.4 Limitations and Rationale for Pilot Scale

As a pilot study, the **sample size was intentionally limited** to 15 smallholder farming households. This decision was made to allow for a focused and manageable inquiry that could **test the effectiveness of the research tools**, **assess the feasibility of the data collection process**, and **generate preliminary insights** into the role of language in agricultural input uptake. The modest scale enabled in-depth engagement with participants, allowing for the collection of rich qualitative data. However, this also means that the findings cannot be statistically generalized to the broader population of smallholder farmers in Zambia. The **limited geographic scope**, centred around communities accessible through Chalimbana University, may not capture the full linguistic, cultural, or economic diversity found in other provinces. In addition, the small sample size reduces the study's ability to analyse trends across sub-groups such as gender, education level, or language background with statistical confidence. Variations in internet access and literacy levels may also have influenced participation in the online component of the data collection (via Google Forms), introducing potential **sampling bias**.

Moreover, the study was conducted without external funding, which constrained both the scale and duration of fieldwork. These resource limitations affected the ability to recruit a more

representative sample and to include certain remote or minority-language communities that might face even greater communication barriers. Despite these constraints, the study provides a **valuable foundation for future research**. The qualitative richness and thematic insights drawn from this small cohort offer **practical guidance for designing language-sensitive agricultural extension strategies** and highlight key areas for deeper investigation.

It is anticipated that this pilot will inform the development of a **comprehensive, large-scale study**, contingent on securing **adequate funding and logistical support**. Such a study would aim to capture a more statistically robust picture of how language influences agricultural technology adoption across Zambia's diverse farming communities, and to validate the preliminary findings presented here.

3. Results

3.1 Demographic Overview

The study involved 15 respondents, with the majority (14) aged between 21 and 40 years, and only one falling within the 41–60 age bracket. In terms of gender distribution, 12 participants were male, and 3 were female. Educational backgrounds were predominantly high, with 13 respondents indicating they had attained tertiary education. One respondent reported primary-level education, and one did not specify their educational attainment.

3.2 Farming Experience and Input Use

Most respondents had been involved in farming activities for a period ranging from 4 to 10 years, indicating moderate farming experience. The use of agricultural inputs was widespread among participants. Commonly used inputs included seeds, fertilizers, pesticides, herbicides, and insecticides. Less frequently used inputs were organic fertilizers and biopesticides, suggesting a reliance on conventional farming inputs over more sustainable alternatives.

3.3 Sources of Agricultural Information

Participants reported obtaining information on agricultural inputs from a variety of sources. Agro-dealers were the most frequently cited source, with 6 respondents identifying them as their

primary point of information. Online platforms followed closely, with 5 respondents indicating that they accessed agricultural information via digital sources. Peer-to-peer learning was also evident, as 3 respondents stated they relied on fellow farmers for input guidance. Only 2 participants reported receiving information from agricultural extension officers, reflecting a potential gap in formal extension services.

3.4 Language Preference and Comprehension

Language preference for receiving agricultural input information varied across respondents. While English emerged as the most commonly preferred language, several local languages including Bemba, Nyanja, Soli, Lozi, Tonga, and Lamba were also frequently mentioned, reflecting Zambia's linguistic diversity. A large majority of respondents (13 out of 15) expressed confidence or high confidence in their ability to understand input instructions. Despite this, 7 participants reported encountering language-related challenges. These challenges included exposure to complex or technical terminology, instructions written in unfamiliar languages, and overall difficulty understanding proper usage directions.

3.5 Language Barriers and Decision Making

The presence of language barriers appeared to influence agricultural decision-making significantly. Nine respondents indicated that such barriers had previously affected their decision to use or avoid particular agricultural inputs. Furthermore, 8 respondents reported experiencing losses as a result of misinterpreting instructions. Specific consequences included the misapplication of weed killers and confusion over dosage or the timing of application issues that directly impact both productivity and crop health.

3.6 Importance of Language in Input Instructions

Almost all respondents (14 out of 15) emphasized the importance of receiving agricultural input information in a language they fully understand. The reasons cited for this included the need to prevent misuse and potential crop loss, enhance both safety and application efficiency, and enable smallholder farmers to engage with instructions independently, without external

interpretation. This strong consensus underscores the critical role that language plays in facilitating effective and safe agricultural practices.

4. Discussion

The findings of this pilot study underscore the **critical role of language in shaping the accessibility, comprehension, and adoption of agricultural inputs** among smallholder farmers in Zambia as what (Chanda, 2024) found in their study. While a majority of respondents reported **high confidence in understanding input instructions** and had attained **tertiary education**, a strong preference remained for receiving information in **local languages**, including Bemba, Nyanja, Soli, Lozi, Tonga, and Lamba, (Yao et al., 2024) in their study found the same that local language is usually preferred. This indicates that **linguistic accessibility is not only a concern for the illiterate or less educated**, but is valued even by educated individuals who may be more comfortable processing technical information in their native languages.

This preference reflects a broader trend observed in multilingual societies, where the language of everyday life, community engagement, and trust-building is often different from the official or commercial language as Leppäkoski, M. (2021) concluded in their paper. **English**, though the most common language of instruction and labeling, **is not the primary language for many rural farmers**, and its exclusive use can create a psychological and cognitive barrier to full comprehension especially when it involves technical jargon or unfamiliar terminology. This was reflected in the responses of **seven participants who admitted experiencing language-related challenges**, including confusion due to complex language, poorly translated instructions, or packaging entirely in unfamiliar languages, Premji, S et.al., (2023).

Another significant insight is the **impact of language barriers on decision-making and farm-level outcomes**. The study revealed that **9 out of 15 farmers were influenced by language barriers** when deciding whether to adopt certain agricultural inputs, with **8 reporting actual losses** stemming from misinterpretation of instructions. These included the **misapplication of weed killers** and incorrect dosage or timing errors that have direct implications for productivity, environmental safety, and cost-efficiency. These findings similar to what Gupta et al., (2024) found

illustrate that language barriers are not abstract communication problems they have **tangible consequences on livelihoods** and food systems.

Moreover, the **channels through which farmers access agricultural information** further complicate the communication landscape. While agro-dealers and online platforms were prominent sources of input information, **only two respondents cited extension officers**, traditionally a key source of farmer education. This may reflect either limited access to extension services or a **lack of trust and engagement** due to language or cultural gaps between extension agents and farmers. Notably, online platforms which are increasingly accessible can either bridge or widen the communication gap, depending on whether content is **linguistically and visually inclusive**.

Given these findings, the importance of **multilingual and multimodal communication strategies** becomes evident. Packaging and instructional materials that rely solely on English text fail to reach a significant segment of the farming population, even among those with some formal education. The inclusion of **local languages**, along with **visual aids such as pictograms, color codes, or step-by-step illustrations**, can drastically improve comprehension and minimize the risk of misuse, this finding is in line with what Wooten, J. H. (2019) found in their article. These strategies are particularly valuable in rural and multilingual contexts, where oral communication, peer learning, and community trust play pivotal roles.

Furthermore, the **over-reliance on written materials** and the lack of customization to local dialects or literacy levels point to a structural disconnect between **input producers (e.g., agrochemical companies)** and **end-users (smallholder farmers)**. Designing communication strategies that are culturally and linguistically grounded could significantly **enhance adoption rates and improve agricultural outcomes similar to what** John, D et al., (2023) found. For instance, training agro-dealers and extension officers to communicate in farmers' preferred languages or co-creating materials with community input may lead to better understanding and trust.

Lastly, the nearly **unanimous agreement (14 out of 15 respondents)** on the importance of receiving instructions in a language they understand well speaks to a **broad-based awareness** of the risks posed by miscommunication. Farmers articulated that understanding input information

is vital for **avoiding crop loss, ensuring safety, and empowering them to use products independently** without external interpretation (Prajapati, C. S et al., 2025).

In sum, while this study was limited in scale, the results provide compelling evidence that **language is a central determinant of effective agricultural communication**. Efforts to improve agricultural productivity must go beyond input distribution and infrastructure and address the **linguistic and cultural dimensions of communication**, which have been largely overlooked in extension and input marketing strategies.

5. Conclusion

This pilot study confirms that **language plays a crucial role in the adoption, comprehension, and effective use of agricultural inputs among smallholder farmers in Zambia**. While many respondents had relatively high levels of education and expressed confidence in understanding input instructions, their consistent preference for receiving information in local languages highlights the **continued importance of linguistic accessibility**, even among literate populations. This finding challenges the assumption that formal education alone guarantees comprehension of technical agricultural information, especially when such information is presented in English or using complex terminology.

The study also found that **language barriers directly impact farmers' decision-making and productivity**. Misinterpretation of instructions stemming from English-only packaging, technical jargon, and lack of visual aids led to the **misuse of inputs** and **tangible financial losses**, including crop damage from incorrect chemical application. Furthermore, the presence of these barriers resulted in **hesitancy to adopt new or unfamiliar inputs**, thereby limiting the potential benefits of agricultural innovations. Such barriers disproportionately affect farmers in linguistically diverse and underserved rural areas, reinforcing existing inequalities in access to knowledge and productivity-enhancing technologies.

Importantly, farmers' reliance on **agro-dealers and online sources** as primary channels of information, rather than extension officers, suggests a shifting information landscape—one that requires **improved regulation, training, and standardization** to ensure that communication is both accurate and accessible. The strong consensus among respondents that input information

should be provided in a language they fully understand further emphasizes the need for **multilingual and multimodal communication strategies**, including the use of local languages, simplified explanations, and pictorial instructions.

While the sample size was limited to 15 households due to resource and logistical constraints, the **rich qualitative insights** gathered in this pilot offer a strong foundation for **scaling up the research**. With adequate funding and institutional support, a larger, nationally representative study could further explore these findings and inform policy and practice.

In conclusion, addressing language barriers in agricultural communication is not a peripheral issue it is central to achieving effective, equitable, and sustainable agricultural development. For smallholder farmers to make informed decisions and fully benefit from modern agricultural technologies, **language must be treated as a core component of agricultural extension and input dissemination strategies**.

7. Recommendations

Based on the findings of this pilot study, it is clear that language inclusion is vital for improving the uptake and correct use of agricultural inputs among smallholder farmers in Zambia. To address the communication challenges identified, the following key recommendations are proposed:

1. **Multilingual Labelling**

   Input manufacturers should ensure that packaging includes instructions in Zambia's widely spoken local languages such as Bemba, Nyanja, Tonga, Lozi, and Lamba. Providing multilingual labels would significantly enhance comprehension across diverse farming communities and reduce the risk of misuse due to language confusion.

2. **Incorporation of Visual Aids**

   The use of symbols, pictograms, and diagrams should be standardized across packaging and extension materials. These visual tools can bridge literacy gaps and serve as universal

aids for demonstrating dosage, application steps, safety precautions, and timing, especially for farmers with limited reading skills.

3. **Community-Based Training and Translation Support**

   Agricultural extension programs should prioritize localized training sessions delivered in farmers' preferred languages. Where possible, local interpreters or bilingual facilitators should be engaged to support clear communication. Strengthening the capacity of extension officers to operate in local languages is equally important for building trust and knowledge retention.

4. **Policy and Institutional Frameworks for Language Inclusion**

   There is a need for policy-level intervention by government bodies and regulatory authorities to mandate the inclusion of local languages in agricultural input communication. Input suppliers should be guided by official language accessibility standards, and compliance should be monitored as part of product approval and distribution processes.

5. **Localized Media for Agricultural Awareness**

   Efforts to disseminate agricultural information should include radio broadcasts, posters, and short video content in local languages. These platforms are widely accessible in rural communities and have the potential to reach farmers with limited access to formal training or internet services.

6. **Further large-scale research**

   It is necessary to deepen the understanding of how language barriers affect agricultural input adoption across diverse linguistic and regional contexts in Zambia. This pilot study, while insightful, was limited by its small sample size and geographic scope. Expanding research efforts will enable more comprehensive data collection, identify region-specific challenges, and inform the design of tailored communication interventions. Additionally, broader studies can evaluate the effectiveness of multilingual and multimodal strategies

in improving farmer outcomes, thus providing stronger evidence for policy and program development.

By adopting these strategies, stakeholders including government, agro-input suppliers, extension agencies, and NGOs can significantly improve farmers' understanding, reduce misuse of inputs, and enhance adoption rates. Ultimately, addressing language barriers is a practical and necessary step toward more inclusive and effective agricultural development in Zambia.

References

Akinyemi, A., & Falola, T. (2021). *The Palgrave handbook of African oral traditions and folklore*. Springer.

Becerra-Encinales, J. F., Bernal-Hernandez, P., Beltrán-Giraldo, J. A., Cooman, A. P., Reyes, L. H., & Cruz, J. C. (2024). Agricultural extension for adopting technological practices in developing countries: A scoping review of barriers and dimensions. *Sustainability*, *16*(9), 3555.

Chanda, R. (2024). *A study of the factors that affect agribusiness financing in Zambia: A case study of smallholder farmers in Chibombo district.*

Chavula, P., & Yali, S. (2022). *Description of Agricultural Extension and Advisory Service System in Zambia*.

Chibamba, M. (2018). *Translation practices in a developmental context: An exploration of public health communication in Zambia*.

Chikasha, J., & Beukes, A.-M. (2021). When language revitalisation transcends linguistic issues: Motivations for the revitalisation of Tonga. *Southern African Linguistics and Applied Language Studies*, *39*(1), 43–54.

Dent, D., & Binks, R. H. (2020). *Insect pest management*. Cabi.

Fiset, J., Bhave, D. P., & Jha, N. (2024). The effects of language-related misunderstanding at work. *Journal of Management*, *50*(1), 347–379.

Gupta, A., Ponticelli, J., & Tesei, A. (2024). Language barriers, technology adoption and productivity: Evidence from agriculture in india. *Review of Economics and Statistics*, 1–28.

Jacquet, F., Jeuffroy, M.-H., Jouan, J., Le Cadre, E., Litrico, I., Malausa, T., Reboud, X., & Huyghe, C. (2022). Pesticide-free agriculture as a new paradigm for research: Pesticide-free agriculture as a new paradigm for research. *Agronomy for Sustainable Development*, *42*(1), 8.

John, D., Hussin, N., Shahibi, M. S., Ahmad, M., Hashim, H., & Ametefe, D. S. (2023). A systematic review on the factors governing precision agriculture adoption among small-scale farmers. *Outlook on Agriculture*, *52*(4), 469-485.

Kaani, B., & Joshi, R. M. (2023). Literacy Practices in Zambia: Becoming Literate in a Multilingual Classroom. In *Handbook of Literacy in Africa* (pp. 405–437). Springer.

Kaoma, O. N., & Mpundu, M. (2023). The Farmer Input Support Program and Poverty Alleviation in Zambia: The Smallholder Farmer's Perspective Using Intervention and Sustainability Theories. *Open Access Library Journal*, *10*(8), 1–20.

Leppäkoski, M. (2021). The role of leadership in building trust in multilingual virtual teams.

Livune, D. (2022). *An establishment of strategies that can make the agriculture extension education programme provided in Zambia effective: A case of Kazungula district.*

Lumosi, C. K., Pahl-Wostl, C., & Scholz, G. (2020). Evaluating trust and shared group identities in emergent social learning processes in the Zambezi river basin. *Humanities and Social Sciences Communications*, *7*(1), 1–13.

MacLeod, A. A., & Demers, C. (2023). Transmitting white monolingual Anglo-American norms: A concept analysis of "quality of language" in parent-child interactions. *Applied Psycholinguistics*, *44*(4), 431–459.

Marambe, B., Jayawardena, S., Weerakoon, W., & Wijewardena, H. (2020). Input intensification in food crops production and food security. In *Agricultural Research for Sustainable Food Systems in Sri Lanka: Volume 1: A Historical Perspective* (pp. 215–248). Springer.

MASTA, K. (2022). *FARMERS'ATTITUDE AND EFFECT OF TRAINING DESIGN ON TRANSFER OF TRAINING*.

Maswanganyi, F. T. (2023). Leveraging indigenous languages for efficient local government: An analysis in a South African context. *International Journal of Research in Business & Social Science*, *12*.

Mukuka, D. M. (2020). The usage of English Language as a challenge for students to access and succeed in Zambian higher education. In *The Education Systems of Africa* (pp. 1–15). Springer.

Mumba, C., Kasanga, B., Mwamba, C. T., Sichilima, T., Siankwilimba, E., Sitali, D. C., Munkombwe, J., Banda, R., & Muma, J. B. (2024). An in-depth analysis of factors influencing small-scale cattle farmers' participation in livestock markets in Western Province of Zambia: Navigating challenges and barriers. *Frontiers in Veterinary Science*, *11*, 1397000.

Mupeta, M., Kuntashula, E., & Kalinda, T. (2020). Impact of urban agriculture on household income in Zambia: An economic analysis. *Asian Journal of Agriculture and Rural Development*, *10*(2), 550–562.

Mwogela, T. J., Sane, E., & Magashi, S. (2023). Disseminating Scientific Information to Rural Communities: Communication Strategies Used to Support Peasants‟ Comprehension and Use of Written Information. *Journal of Linguistics and Language in Education*, *17*(2), 188–218.

Njekwa, N. (2024). *LINGUISTIC OPPRESSION THROUGH ZONAL LANGUAGE MONOPOLY: A CASE OF KAFUE RURAL LITERACY CLASSES*.

Nsakaza, K., Arogundade, S., & Jimaima, M. (2025). A three-way dynamic causality analysis on domestic credit risk, external debt, and external debt servicing and its implications on debt sustainability initiatives: Evidence from Zambia. https://mpra.ub.uni-muenchen.de/125827/

Osei-Tutu, A. A. (2023). Developing African oral traditional storytelling as a framework for studying with African peoples. *Qualitative Research*, *23*(6), 1497–1514.

Phiri, M., Chanda, C., & Mwanapabu, N. H. (2024). The effect of using local languages as a medium of instruction on academic performance of learners: A case of selected primary schools in Solwezi District of North-Western Province, Zambia. *International Journal of Novel Research in Humanity and Social Sciences*, *11*(3), 9–26.

Prajapati, C. S., Priya, N. K., Bishnoi, S., Vishwakarma, S. K., Buvaneswari, K., Shastri, S., ... & Jadhav, A. (2025). The role of participatory approaches in modern agricultural extension: bridging knowledge gaps for sustainable farming practices. *Journal of Experimental Agriculture International*, *47*(2), 204-222.

Premji, S., Begum, M., & Medley, A. (2023). Systemic barriers to reporting work injuries and illnesses in contexts of language barriers. *American journal of industrial medicine*, *66*(2), 122-131.

Ribner, A. D., Tamis-LeMonda, C. S., & Liben, L. S. (2020). Mothers' distancing language relates to young children's math and literacy skills. *Journal of Experimental Child Psychology*, *196*, 104863.

Simungala, G., & Jimaima, H. (2021). Multilingual realities of language contact at the University of Zambia. *Journal of Asian and African Studies*, *56*(7), 1644–1657.

Teresi, J. A., Yu, X., Stewart, A. L., & Hays, R. D. (2022). Guidelines for designing and evaluating feasibility pilot studies. *Medical Care*, *60*(1), 95–103.

Wooten, J. H. (2019). *Symbolism in agriculture: A qualitative inquiry of the visual vocabularies of graphic communicators* (Doctoral dissertation).

Yao, J., Pan, S., Zhang, X., & Nie, P. (2024). Linguistic landscape as a way to reflect the tension between mandated language policies and residents' language preferences: The case of Kashgar in China. *Journal of Multilingual and Multicultural Development*, *45*(6), 2252–2268.