

Information-seeking behaviour and adoption of improved sorghum farming practices in Dodoma, Tanzania

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ABSTRACT

Reliable agricultural information is vital for adopting improved sorghum practices, including certified seed use, effective pest and disease management, and reducing post-harvest losses. Guided by the Diffusion of Innovations and Information Seeking behaviour frameworks, this study examined determinants of information-seeking behaviour and its influence on adoption of improved sorghum practices among farmers in Dodoma, Tanzania. A cross-sectional survey of 399 household heads was conducted using multi-stage random sampling. Quantitative data were obtained using a structured questionnaire administered by the researcher. Qualitative data were also collected through 15 key informant interviews with extension officers and agricultural experts. Data were analysed with descriptive statistics, a linear mixed model to identify predictors of information-seeking behaviour, and binary logistic regression to assess its effect on adoption. Thematic analysis was used to examine qualitative data. Education level ($\beta = 0.296$, $p = 0.008$) and ownership of communication assets ($\beta = 0.749$, $p < 0.001$) significantly increased information-seeking behaviour. Farmers who actively sought information were four times more likely to adopt improved practices ($OR = 4.03$, $p < 0.001$), while trust in credible sources also significantly enhanced adoption ($OR = 2.79$, $p = 0.006$). Strengthening extension systems, promoting credible information channels such as community radio and mobile platforms, and supporting farmer groups can enhance informed decision-making and adoption of improved sorghum practices in semi-arid regions. Interventions targeting farmers' education and access to communication tools are likely to maximise adoption outcomes.

Keywords: Information-Seeking Behaviour, Semi-Arid Agriculture, Sorghum Farmers, Technology Adoption, Tanzania

I. INTRODUCTION

People seek information when they perceive a gap in knowledge or experience uncertainty. Information-seeking behaviour encompasses purposeful searching, passive exposure, and evaluation of information for decision-making (Ruppel et al., 2020). It enables individuals to reduce uncertainty and make informed choices (Golman et al., 2022). This general understanding of information-seeking behaviour provides a foundation for examining how it operates within agricultural settings, where decision-making is closely tied to risk, productivity, and environmental uncertainty.

In agricultural contexts, this behaviour becomes particularly important when farmers confront unfamiliar technologies, production risks, or changing climatic conditions. Farmers actively seek information to solve production problems and improve productivity. Such behaviour may be triggered by push factors, including declining yields, pest outbreaks, and economic pressure, or by pull factors, such as access to credible information and perceived benefits of innovations (Nyamekye et al., 2021; Seenuankaew et al., 2018). Social forces and community norms may also facilitate information-seeking behaviour through encouraging adherence to prevailing agricultural patterns (Constantino et al., 2022). Through these processes, farmers evaluate risks and opportunities before deciding whether to adopt new practices. Building on this, it is essential to explore how farmers' information-seeking behaviour interacts with communication, socio-economic factors, and innovation characteristics to influence the adoption of improved farming practices

Access to timely, credible information is decisive for adopting improved farming practices, including proper land preparation, certified sorghum seeds, appropriate fertilization, integrated pest and weed management, and better post-harvest handling, all of which enhance productivity, resilience, and market competitiveness. In Tanzania, such information is mainly delivered through the public extension system, supported by research institutions, Non-Governmental Organizations [NGOs], and the private sector via extension officers, farmer field schools, radio, demonstration plots, and mobile advisories (Matla, 2025; Mwantimwa & Ndege, 2022) While national policies promote modernization and climate-smart agriculture, limited extension coverage and staffing, especially in semi-arid regions



like Dodoma, constrain farmers' access to research-based guidance. Effective access to extension services and information channels is therefore closely linked to farmers' information-seeking behaviour, which enables them to obtain and apply knowledge for adopting improved farming practices and enhancing productivity.

Information-seeking behaviour of farmers enables access to timely and relevant information for making informed decisions. Credible information supports the adoption of improved farming practices, including the use of certified seed varieties, adoption of efficient pest, disease and weed management, and reduction of post-harvest losses (Mdoda et al., 2024; Rahman et al., 2020). This ability to seek and apply knowledge is even more critical in the wake of challenges such as climate change and evolving market demands, where farmers are required to remain adaptable and resilient. Sorghum farmers in Dodoma, Tanzania, employ diverse information sources, including extension services, radio programmes, and interpersonal networks, to obtain knowledge on modern farming practices to enhance productivity and livelihoods (Ndimbwa et al., 2021; Sennuga et al., 2020).

1.1 Statement of the Problem

Access to timely and credible agricultural information is essential for enabling farmers to adopt improved farming practices and enhance productivity. Through effective information-seeking behaviour, farmers obtain knowledge on innovations such as improved seed varieties, soil fertility management, pest and weed control, and post-harvest handling. This information helps farmers reduce uncertainty and make informed production decisions that can improve farm performance.

However, farmers' access to reliable agricultural information remains uneven in many developing agricultural systems. In Tanzania, agricultural information is mainly disseminated through extension services, research institutions, media platforms, and interpersonal networks. Despite these efforts, limited extension coverage, inadequate staffing, and disparities in access to communication assets constrain farmers' opportunities to obtain research-based information, particularly in semi-arid regions such as Dodoma.

These challenges are reflected in sorghum production in Dodoma, where average yields remain around one ton per hectare, far below the potential yield of about five tons per hectare. Although sorghum is promoted as a drought-tolerant crop suitable for semi-arid environments, the adoption of improved farming practices remains limited. This study therefore examined the determinants of farmers' information-seeking behaviour and its influence on the adoption of improved farming practices among sorghum farmers in Dodoma.

1.2 Research Objectives

This study examined determinants of information-seeking behaviour and its influence on adoption of improved sorghum practices among farmers in Dodoma, Tanzania. Specifically, it focused on:

- i. To determine the influence of socio-demographic characteristics (sex, age, education, marital status, farm size, and farming experience) on the information-seeking behaviour of sorghum farmers;
- ii. To assess the influence of ownership of communication assets on the information-seeking behaviour of sorghum farmers, and
- iii. To examine the association between information-seeking behaviour and the adoption of improved farming practices among sorghum farmers.

II. LITERATURE REVIEW

2.1 Theoretical Review

The Diffusion of Innovation (DOI) Theory and the Information Seeking Behaviour and Communication Model (ISCM) Model were used in this study to examine how smallholder sorghum farmers in Dodoma, Tanzania, seek and adopt improved farming practices. DOI theory highlights the central role of communication in disseminating new ideas and practices. It views the adoption of innovations, such as improved farming practices, as a process of communication involving various channels (Rogers et al., 2014). In this study, the DOI theory helps to examine how farmers' information-seeking behaviour influences their adoption of new farming practices. It highlights how farmers learn about innovations and decide to adopt them, and as such, it is the most appropriate approach to understanding the adoption process in sorghum farming. The ISCM model (Robson & Robinson, 2013) complements the DOI theory by explaining how farmers actively search for, process, and use information in particular ways. It identifies information triggers (e.g. low crop yields), information sources (e.g. extension services, peers, and media), and obstacles to accessing information (e.g. technological or financial constraints). By using this model, the study can examine how these variables influence farmers' information-seeking behaviours and their adoption of improved farming practices.



2.2 Empirical Review

Empirical evidence shows that farmers' information-seeking behaviour is influenced by socio-demographic and resource-related factors, including age, education, gender, farming experience, income, and ownership of communication assets (Colussi et al., 2022). Younger and more educated farmers are more likely to use digital platforms, whereas older farmers often rely on radio and interpersonal networks. Access to mobile phones, radios, and internet-enabled devices enhances exposure to weather forecasts, market information, and expert advice (Hoang & Tran, 2023; Unay-Gailhard & Simões, 2022). Farmers who own these assets are likely to actively seek and use information to improve their farming practices (Malik & Rathi, 2020). Conversely, limited ownership of communication assets constrains information access and informed decision-making (Mapiye et al., 2023).

These constraints are reflected in sorghum production in Dodoma, where average yields remain around 1 ton per hectare, far below potential levels (Mwamahonje et al., 2021; Simtowe & Mausch, 2018). Although sorghum is a drought-tolerant and strategic food security crop in semi-arid Tanzania (Kangile et al., 2020), adoption of improved practices remains low. While previous studies have examined agricultural information behaviour and innovation adoption in general terms, limited empirical attention has been given to semi-arid contexts such as Dodoma. Understanding how sorghum farmers seek, evaluate, and apply agricultural information is therefore critical. Examining these processes helps identify barriers to effective information use and informs strategies to strengthen extension delivery and communication systems.

This study assessed the information-seeking behaviour of sorghum farmers in Dodoma and its influence on the adoption of improved farming practices. Specifically, it examined the determinants of information-seeking behaviour and its effect on adoption decisions. The findings provide evidence to guide targeted communication and policy interventions aimed at improving productivity and resilience in semi-arid agricultural systems.

2.3 Hypotheses Development

2.3.1 Factors influencing information-seeking behaviour among sorghum farmers

Existing literature identifies socio-demographic and resource-related factors as important determinants of farmers' information-seeking behaviour. However, evidence is not uniform, and effects often vary by context. Rather than operating independently, factors such as age, education, farm size, farming experience, and access to communication assets interact with institutional and socio-economic conditions.

Age is frequently associated with differences in information channels. Studies suggest that younger farmers are more inclined to use digital platforms and experiment with new information sources (Fabregas et al., 2019). Yet, this relationship is mediated by infrastructure and digital literacy. In many African contexts, including East Africa, limited internet penetration and high data costs constrain the practical advantages of youth in accessing digital advisory services (Mapiye et al., 2023; Rwigema, 2020). Thus, age alone may not determine information-seeking intensity; rather, access and capacity shape its effect.

The influence of education on information-seeking behaviour enjoys broad support. Zimmerman and Shaw (2020) and Chang and Huang (2020) highlight that farmers with higher levels of education tend to have better information literacy. This means that educated farmers are more skilled at using different communication channels, which helps them access and utilize important information more effectively. Creissen et al. (2021) adds to this by noting that educated farmers not only seek information but are also likely to be more open to scientifically tested practices. However, studies in East Africa show that even educated farmers may face structural barriers, such as limited extension contact or poor market access (Magesa et al., 2023; Rahman et al., 2020). This suggests that education enhances potential for information seeking, but institutional support determines its realization.

Marital status is another factor that influences how farmers engage in information-seeking. Giroux et al. (2023) indicate that married farmers have the benefit of shared decision-making and shared resources, which can make information-seeking easier and more of a shared endeavour. Rahman et al. (2020) agree and note that a supportive family environment, especially the support of spouses, tends to increase farmers' engagement in seeking agricultural information. However, other scholars such as Mesfin et al. (2023) and Haumba and Kadu (2021) disagree and argue that while family support is useful, individual motivation and access to resources are also vital in stimulating information-seeking behaviours among farmers regardless of whether they are married or not.

Farm size is also a factor in that large farms command more resources, which tends to mean more motivation and capacity for seeking agricultural information (Magesa et al., 2020). Similarly, Tittonell et al. (2020) and Das et al. (2022) agree that large-scale farmers tend to prioritize keeping themselves informed on innovations in order to increase productivity. However, there are also cautionary notes by scholars such as Diemer et al. (2020), that this is not necessarily the case because even smallholder farmers can be motivated to seek information if it will directly assist them in overcoming their resource limitations. Indeed, smallholders tend to be highly resourceful and are capable of accessing information through informal networks and community interactions (Freeman & Qin, 2020; Mbugua et al., 2019).



Consideration of farming experience offers a mixed set of views. Kumar et al. (2020) observe that the more experienced farmers may be less receptive to new information, preferring tried and tested techniques. Acheampong et al. (2021), on the other hand, provide a more nuanced perspective, acknowledging that while experienced farmers may initially resist new methods, they are more likely to adopt them when presented with compelling evidence of their effectiveness, such as through field demonstrations. This, then, would suggest that experience does not always close off farmers from innovativeness but perhaps make them more cautious, particularly in the absence of engagement from trustworthy sources.

Access to communication assets particularly mobile phones and radios has become increasingly central. In East Africa, studies from the region show that mobile-based advisory services improve timely decision-making, especially for weather and market information (Sansa-Otim et al., 2022). Nonetheless, digital divides persist, limiting the inclusiveness of such interventions (McCampbell et al., 2023). In semi-arid regions such as Dodoma, uneven extension coverage further amplifies these disparities. These disparities highlight the need for a theoretical perspective to explain how differences in access and individual characteristics shape information exposure and adoption outcomes.

The Diffusion of Innovations (DOI) theory provides a useful lens for interpreting these dynamics by explaining how individual characteristics shape exposure to information and progression toward adoption. Complementing this, the information seeking and communication model emphasizes that farmers are active agents who deliberately select channels such as extension services, peer networks, and media based on perceived accessibility and credibility. In the Tanzanian context, socio demographic attributes and ownership of communication assets influence both the intensity of information seeking and the effectiveness of communication flows, thereby shaping farmers' movement through the innovation decision stages knowledge, persuasion, decision, implementation, and confirmation. Accordingly, the following hypothesis is proposed:

H₀₁: Sex, age, education, marital status, farm size, farming experience, and ownership of communication assets do not influence information-seeking behaviour of sorghum farmers.

Association between information seeking behaviour and the adoption of improved farming practices among sorghum farmers. A substantial body of research suggests a positive association between active information seeking and technology adoption. Farmers who deliberately engage extension agents, peer networks, and media platforms tend to acquire greater awareness and confidence regarding new practices Sutherland and Marchand (2021) and Cook et al. (2021). The quality, relevance, and credibility of information, as well as socio-cultural compatibility, condition behavioural outcomes. However, empirical findings also caution that access to information does not automatically translate into adoption (Zheng et al., 2022). The quality, relevance, and credibility of information, as well as socio-cultural compatibility, condition behavioural outcomes.

In East Africa, adoption of improved agricultural practices often depends on localized demonstration, peer validation, and trust in extension officers (Morrison, 2023). Social capital plays a critical role, as farmers embedded in strong networks are more likely to share experiences and reduce perceived risks. Social capital plays a critical role, as farmers embedded in strong networks are more likely to share experiences and reduce perceived risks (Silvert et al., 2022). Conversely, Brown et al. (2018) argue that socially isolated farmers may remain hesitant even when information is available. These findings underscore that information-seeking behaviour operates within broader social and institutional ecosystems.

Push and pull factors further complicate this relationship. Economic pressure, climate variability, and declining yields may push farmers to search for alternatives (Acharya & Lillywhite, 2021; Kassie et al., 2018). At the same time, perceived credibility and accessibility of information sources act as pull factors influencing adoption decisions (Yu & Gambrah, 2024). In semi-arid Tanzania, where sorghum is promoted as a climate-resilient crop, these dynamics are particularly salient. This interacting push and pull forces therefore necessitate a theoretical explanation of how information-seeking behaviour translates into movement across the stages of innovation adoption.

The DOI framework clarifies this relationship by emphasizing that information seeking behaviour mainly influences the early stages of the innovation decision process, particularly knowledge and persuasion. The information seeking and communication model complements this by highlighting farmers as active agents who select communication channels based on access, trust, and relevance. Progression to adoption then depends on perceived relative advantage, compatibility, complexity, trialability, and observability. In the Tanzanian extension context, limited demonstration plots and constrained advisory services may weaken these attributes and communication flows, thereby slowing adoption despite active information seeking. While prior research establishes a general link between information behaviour and adoption, limited empirical evidence specifically addresses sorghum farmers in semi-arid regions of Tanzania. This contextual gap justifies examining the relationship within Dodoma, where extension constraints and climate pressures shape farmers' decision environments. Accordingly, the following null hypothesis is proposed:

$H0_2$: There is no significant association between information seeking behaviour and the adoption of improved farming practices among sorghum farmers.

III. METHODOLOGY

3.1 Description of the Study Area

This study was carried out in Dodoma, Tanzania, which is known for its semi-arid climatic conditions and persistent food insecurity. The cultivation of sorghum is seen as a climate-resilient, nutritious, and sustainable alternative for farmers that supports food security and livelihoods (Amede et al., 2023). Given the region's challenges and sorghum's potential to address food security issues Mwamahonje et al. (2021), it provides an ideal setting to explore how information-seeking behaviour influences the adoption of improved farming practices and contributes to better agricultural decision-making.

3.2 Research Design, Sampling Procedure and Sample Size

This study adopted a cross-sectional design to capture a snapshot of the current situation and examine the relationship between information seeking behaviour and the adoption of improved sorghum farming practices. To ensure a diverse and representative sample, a multi-stage random sampling method was used. First, three districts Kongwa, Kondoa, and Bahi were randomly selected from a pool of seven districts. In the next stage, three wards were randomly chosen from each of the selected districts. Then, three villages were randomly selected from each ward. Finally, households were randomly picked from the lists of households within the chosen villages. The multi-stage, random sampling approach was used to ensure that the sample was both representative and unbiased, capturing a broad range of local contexts. Data were gathered from household heads, who are typically the primary decision-makers in most African communities. Based on the Cochran (1963) formula specifications (equation 1) with $Z=1.96$; $q=0.5$, $p=0.5$, and $e=0.05$ as parameters, the sample size pointed to a minimum number of 384 respondents. However, a sample size of 399 was chosen in the study to allow for non-response, missing data, or outliers - factors that may affect the reliability of findings

$$n_o = \frac{Z^2 pq}{e^2} \quad 1$$

$$n_o = \frac{(1.96^2 \times 0.5 \times 0.5)}{0.05^2} = 384$$

3.3 Data Collection and Analysis

Quantitative data were obtained using a structured questionnaire administered by the researcher. A pre-test of data collection instruments was conducted with 38 sorghum farmers in Mlowa-Barabarani Village, Chamwino district. The goal was to check reliability using Cronbach's alpha for Likert-type scale questions, and all Alphas exceeded 0.7, indicating good internal consistency. We also ensured validity by assessing face validity through a questionnaire overview and content validity by involving experts to review and suggest improvements. This process aimed to enhance the questionnaire's accuracy in measuring intended constructs and improve data quality (Mohd Yusoff & Tengku Ariffin, 2021). Qualitative data were also collected through 15 key informant interviews with extension officers and agricultural experts from TARI. Participants were purposively selected based on their expertise in sorghum production and extension services. The interviews followed a semi-structured guide covering knowledge of improved farming practices, information dissemination strategies, and challenges in adoption. Each interview lasted approximately 45–60 minutes, allowing for in-depth exploration of participants' experiences and perspectives (Creswell et al., 2014).

Quantitative data analysis included descriptive and inferential analysis. With regards to information-seeking behaviour we asked participants to indicate how often they sought agricultural information on improved sorghum farming practices from agricultural information source(s). Farmers were given 5 choices with the codes from 1 to 5. 1=Never, 2= Rarely, 3=Sometimes, 4=Often, 5=Always. The variable information seeking behaviour was later categorized into two groups (non-seekers, and seekers). Those who responded never sought information were termed as non-seeker, while those who responded Rarely, Sometimes, Often, or Always seeking were termed as information seeker. Frequency table summarized the distribution of information-seeking behaviour. A table was drawn to show the proportion of the farmers who were information seekers and non-information seekers for inferential analysis, a linear mixed model was fitted to determine the factors influencing information seeking behaviour. A linear mixed model with sex, age, level of education, marital status, farm size, farming experience, and possession of communication assets as predictors was fitted with information-seeking behaviour as the response variable. The model estimated the coefficient for each of the predictors by assuming their effect to be fixed effects.

Furthermore, the model accounted for potential clustering of farmers within districts by including district-level random effects. This helped to control for unobserved district-level characteristics that could influence information-



seeking behaviour. Variance components for the district-level random effects were estimated, and the intraclass correlation (ICC) was calculated to determine the proportion of variability in information-seeking behaviour attributable to district-level factors. The Linear Mixed Model used to assess the factors influencing information-seeking behaviour among sorghum farmers is given in equation 2:

$$Y_{ij} = \beta_o + \beta_1 S + \beta_2 A + \beta_3 E + \beta_4 MS + \beta_5 FS + \beta_6 FE + \beta_7 CA + u_j + \varepsilon_{ij} \dots\dots\dots 2$$

Where:

Y_{ij} = Information seeking score represents the level of information-seeking behaviour measured on a scale of 1 to 5. The use of this scale helped to get more information to capture variation in information seeking behaviour across different farmer characteristics. Therefore, Y_{ij} is the outcome variable for the i-th individual in the j-th district. S (Sex), A (Age), E (Education), MA (Marital Status), FS (Farm Size), FE (Farming Experience), CA (Ownership of communication assets) u_j is the random effect for the district, accounting for variability between districts and ε_{ij} is the residual error term for individual-level variability.

A binary logistic regression model was employed to evaluate the association between information-seeking behaviour and the adoption of improved farming practices. The binary outcome variable (adoption vs. non-adoption) was regressed on the key predictor (information seeker vs. non-information seeker), while controlling for covariates such as sex, age, marital status, farm size, farming experience, and perceived credibility of information. Perceived credibility of information was assessed through trustworthiness, reliability, and accuracy of agricultural information. Participants rated the credibility of six information sources on a 5-point Likert scale for each of the three credibility aspects. Three indices were computed, one for each credibility aspect, by summing scores from the six sources. These indices ranged from 6 to 30. An overall credibility index was also calculated by summing the three individual indices, with values ranging from 18 to 90. We expected that for a farmer who respond average credibility (value of 3) for each aspect would have an index of 54 (3*3*6), therefore an index > 54 were termed as high perceived credibility, otherwise low. The Binary Logistic Regression Model, in equation 3, was used to assess the association between information-seeking behaviour and the adoption of improved farming practices.

$$\text{logit}(\pi(x)) = \beta_o + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + \varepsilon_i \dots\dots\dots 3$$

Where;

$\text{Logit}(\pi(x))$ is the logarithm of the odd of a farmer to adopt improved farming practices given covariate (independent variable) x and

x_1 =Sex, x_2 =Age, x_3 =Marital Status, x_4 =Farm Size,

x_5 =Farming Experience, x_6 =Perceived Information Credibility, x_7 =Information Seeking Behavior

ε_i = error term

The odds ratios and their 95% confidence intervals were estimated for each predictor to assess the likelihood of adopting improved farming practices. The primary interest was in the odds ratio associated with information-seeking behaviour, which indicated how the odds of adoption differed between information seekers and non-seekers. The statistical significance of each predictor was tested using Wald tests. The results were presented in a table showing the odds ratios, standard errors, z-values, and p-values for each covariate.

Thematic analysis was used to examine qualitative data. Data were initially transcribed, and important phrases were extracted, coded, and then grouped into themes relating to sorghum farming practices. As analysis progressed, emerging themes were compared and contrasted across different interviewees and were then refined. Patterns in communication strategies emerged through this process, providing an understanding of how farmers’ information-seeking behaviours influence farming practices. To ensure data quality Kobo tool box was used during data collection. Validation criteria included in the tool, skipping logic (if the question not for specific individual), and setting questions as mandatory increased data quality by remove the risk of having responses which are out of require range or having missing values (A question cannot be submitted if it has missing value in any of the question) therefore there was no any missing response in the dataset.

3.4 Research Ethical Consideration

Before data collection, ethical clearance was obtained from Moshi Cooperative University (MoCU) and the Office of the Regional Administrative Secretary in Dodoma, authorizing research in three districts across four themes related to communication and adoption of improved sorghum farming practices. Respondents were informed about the



study’s objectives, procedures, and benefits, and provided voluntary verbal consent before participating. Participation was entirely voluntary, with the right to withdraw at any time without consequences. Confidentiality and anonymity were strictly maintained, and respondents were informed about how the data would be collected, used, and shared. All data were securely stored to prevent identification of participants. The study was conducted with honesty, integrity, and scientific rigor.

IV. FINDINGS & DISCUSSION

4.1 Findings

4.1.1 Socio-Demographic Characteristics and Information-Seeking Behaviour

The study findings in Table 1 reveal several socio-demographic factors that influence information-seeking behavior and the adoption of improved farming practices. The results show that 57.14% of the respondents were male and most of them (83.46%) were married, which could affect decision-making dynamics and social support for the adoption of new practices. A high percentage (75.44%) of the farmers had primary education, which could limit their ability to fully grasp complex agricultural information, which could affect the intensity of their engagement with new practices. However, 83.21% of the farmers possessed at least one communication asset, such as a mobile phone, television, or radio, which greatly facilitates access to agricultural information. The mean age of 46.89 years (SD = 13.46) indicates a middle-aged farming population, which suggests a balance between experience and openness to new practices. With a mean of 17.43 years (SD = 11.79) of farming experience, most farmers possess a wealth of practical knowledge. Notably, 81.20% of the farmers proactively sought agricultural information, which indicates their recognition of the role of information in improving farming practices and decision-making. This aligns with Saengavut and Jirasathumb (2021) and Campenhout (2021) who found that access to agricultural information positively influences farmers’ decision-making and adoption of technology. Therefore, socio-demographic factors such as education, communication access, and experience play key roles in shaping information-seeking behaviour and, subsequent adoption of improved farming practices.

Table 1
Socio-Demographic Characteristics and Information-Seeking Behaviour

Characteristics		Frequency (n)	Percentage (%)
Sex	Male	228	57.14
	Female	171	42.86
Marital Status	Single/divorced/separated/widowed	66	16.54
	Married	333	83.46
Education Level	No formal education	69	17.29
	Primary education	301	75.44
	Secondary education and above	29	7.27
Communication assets ownership	Yes	332	83.21
	No	67	16.79
Information seeking behaviour	Non-information seeker	75	18.80
	Information seekers	324	81.20
		Mean	Std.Dev
Age (in years)		46.89	13.46
Farm Size (in acres)		2.16	0.62
Farming Experience (in years)		17.43	11.79

4.1.2 Factors Influencing Information-Seeking Behaviour among Sorghum Farmers

The linear mixed model estimates in Zheng et al. (2021) reported that geographical location could have an effect on access to agricultural information. Farmers in rural locations are disadvantaged by lack of infrastructure and connectivity, while those in urban and peri-urban locations are benefited by closeness to research institutions and extension agents. The absence of geographical variation in this study could reflect relatively homogeneous access to communication assets and education throughout the study area or dominance of individual over geographical factors. The finding suggests the need for targeted interventions that focus on improving individual access to education and communication technologies.

Table 2 provide the most crucial explanations for the determinants of information-seeking behaviour among sorghum farmers. The level of education and access to communication resources were the strongest predictors. Farmers with higher levels of education were more inclined to search for agricultural information ($\beta = 0.296$; $p = 0.008$), thereby rejecting the null hypothesis that education does not influence information-seeking behaviour. This aligns with existing



literature Sisay et al. (2023) and Babu and Glendenning (2019) that argues education raises the ability of farmers to learn and evaluate new technologies, thereafter improving their capacity to seek information. Further, key informant interview observations confirmed that better-educated farmers sought agricultural information more actively, with greater interest in extension services and digital media. These results highlight the contributions of literacy and education campaigns in empowering farmers to access and use agricultural knowledge, and advocate for targeted interventions to ensure information is well disseminated and made accessible to farmers of varying education levels.

Ownership of communication assets such as mobile phones, radios, or televisions had a positive effect on information-seeking behaviour ($\beta = 0.749$; $p < 0.001$). This confirms the imperative role played by communication tools in accessing agricultural information. The finding validates the rejection of the null hypothesis that ownership of communication assets has no influence on information-seeking behaviour of sorghum farmers. Krell et al. (2021) also reported that mobile phones improved farmers’ access to various agricultural information. Similarly, Király et al. (2023) and Mbaya (2023) showed that digital platforms allow farmers to connect with agricultural experts, further enhancing their information-seeking potentials. This was also confirmed by key informants, who asserted that ownership of mobile phones has significantly improved farmers’ access to agricultural information, allowing real-time updates and direct contact with experts and peers, and consequently enhancing decision-making.

In contrast, demographic factors such as gender, age, marital status, farm size, and farming experience years did not significantly influence information-seeking behaviour in this study. There is not enough evidence against the null hypothesis for these factors in this study. Prior studies, nevertheless, show these factors can still be significant in another context. For instance, Balayar and Mazur (2022) noted that socio-cultural barriers linked to gender can affect access to agricultural information. Farming experience, highlighted by Rahman et al. (2020) as a possible determinant of the type of information sought, did not show significance here, likely due to this study’s unique context.

Random effects showed minimal variation between districts ($\sigma^2 = 0.059$, 95% CI: 0.003, 1.004), with an intraclass correlation coefficient (ICC) of 0.003. It suggests that district-level factors had minimal effect on information-seeking behaviour of sorghum farmers. Instead, individual-level factors like education and communication devices appeared more significant. Contrastively, Liu et al. (2021) and Zheng et al. (2021) reported that geographical location could have an effect on access to agricultural information. Farmers in rural locations are disadvantaged by lack of infrastructure and connectivity, while those in urban and peri-urban locations are benefited by closeness to research institutions and extension agents. The absence of geographical variation in this study could reflect relatively homogeneous access to communication assets and education throughout the study area or dominance of individual over geographical factors. The finding suggests the need for targeted interventions that focus on improving individual access to education and communication technologies.

Table 2
Linear Mixed Model Results: Factors Influencing Information-Seeking Behaviour among Sorghum Farmers (N = 399)

Fixed effect		Coefficient	Std. error	t	P>t	95% Conf. Int.
Sex	Female	Ref	-	-	-	-
	Male	-0.109	0.114	-0.95	0.341	-0.333, 0.115
Age		-0.001	0.005	-0.18	0.860	-0.011, 0.009
Education level		0.296	0.111	2.67	0.008	0.079, 0.514
Marital status	Not Married	Ref	-	-	-	-
	Married	0.205	0.149	1.38	0.169	-0.087, 0.496
Farm size (in acres)		0.021	0.02	1.08	0.279	-0.017, 0.06
Farming experience (in years)		0.004	0.006	0.75	0.451	-0.007, 0.016
Communication assets ownership	No	Ref	-	-	-	-
	Yes	0.749	0.146	5.13	<0.001	0.463, 1.035
Random effect		Estimate	Std. err			95% Conf. Int.
Var (Districts), σ_u^2		0.059	0.085			0.003, 1.004
Var (Residual), σ_e^2		0.993	0.035			0.927, 1.065
Intraclass correlation (ICC)		0.003	0.010			0.000, 0.508

4.1.3 Association between information seeking behaviour and the adoption of improved farming practices among sorghum farmers

The findings in Beaman et al. (2021) highlight how social connections can facilitate the flow of information and increase the likelihood of adopting new practices. These studies suggest that community dynamics may have a basic, but unexamined, role in shaping adoption behaviours.



This study highlights the priority of information-seeking behaviour and information credibility in shaping the adoption of improved farming practices. Key informant feedback emphasizes that farmers who have a tendency to seek credible information, especially from trustworthy sources like peers or extension officers, are more likely to adopt new practices. While there were some demographic and regional factors that appeared less relevant in this study, the findings point to the need for further research to arrive at a more sophisticated understanding of the multi-faceted variables that impact adoption, particularly in areas with distinct socio-economic challenges.

Table 3 reveal a strong link between information-seeking behaviour and the adoption of improved farming practices, which is corroborated by a significant odds ratio of 4.03 (95% CI: 2.116, 7.678; $p < 0.001$). This indicates that farmers who had a tendency to seek agricultural information had four times odd of adopting improved practices compared to farmers who had no tendency of seeking information. This result is in conformity with Maqbool et al. (2023) who revealed a similar trend where proactive information-seeking increases farmers' awareness of innovative agricultural technologies and their respective advantages. Moreover, Diemer et al. (2020) corroborate this finding, demonstrating that actively seeking information significantly increases the likelihood of adopting modern farming techniques.

Information credibility of what is received also assumes a central position in influencing adoption. The research shows that a high degree of perceived credibility of the received information significantly increases the likelihood of adoption (OR = 2.79, 95% CI: 1.338, 5.822; $p = 0.006$). The finding is consistent with the observation of Skaalsveen et al. (2020) who noted that farmers are likely to adopt practices if they trust the sources of their information. The argument is also consistent with Rust et al. (2022) and Bavorová et al. (2020) which noted that credible sources of information increase farmers' trust in new practices, thereby enabling adoption.

Farming experience positively influences the adoption of improved practices, with an additional year of experience slightly increasing the chance of adoption (OR = 1.06, 95% CI: 1.022, 1.096; $p = 0.001$). This finding is consistent with Landini (2021), who elucidated that experienced farmers are generally better placed to evaluate and adopt new practices as they have developed knowledge and skills over time. Nettle et al. (2022) also determined that experienced farmers are more adept at perceiving the daily applications of new technologies, further confirming the influence of experience on the adoption process.

Conversely, the research also reveals some nuances regarding non-significant factors. It found that sex, age, marital status, and farm size did not have statistically significant relationships with the adoption of improved practices. This contradicts with Giua et al. (2022), who posit that such demographic variables can indeed have a role in influencing adoption decisions through their effects on access to resources and information. Additionally, Dapilah et al. (2020) emphasize the role of social networks and community dynamics in the adoption process, variables not adequately captured in the controlled variables of this study's model. Similarly, Beaman et al. (2021) highlight how social connections can facilitate the flow of information and increase the likelihood of adopting new practices. These studies suggest that community dynamics may have a basic, but unexamined, role in shaping adoption behaviours.

This study highlights the priority of information-seeking behaviour and information credibility in shaping the adoption of improved farming practices. Key informant feedback emphasizes that farmers who have a tendency to seek credible information, especially from trustworthy sources like peers or extension officers, are more likely to adopt new practices. While there were some demographic and regional factors that appeared less relevant in this study, the findings point to the need for further research to arrive at a more sophisticated understanding of the multi-faceted variables that impact adoption, particularly in areas with distinct socio-economic challenges.

Table 3

Binary Logistic Model Results: Assessing the Association between Information-Seeking Behaviour and Adoption of Improved Farming Practices Among Sorghum Farmers (N = 399)

Factor		Odds ratio	Std. err	z	P>z	95% Conf. Int.
Sex	Female	Ref	-	-	-	-
	Male	1.16	0.393	0.44	0.657	0.599, 2.255
Age		0.98	0.014	-1.49	0.138	0.953, 1.007
Marital status	Not married	Ref	-	-	-	-
	Married	0.43	0.209	-1.73	0.083	0.168, 1.116
Farm size (in acre)		0.97	0.058	-0.52	0.6	0.861, 1.09
Farming experience (in years)		1.06	0.019	3.19	0.001	1.022, 1.096
Perceived information credibility	Low	Ref	-	-	-	-
	High	2.79	1.047	2.74	0.006	1.338, 5.822
Information seeking behaviour	Non-seekers	Ref	-	-	-	-
	Seekers	4.03	1.325	4.24	0	2.116, 7.678

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This study highlights the pivotal role played by information-seeking behaviour in the adoption of improved farming practices by sorghum farmers. The primary findings indicate that education levels and ownership of communication assets contribute positively towards the likelihood of farmers seeking agricultural information. Those who were actively seeking information were also identified as being four times as likely to adopt improved practices, validating the relationship between active information seeking and innovation adoption. The credibility of sources of information also influences this relationship, with credible information enhancing the chances of adoption. Demographic factors such as sex, age, marital status, and farm size were not significant in influencing adoption behaviours, suggesting that community dynamics and social networks may play a more crucial role than initially assumed. Overall, the findings beckon the implementation of focused education and communication strategies to uplift the farmers, enhancing agricultural productivity and sustainability in the long run. Further study is invited to explore the multi-faceted determinants of adoption in diverse socio-economic settings.

5.2 Recommendations

The study recommends that policymakers, agricultural extension services, NGOs, and farmers improve access to information through easy-to-use channels like mobile applications and community radio. The extension services must organise training to encourage information-seeking habits among farmers. Stakeholders must ensure credible information dissemination through coordination with experts and periodic reviews. Farmers must be trained in modern communication tools to encourage digital literacy, especially in rural areas. Community leaders and NGOs must encourage the formation of farmer groups for knowledge exchange. Programmes must address the unique interests of heterogeneous groups, e.g., women and young farmers. Continued monitoring of adoption patterns and intervention impact is important for the identification of best practices. Lastly, coordination between government agencies, NGOs, and the private sector is required for the formulation of a comprehensive approach to agricultural development, maximising resource sharing and effectiveness of information dissemination initiatives.

REFERENCES

- Acharya, R. N., & Lillywhite, J. (2021). The Role of Push and Pull Motivations on Satisfaction and Consumer Loyalty to Agricultural Fairs. *Agriculture*, *11*(10). <https://doi.org/10.3390/agriculture11100923>
- Acheampong, E. O., Sayer, J., Macgregor, C. J., & Sloan, S. (2021). Factors Influencing the Adoption of Agricultural Practices in Ghana's Forest-Fringe Communities. *Land*, *10*(3), 266. <https://doi.org/10.3390/land10030266>
- Amede, T., Konde, A. A., Muhinda, J. J., & Bigirwa, G. (2023). Sustainable Farming in Practice: Building Resilient and Profitable Smallholder Agricultural Systems in Sub-Saharan Africa. *Sustainability*, *15*(7), 5731. <https://doi.org/10.3390/su15075731>
- Babu, S. C., & Glendenning, C. J. (2019). Chapter 6 - Information needs of farmers: a systemic study based on farmer surveys. In S. C. Babu & P. K. Joshi (Eds.), *Agricultural Extension Reforms in South Asia* (pp. 101–139). Academic Press. <https://doi.org/10.1016/B978-0-12-818752-4.00006-0>
- Balayar, R., & Mazur, R. (2022). Beyond household income: the role of commercial vegetable farming in moderating socio-cultural barriers for women in rural Nepal. *Agriculture & Food Security*, *11*(1), 28. <https://doi.org/10.1186/s40066-022-00368-3>
- Bavorová, M., Unay-Gailhard, Ľ., Ponkina, E. V., & Pilařová, T. (2020). How sources of agriculture information shape the adoption of reduced tillage practices? *Journal of Rural Studies*, *79*, 88–101. <https://doi.org/10.1016/j.jrurstud.2020.08.034>
- Beaman, L., BenYishay, A., Magruder, J., & Mobarak, A. M. (2021). Can network theory-based targeting increase technology adoption? *American Economic Review*, *111*(6), 1918–1943. <https://doi.org/10.1257/aer.20200295>
- Brown, B., Llewellyn, R., & Nuberg, I. (2018). Why do information gaps persist in African smallholder agriculture? Perspectives from farmers lacking exposure to conservation agriculture. *The Journal of Agricultural Education and Extension*, *24*(2), 191–208. <https://doi.org/10.1080/1389224X.2018.1429283>
- Campenhout, B. V. (2021). The Role of Information in Agricultural Technology Adoption: Experimental Evidence from Rice Farmers in Uganda. *Economic Development and Cultural Change*, *69*(3), 1239–1272. <https://doi.org/10.1086/703868>
- Chang, C.-C., & Huang, M.-H. (2020). Antecedents predicting health information seeking: A systematic review and meta-analysis. *International Journal of Information Management*, *54*, 102115. <https://doi.org/10.1016/j.ijinfomgt.2020.102115>
- Cochran, W. (1963). Lattice vibrations. *Reports on Progress in Physics*, *26*(1), 1–45.

- Colussi, J., Morgan, E. L., Schnitkey, G. D., & Padula, A. D. (2022). How communication affects the adoption of digital technologies in soybean production: A survey in Brazil. *Agriculture*, 12(5), 611. <https://doi.org/10.3390/agriculture12050611>
- Constantino, S. M., Sparkman, G., Kraft-Todd, G. T., Bicchieri, C., Centola, D., Shell-Duncan, B., Vogt, S., & Weber, E. U. (2022). Scaling Up Change: A Critical Review and Practical Guide to Harnessing Social Norms for Climate Action. *Psychological science in the public interest*, 23(2), 50–97. <https://doi.org/10.1177/15291006221105279>
- Cook, B. R., Satizábal, P., & Curnow, J. (2021). Humanising agricultural extension: A review. *World Development*, 140, 105337. <https://doi.org/10.1016/j.worlddev.2020.105337>
- Creissen, H. E., Jones, P. J., Tranter, R. B., Girling, R. D., Jess, S., Burnett, F. J., Gaffney, M., Thorne, F. S., & Kildea, S. (2021). Identifying the drivers and constraints to adoption of IPM among arable farmers in the UK and Ireland. *Pest Manag Sci*, 77(9), 4148–4158. <https://doi.org/10.1002/ps.6452>
- Creswell, J. D., Pacilio, L. E., Lindsay, E. K., & Brown, K. W. (2014). Brief mindfulness meditation training alters psychological and neuroendocrine responses to social evaluative stress. *Psychoneuroendocrinology*, 44, 1–12. <https://doi.org/10.1016/j.psyneuen.2014.02.007>
- Dapilah, F., Nielsen, J. Ø., & Friis, C. (2020). The role of social networks in building adaptive capacity and resilience to climate change: A case study from northern Ghana. *Climate and Development*, 12(1), 42–56. <https://doi.org/10.1080/17565529.2019.1596063>
- Das, U., Ansari, M. A., & Ghosh, S. (2022). Effectiveness and upscaling potential of climate smart agriculture interventions: Farmers' participatory prioritization and livelihood indicators as its determinants. *Agricultural Systems*, 203, 103515. <https://doi.org/10.1016/j.agsy.2022.103515>
- Diemer, N., Staudacher, P., Atuhaire, A., Fuhrimann, S., & Inauen, J. (2020). Smallholder farmers' information behavior differs for organic versus conventional pest management strategies: A qualitative study in Uganda. *Journal of cleaner production*, 257, 120465. <https://doi.org/10.1016/j.jclepro.2020.120465>
- Fabregas, R., Kremer, M., & Schilbach, F. (2019). Realizing the potential of digital development: The case of agricultural advice. *Science*, 366(6471), eaay3038. <https://doi.org/10.1126/science.aay3038>
- Freeman, K., & Qin, H. (2020). The role of information and interaction processes in the adoption of agriculture inputs in Uganda. *Agronomy*, 10(2), 202. <https://doi.org/10.3390/agronomy10020202>
- Giroux, S., Kaminski, P., Waldman, K., Blekking, J., Evans, T., & Caylor, K. K. (2023). Smallholder social networks: Advice seeking and adaptation in rural Kenya. *Agricultural Systems*, 205, 103574. <https://doi.org/10.1016/j.agsy.2022.103574>
- Giua, C., Materia, V. C., & Camanzi, L. (2022). Smart farming technologies adoption: Which factors play a role in the digital transition? *Technology in Society*, 68, 101869. <https://doi.org/10.1016/j.techsoc.2022.101869>
- Golman, R., Loewenstein, G., Molnar, A., & Saccardo, S. (2022). The Demand for, and Avoidance of, Information. *Management Science*, 68(9), 6454–6476. <https://doi.org/10.1287/mnsc.2021.4244>
- Haumba, E. N., & Kaddu, S. (2021). Information seeking behaviour patterns of family farmers and house-hold food security in Kisoga B village, Ntenjeru sub county in Mukono district, Uganda. *University of Dar es Salaam Library Journal*, 16(1), 21–37.
- Hoang, H. G., & Tran, H. D. (2023). Smallholder farmers' perception and adoption of digital agricultural technologies: An empirical evidence from Vietnam. *Outlook on Agriculture*, 52(4), 457–468. <https://doi.org/10.1177/00307270231197825>
- Kangile, R. J., Mgeni, C. P., Mpenda, Z. T., & Sieber, S. (2020). The determinants of farmers' choice of markets for staple food commodities in Dodoma and Morogoro, Tanzania. *Agriculture*, 10(5), 142. <https://doi.org/10.3390/agriculture10050142>
- Kassie, M., Stage, J., Diiro, G., Muriithi, B., Muricho, G., Ledermann, S. T., Pittchar, J., Midega, C., & Khan, Z. (2018). Push–pull farming system in Kenya: Implications for economic and social welfare. *Land Use Policy*, 77, 186–198. <https://doi.org/10.1016/j.landusepol.2018.05.041>
- Király, G., Vágó, S., Bull, E., Cruyssen, L. v. d., Arbour, T., Spanoghe, P., & van Dijk, L. (2023). Information behaviour of farmers, foresters, and advisors in the context of digitalisation in the EU. *Studies in Agricultural Economics*, 125(1), 1–12. <https://doi.org/10.7896/j.2392>
- Krell, N., Giroux, S., Guido, Z., Hannah, C., Lopus, S., Caylor, K., & Evans, T. (2021). Smallholder farmers' use of mobile phone services in central Kenya. *Climate and Development*, 13(3), 215–227. <https://doi.org/10.1080/17565529.2020.1748847>
- Kumar, U., Werners, S., Roy, S., Ashraf, S., Hoang, L. P., Kumar Datta, D., & Ludwig, F. (2020). Role of information in Farmers' response to weather and water related stresses in the lower Bengal Delta, Bangladesh. *Sustainability*, 12(16), 6598. <https://doi.org/10.3390/su12166598>



- Landini, F. (2021). How do rural extension agents learn? Argentine practitioners' sources of learning and knowledge. *The Journal of Agricultural Education and Extension*, 27(1), 35–54. <https://doi.org/10.1080/1389224X.2020.1780140>
- Liu, W., Shao, X.-F., Wu, C.-H., & Qiao, P. (2021). A systematic literature review on applications of information and communication technologies and blockchain technologies for precision agriculture development. *Journal of cleaner production*, 298, 126763. <https://doi.org/10.1016/j.jclepro.2021.126763>
- Magesa, M., Jonathan, J., & Urassa, J. (2023). Digital Literacy of Smallholder Farmers in Tanzania. *Sustainability*, 15(17), 13149. <https://doi.org/10.3390/su151713149>
- Magesa, M. M., Michael, K., & Ko, J. (2020). Access and use of agricultural market information by smallholder farmers: Measuring informational capabilities. *The Electronic Journal of Information Systems in Developing Countries*, 86(6), e12134. <https://doi.org/10.1002/isd2.12134>
- Malik, N., & Rathi, P. (2020). Information seeking behaviour of farmers in Aligarh District of Uttar Pradesh. *Journal of Krishi Vigyan*, 9(1), 211–217. <https://doi.org/10.5958/2349-4433.2020.00161.0>
- Mapiye, O., Makombe, G., Molotsi, A., Dzama, K., & Mapiye, C. (2023). Information and communication technologies (ICTs): The potential for enhancing the dissemination of agricultural information and services to smallholder farmers in sub-Saharan Africa. *Information Development*, 39(3), 638–658. <https://doi.org/10.1177/02666669211064847>
- Maqbool, R., Soroya, S. H., Mahmood, K., & Naeem, S. B. (2023). Determinants of agriculture information utilization among farmers: Contextualization of Wilson's information behavior model. *Information Development*, 42(1), 372–386. <https://doi.org/10.1177/02666669231215809>
- Matla, H. M. D. (2025). Gender mainstreaming in agricultural extension education. In B. S. J. Anshuman, & K. S. Das (Ed.), *Transforming agriculture: The role of effective extension education* (pp. pp. 195–210). Elite Publishing House.
- Mbaya, A. K. (2023). *The Role of Information and Communication Technology (Ict) in Market Information Access Among Smallholder Potato Farmers in Buuri Sub County, Meru County. A Case Study of Viazisoko Digital Platform* University of Nairobi]. <https://erepository.uonbi.ac.ke/bitstream/handle/11295/166755/ANN%20KARWITHA%20>
- Mbugua, M., Nzuma, J., & Muange, E. (2019). Social networks and ex post risk management among smallholder farmers in Kenya. *Development Studies Research*, 6(1), 30–39. <https://doi.org/10.1080/21665095.2019.1573149>
- McCampbell, M., Adewopo, J., Klerkx, L., & Leeuwis, C. (2023). Are farmers ready to use phone-based digital tools for agronomic advice? Ex-ante user readiness assessment using the case of Rwandan banana farmers. *The Journal of Agricultural Education and Extension*, 29(1), 29–51. <https://doi.org/10.1080/1389224X.2021.1984955>
- Mdoda, L., Christian, M., & Agbugba, I. (2024). Use of Information Systems (Mobile Phone App) for Enhancing Smallholder Farmers' Productivity in Eastern Cape Province, South Africa: Implications on Food Security. *Journal of the Knowledge Economy*, 15(1), 1993–2009. <https://doi.org/10.1007/s13132-023-01212-0>
- Mesfin, H., Cecchi, F., Nillesen, E., & Tirivayi, N. (2023). Overconfidence, trust, and information-seeking among smallholder farmers: Experimental evidence from Ethiopia. *Economic Development and Cultural Change*, 72(1), 79–122. <https://doi.org/10.1086/719464>
- Mohd Yusoff, S., & Tengku Ariffin, T. F. (2021). Development and Validation of Contextual Leadership Instrument for Principals in Malaysian School Context (MyCLIPS). *Leadership and Policy in Schools*, 22(2), 402–417. <https://doi.org/10.1080/15700763.2021.1971259>
- Morrison, R. (2023). *Farmer networks and the adoption of agricultural innovations in East Africa* [The University of Edinburgh]. <https://hdl.handle.net/1842/40878>
- Mwamahonje, A., Eleblu, J. S. Y., Ofori, K., Deshpande, S., Feyissa, T., & Bakuza, W. E. (2021). Sorghum production constraints, trait preferences, and strategies to combat drought in Tanzania. *Sustainability*, 13(23), 12942. <https://doi.org/10.3390/su132312942>
- Mwantomwa, K., & Ndege, N. (2022). Transferring knowledge and innovations through village knowledge center in Tanzania: approaches, impact and impediments. *VINE Journal of Information and Knowledge Management Systems*, 54(2), 379–397. <https://doi.org/10.1108/vjikms-09-2021-0195>
- Ndimbwa, T., Mwantomwa, K., & Ndumbaro, F. (2021). Channels used to deliver agricultural information and knowledge to smallholder farmers. *IFLA Journal*, 47(2), 153–167. <https://doi.org/10.1177/0340035220951828>
- Nettle, R., Major, J., Turner, L., & Harris, J. (2022). Selecting methods of agricultural extension to support diverse adoption pathways: a review and case studies. *Animal Production Science*, 64(1), 64. <https://doi.org/10.1071/AN22329/20684>

- Nyamekye, A. B., Nyadzi, E., Dewulf, A., Werners, S., Van Slobbe, E., Biesbroek, R. G., Termeer, C. J. A. M., & Ludwig, F. (2021). Forecast probability, lead time and farmer decision-making in rice farming systems in Northern Ghana. *Climate Risk Management*, 31, 100258. <https://doi.org/10.1016/j.crm.2020.100258>
- Rahman, T., Ara, S., & Khan, N. A. (2020). Agro-information Service and Information-seeking Behaviour of Small-scale Farmers in Rural Bangladesh. *Asia-Pacific Journal of Rural Development*, 30(1-2), 175–194. <https://doi.org/10.1177/1018529120977259>
- Robson, A., & Robinson, L. (2013). Building on models of information behaviour: linking information seeking and communication. *Journal of documentation*, 69(2), 169–193. <https://doi.org/10.1108/00220411311300039>
- Rogers, E. M., Singhal, A., & Quinlan, M. M. (2014). Diffusion of innovations. In D. W. S. M. B. Salwen (Ed.), *An integrated approach to communication theory and research* (pp. 432–448). Routledge.
- Ruppel, E. K., Kahlow, J. A., & Pu, Z. (2020). Information Seeking. *The International Encyclopedia of Media Psychology*, 1–14. <https://doi.org/10.1002/9781119011071.iemp0264>
- Rust, N. A., Stankovics, P., Jarvis, R. M., Morris-Trainor, Z., de Vries, J. R., Ingram, J., Mills, J., Glikman, J. A., Parkinson, J., & Toth, Z. (2022). Have farmers had enough of experts? *Environmental management*, 1–14. <https://doi.org/10.1007/s00267-021-01546-y>
- Rwigema, P. (2020). Digital technology and its relevance to political and social economic transformation. Case study of east african community region. *The Strategic Journal of Business & Change Management*, 7(4), 1402–1436. <https://doi.org/10.1177/02666669211064847>
- Saengavut, V., & Jirasatthumb, N. (2021). Smallholder decision-making process in technology adoption intention: implications for *Dipterocarpus alatus* in Northeastern Thailand. *Heliyon*, 7(4), e06633. <https://doi.org/10.1016/j.heliyon.2021.e06633>
- Sansa-Otim, J., Nsabagwa, M., Mwesigwa, A., Faith, B., Owoseni, M., Osulale, O., Mboma, D., Khemis, B., Albino, P., & Ansah, S. O. (2022). An assessment of the effectiveness of weather information dissemination among farmers and policy makers. *Sustainability*, 14(7), 3870. <https://doi.org/10.3390/su14073870>
- Seenuankaew, U., Rattichot, J., Phetwong, W., & Leenaraj, B. (2018). Thai farmers' information needs and seeking that lead to mobile phone application development for production and marketing promotion. *Information and Learning Sciences*, 119(5-6), 246–259. <https://doi.org/10.1108/ils-06-2017-0051>
- Sennuga, S., Baines, R., Conway, J., & Angba, C. (2020). Awareness and adoption of good agricultural practices among smallholder farmers in relation to the adopted villages programme: The case study of Northern Nigeria. *Journal of Biology, Agriculture and Healthcare*, 10(6), 34–49. <https://doi.org/10.7176/JBAH/10-6-06>
- Silvert, C. J., Ochieng, W., Perez Orozco, J., & Asanzi, A. (2022). Dissecting the roles of social Capital in Farmer-to-Farmer Extension: a review. *Journal of International Agricultural and Extension Education*, 29(4), 7–26.
- Simtowe, F., & Mausch, K. (2018). Who is quitting? An analysis of the dis-adoption of climate smart sorghum varieties in Tanzania. *International Journal of Climate Change Strategies and Management*, 11(3), 341–357.
- Sisay, T., Tesfaye, K., Ketema, M., Dechassa, N., & Getnet, M. (2023). Climate-smart agriculture technologies and determinants of farmers' adoption decisions in the Great Rift Valley of Ethiopia. *Sustainability*, 15(4), 3471. <https://doi.org/10.3390/su15043471>
- Skaalsveen, K., Ingram, J., & Urquhart, J. (2020). The role of farmers' social networks in the implementation of no-till farming practices. *Agricultural Systems*, 181, 102824. <https://doi.org/10.1016/j.agry.2020.102824>
- Sutherland, L.-A., & Marchand, F. (2021). On-farm demonstration: enabling peer-to-peer learning. *The Journal of Agricultural Education and Extension*, 27(5), 573–590. <https://doi.org/10.1080/1389224x.2021.1959716>
- Tittonell, P., Piñeiro, G., Garibaldi, L. A., Dogliotti, S., Olf, H., & Jobbagy, E. G. (2020). Agroecology in large scale farming—A research agenda. *Frontiers in Sustainable Food Systems*, 4, 584605. <https://doi.org/10.3389/fsufs.2020.584605>
- Unay-Gailhard, I., & Simões, F. (2022). Becoming a Young Farmer in the Digital Age—An Island Perspective. *Rural Sociology*, 87(1), 144–185. <https://doi.org/10.1111/ruso.12400>
- Yu, Q., & Gambrah, P. P. (2024). Information Network Among Farmers: A Case Study in Ghana. *Sage Open*, 14(1), 21582440241228696. <https://doi.org/10.1177/21582440241228696>
- Zheng, H., Ma, W., & Li, G. (2021). Learning from neighboring farmers: Does spatial dependence affect adoption of drought-tolerant wheat varieties in China? *Canadian Journal of Agricultural Economics/Revue canadienne d'agroéconomie*, 69(4), 519–537. <https://doi.org/10.1111/cjag.12294>
- Zheng, Y.-y., Zhu, T.-h., & Jia, W. (2022). Does Internet use promote the adoption of agricultural technology? Evidence from 1 449 farm households in 14 Chinese provinces. *Journal of Integrative Agriculture*, 21(1), 282–292. [https://doi.org/10.1016/S2095-3119\(21\)63750-4](https://doi.org/10.1016/S2095-3119(21)63750-4)
- Zimmerman, M. S., & Shaw, G., Jr. (2020). Health information seeking behaviour: a concept analysis. *Health Info Libr J*, 37(3), 173–191. <https://doi.org/10.1111/hir.12287>