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Understanding agricultural extension professionals' intention to use participatory approaches in Kenya

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ABSTRACT

This study investigates the factors motivating agricultural extension professionals to adopt participatory approaches (PA) and examines how their beliefs and attitudes influence the design and delivery of extension services for farmers and rural communities. A total of 180 public sector agricultural extension officers working with smallholder farmers across five Kenyan counties were surveyed. Data were collected using a questionnaire based on the theory of (TPB) planned behaviour to assess the officers' attitudes and intentions. Results indicate that extension professionals generally hold favourable views towards participatory extension methods. However, systemic barriers, such as staff shortages and insufficient management support, hinder their willingness to implement these approaches. Furthermore, demographic factors, including education, gender, and marital status, significantly influence their readiness to adopt participatory methods. This research contributes to the existing literature on PA and offers valuable insights for enhancing extension and advisory services.

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Theory of planned behaviour; participatory approaches; agricultural extension; extension service delivery; agricultural advisory and extension services

1. Introduction and literature review

Agricultural advisory and extension services (AES) are crucial in advancing agricultural innovation and achieving the Sustainable Development Goals (SDGs). AES not only enhance farmers' technical capabilities but also foster positive attitudes, leading to improved agricultural practices (Buehren et al. 2017). Consequently, smallholder farmers can enhance productivity and profitability by effectively adopting new technologies and innovations (Kilelu et al. 2011).

The influence of AES is multi-dimensional, extending beyond agricultural productivity. It also enriches rural livelihoods and drives economic growth in impoverished communities. For instance, Midamba et al. (2022)'s study involving 200 farmers in Western Uganda found that farmers with access to extension services reported higher crop yields compared to those without access, aligning with SDG 2: Zero Hunger. Similarly, Makate and Makate (2019) showed that access to institutional extension services in Zimbabwe was associated with the adoption of Drought-Tolerant Maize (DTM) technology, significantly enhancing farmers' livelihood outcomes. In India, Rajkhowa and Qaim (2021) demonstrated that personalised digital extension services positively influenced input use, crop productivity, and income. Additional studies (e.g. Alene et al. 2009) confirmed that smallholder farmers significantly benefit from adopting innovations and new technologies, including intensified productivity, increased income, and reduced poverty.

AES also empower marginalised groups, including women, contributing to SDG 5: Gender Equality. It advocates for sustainable farming practices essential for SDG 15: Life on Land and provides

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climate change adaptation strategies aligned with SDG 13: Climate Action. Byerlee, Diao, and Jackson (2005) highlighted AES' potential to catalyse pro-poor economic growth in rural areas by helping communities identify new income streams, thereby improving socioeconomic status.

Despite AES' transformative potential for smallholder farmers, its large-scale impact in sub-Saharan Africa remains limited due to several factors, such as the persistence of traditional, top-down extension approaches based on the transfer of technology (TOT) model. This model is characterised by a one-way information flow and inflexible strategies that fail to address local farmers' needs (Darr, Hoffmann, and Helmle 2014). Additionally, smallholder farmers face limited access to production resources and operate in complex environments (Darr, Hoffmann, and Helmle 2014). Unequal gender and power dynamics, along with resource constraints, further hinder the effectiveness of AES (Kilelu et al. 2011; Mbeche, Mose, and Ateka 2021).

Unequal gender dynamics also impact extension professionals. Similar to women farmers, women working in extension services face challenges rooted in societal norms and expectations. According to Manyungwa, Hara, and Chimatiro (2019), cultural norms and societal pressures may compel women to prioritise domestic responsibilities over professional duties or limit their interactions with men outside their families. Furthermore, gender biases within agricultural institutions, as highlighted by Manyire and Apekey (2013), reinforce the perception that women are less competent, credible, and authoritative than men. These biases result in discrimination in employment, promotion, and training opportunities.

The lack of institutional support and resources further exacerbates these challenges. Women in extension services often face limited access to essential resources, such as transportation, technology, and decision-making opportunities. Such social and systemic barriers negatively impact their performance and the overall quality of AES. The effectiveness of AES can be hindered by the attitudes and beliefs of extension workers, which shape the system's capacity for innovation and entrepreneurship (Chatty, Baas, and Fleig 2003)

To address these limitations, adopting participatory approaches (PAs) has become increasingly important. The evolution of PAs in community development is largely attributed to Chambers' pioneering work in the 1980s. Chambers introduced methodologies such as rapid rural appraisal (RRA) and participatory rural appraisal (PRA), which emphasised local knowledge, empowerment, and community-driven actions (Chambers 1994).

In this study, PAs are defined, following Macaulay (2016), as an inclusive set of methods and principles that actively engage stakeholders in research and development, ensuring meaningful involvement of local communities.

Over time, these approaches have evolved to be more farmer centric, incorporating indigenous knowledge and fostering mutual dialogue. Farmers are regarded as experts in their own right, possessing the knowledge and skills needed to develop solutions to their challenges (Jackson-Smith and Veisi 2023).

PAs are characterised by four key principles: (i) farmer centeredness, (ii) participation, (iii) empowerment, and (iv) learning (FAO, 2004). These principles stand in stark contrast to the traditional TOT model, which involves a one-way flow of information from experts to farmers, often disregarding local contexts (Mbeche, Mose, and Ateka 2021).

The adoption of participatory extension approaches represents a significant paradigm shift in agricultural extension. Departing from the constraints of the TOT model, PAs acknowledge the complexities of agricultural systems and aim for sustainable, context-specific outcomes (Leeuwis 2004). However, successful implementation requires commitment, increased investment in capacity building, and improved coordination amongst stakeholders (Kiptot and Franzel 2012).

The advantages of PAs are well documented. These approaches empower individuals by fostering self-confidence and self-reliance, reducing reliance on external assistance (Davis et al. 2012; Saini, Mallick, and Padhan 2023). PAs are also effective in enhancing farmers' knowledge and skills, leading to the adoption of improved agricultural practices and increased crop yields. Additionally, PAs serve as catalysts for innovation and adaptation, enabling farmers to respond to evolving

agricultural conditions with creativity and experimentation (United Nations Framework Convention on Climate Change 2022). They sharpen problem-solving skills within communities, allowing them to independently identify, prioritise, and address issues with minimal external intervention.

Despite a wealth of literature suggesting a paradigm shift from top-down to more participatory, farmer-centred methods, the reality on the ground often fails to reflect this change. Generally, PAs are limitedly accepted by public sector extension professionals who operate within bureaucratic and hierarchical organisational structures. For instance, evidence suggests that PAs are often used merely to legitimise donor-funded programs. Similarly, as PAs become routine, their original participatory goals are frequently overshadowed by operational priorities, such as timely implementation and standardised evaluations (Adamsone-Fiskovica and Grivins 2022). Moreover, some public sector extension professionals may resist adopting PAs due to insufficient training or a perceived loss of control over the extension process (Kandzior and Rivas 2015).

The literature often lacks theoretical frameworks for understanding extension officers' attitudes towards PAs. Thus, this study employs the theory of planned behaviour (TPB) to analyse these professionals' beliefs and attitudes, focusing on how attitudes, subjective norms (SN), and perceived behavioural control (PBC) influence their intentions to use PAs.

The remainder of the paper is structured as follows. Section 2 details the materials and methods, including the TPB theoretical framework and the empirical model used. Section 3 presents the results. Section 4 contains the discussion. Finally, Section 5 presents the concluding remarks.

2. Materials and methods

2.1. Theoretical framework: the theory of planned behaviour (TPB)

The study employs TPB to understand the factors influencing the intentions of agricultural extension professionals to adopt PAs. TPB is a social psychological framework designed to explain and predict human behaviour. The theory has been extensively applied across various fields, including agriculture, to analyse farmers' adoption of sustainable, organic, and climate-smart practices (Kamara et al. 2019; Martínez-García, Dorward, and Rehman 2013; Pambo et al. 2018).

In the TPB model, the intention to act is the immediate precursor of behaviour (Ajzen 2005). According to the TPB, an individual's intention is influenced by three key psychological constructs: attitude, subjective norms, and perceived behavioural control. Attitudes are determined by an individual's positive or negative evaluation of a behaviour. Subjective norms represent the social pressure to perform or refrain from performing the behaviour. PBC is the belief in one's capability to perform the behaviour successfully (Beedell and Rehman 2000). The intention to act is stronger when attitudes and SN are more favourable and when PBC is greater (Ajzen 2005). These constructs provide a robust framework for analysing the motivations and barriers faced by extension professionals in adopting PAs.

The TPB suggests two types of measures to assess factors influencing behaviour: direct (or stated) measures and indirect (or calculated) measures. Direct measures are based on self-reported responses, where respondents rate their attitudes, SN, and PBC regarding a specific behaviour. Contrarily, indirect (or calculated) measures assess the underlying beliefs that are presumed to shape attitudes, SN, and PBC.

For each construct, the scoring process involves multiplying the construct score, typically measured on a 5-point bipolar scale, by the corresponding evaluation score. The resulting products are then summed to compute an overall score for the construct. In this study, indirect measures were preferred over direct measures to further explore the specific beliefs that might be targeted to influence the intentions of extension professionals. Furthermore, according to Mose (2013), indirect measures are more objective and less prone to response biases, although they may be more complex and time consuming to construct and validate. Table 1 lists the outcome beliefs, social referents, and control beliefs used to assess each TPB construct.

Table 1. List of outcome beliefs, social referents, and control beliefs.

Outcomes (i)	Important referents (j)	Control Factors (k)
More demanding; requires one to do much more work	Family members (including extended family)	Lack of adequate resources
Technical messages/advice are more relevant to end users' needs	Employer	Lack of adequate field staff
Raises unreasonable expectations amongst resource-poor farmers	Local community	Lack of skills
Enables target communities to be empowered	Professional colleagues	Farmers' dependence on free handouts
Grassroots communities have ownership of the project	Supervisors	
Strengthens resource mobilisation (funding) from donors		
Resource-poor farmers can analyse complex situations		
Farmers have more trust in extension officers		
It is time consuming		
Resource-poor farmers' needs are more targeted		
Illiterate farmers participate more in the technology development process		

2.2. Data collection and instruments

In the first phase, two focus group discussions (FGDs) were conducted to identify salient beliefs related to using PAs. These beliefs encompassed perceived positive outcomes (advantages) and negative outcomes (disadvantages) associated with PAs. Social referents were elicited by identifying individuals, groups, or organisations that respondents believed had the greatest influence on their decision-making process regarding the use of PAs in their work. Additionally, control beliefs were elicited, which included factors or conditions that respondents believed would either facilitate or hinder their ability to use PAs in their work. Statements that emerged repeatedly from multiple participants were considered important and were incorporated into a structured questionnaire used in the second phase. The TPB questionnaire comprised 11 salient outcome belief statements, five social referents, and four control beliefs (see Table 1). In the second phase, a questionnaire survey was carried out with extension professionals working in the public sector extension system across five counties covering the Rift Valley and western regions of Kenya.

The sampling of respondents was conducted as follows: Initially, five counties – Nakuru, Narok, Bomet, Bungoma, and Busia – were purposively selected. A sampling frame comprising all active technical staff (agriculture and livestock) involved in agricultural extension activities within these counties was developed. The number of respondents per county was proportionately allocated on the basis of the staff population in each sampled county. Subsequently, respondents were randomly selected from the list of active technical staff in each county. These selected staff members were invited to participate in the questionnaire survey. A total of 180 participants with completed questionnaires were yielded.

2.3. Items, scales, and TPB measurements

The questionnaire used in this study comprised three main sections. Section 1 gathered information on eight socioeconomic variables: age, gender, marital status, educational level, specialty, ethnicity, length of experience, and current deployment. Section 2 assessed respondents' knowledge and skills in using PAs, their previous experience with these approaches, and their perception of their effectiveness. To assess respondents' knowledge and skills, they were asked whether they had attended any training sessions on PAs. To evaluate previous experience, a 5-point scale was used to measure the extent of their experience, ranging from no experience to expert-level experience. The questionnaire also included a question on the frequency of use, with options ranging from "never" to "always". Additionally, respondents with prior experience were asked to rate the effectiveness of PAs in achieving extension objectives.

Section 3 comprised items measuring the TPB variables, following the process described by Rehman et al. (2007) and Kamara et al. (2019). The indirect measurement of attitudes, SN, and PBC was employed, as recommended by Ajzen (2005). This method utilised the elicited statements of beliefs, referents, and control factors to measure each construct. This approach is preferred over other methods of measuring attitudes and beliefs, as it can identify the specific beliefs driving individuals' attitudes and behaviours.

2.3.1. Attitudes (A)

The measurement of attitudes, specifically the calculated attitude (CA), relied on salient belief statements elicited from the FGDs regarding the use of PAs in extension. In designing the TPB tool, each of the 11 belief statements comprised two components. First, respondents were asked to rate the "belief strength" of each statement on a 5-point bipolar scale ranging from −2 ("strongly disagree") to +2 ("strongly agree"). Secondly, respondents were asked to evaluate the outcome of each belief statement on a similar scale ranging from −2 ("extremely bad" or "extremely unimportant") to +2 ("extremely good" or "extremely important").

To compute the CA score, the product of the belief strength (b) and the evaluation score (e) for each statement was calculated (b*e), yielding individual outcome attitudes (OAs). These values were then summed to provide the CA score (i.e. $CA = \Sigma b_i{*}e_i$).

Attitudes:

$$A = \sum_{i=1}^{n} bi \times ei \tag{1}$$

2.3.2. Subjective norms (SN)

Subjective norms (SN), a core construct of the TPB, measure the influence of important others (such as individuals or organisations) on an individual's behaviour. The indirect measurement of SN was utilised to assess the normative belief strength of the respondents. Respondents were asked to rate how strongly each identified individual or group would approve or disapprove of their use of PAs over the next 12 months. Responses were rated on a 5-point bipolar scale, with +2 indicating strong approval and −2 indicating strong disapproval.

Additionally, respondents were asked to rate how motivated they would be to follow the advice of each individual or group regarding the use of PAs over the next 12 months. These responses were also rated on a 5-point bipolar scale, ranging from very strongly (+2) to very weakly (−2).

Subjective norms:

$$\mathrm{SN} = \sum_{j=1}^{n} sb_j m_j \tag{2}$$

2.3.3. Perceived behavioural control (PBC)

Perceived behavioural control (PBC) was measured using an indirect approach involving two questions designed to assess the strength of control belief factors and the power of these factors. Respondents were asked to rate: *How likely it is that [factor k] would facilitate or prevent their use of PAs over the next 12 months.* Responses were rated on a 5-point bipolar scale ranging from very likely (+2) to very unlikely (−2). The second item asked respondents to rate: *How strongly they agreed or disagreed that [factor k] would facilitate or prevent their use of PAs over the next 12 months.* Responses were rated on a 5-point bipolar scale ranging from strongly agree (+2) to strongly disagree (−2).

To calculate the PBC score, the individual control belief factors (c) were multiplied by the power of control factors (p) to obtain the product (c*k), representing the individual control belief factors. The sum of these products (i.e. $PBC = \Sigma c_k{*}p_k$) was used to determine the overall calculated PBC score.

Perceived behavioural control:

$$\mathrm{PBC} = \sum c_k p_k \tag{3}$$

2.3.4. Intention

The intention to use PAs amongst extension professionals was measured using three items, which asked respondents to indicate whether they: (1) intended to use PAs over the next year, (2) wanted to use PAs over the next year, and (3) expected to use PAs over the next year. Responses were scored on a 5-point bipolar Likert scale. Reliability analysis was conducted using Cronbach's alpha reliability coefficient.

2.4. Data analysis

The internal consistency reliability of the scales utilised to measure the TPB constructs was evaluated using Cronbach's alpha (α) coefficient prior to conducting the analysis. Cronbach's alpha is a widely accepted measure of internal consistency reliability, with a value of 0.6 or higher considered acceptable (Bruijnis et al. 2013). Given that the data were collected using a Likert scale and the constructs were measured on an ordinal scale, a non-parametric test was deemed appropriate. The Spearman rank correlation coefficient (r_s) was used to examine the relationship between each of the three constructs and behavioural intention, following the methodology of prior studies such as Bruijnis et al. (2013) and Martínez-García, Dorward, and Rehman (2013). The reliability of the scales was confirmed, demonstrating acceptable levels of internal consistency. Figure 1 below illustrates the approach used to analyse the components of the TPB.

3. Results

3.1. Socioeconomic characteristics of the extension professionals

Table 2 presents the demographic characteristics of the 180 agricultural extension professionals who participated in this study. The results indicate that 67.8 per cent of the respondents were men, whereas the remaining 32.2 per cent were women. Regarding education levels, the majority (84 per cent) had attained a diploma or higher qualification, with only 14 per cent holding a certificate-level education. The modal age bracket was 46–50 years, with most respondents (66.7 per cent) aged 41 years and above. Only one-third of the participants were aged 40 years or below, and only 13.9 per cent of them were 30 years or younger. In terms of experience, 77.4 per cent of the respondents had over 11 years of professional experience, whereas 20 per cent had less than five years of experience. These findings are significant, as greater experience may reinforce existing

Table 2. Socioeconomic characteristics of the extension professionals.

Variable		Frequency	Percentage
Gender	Man	122	67.8
	Woman	58	32.2
Age groups	≤ 40 years	60	33.3
	41–50 years	105	58.3
	≥ 51 years	15	8.3
Marital status	Married	156	86.7
	Single	24	13.4
Education	Certificate	26	14.4
	Diploma	91	50.6
	Degree	40	22.2
	Postgraduate	40	12.2
Experience	≤ 5 years	31	20.0
	6–10 years	4	2.6
	≥ 11 years	120	77.4
Role	Frontline extension worker	60	33.3
	Division/district specialist	83	46.1
	Management *	8	4.4
	Undeclared	29	16.1

*County Agricultural Officer, County Livestock Production Officer, respectively.

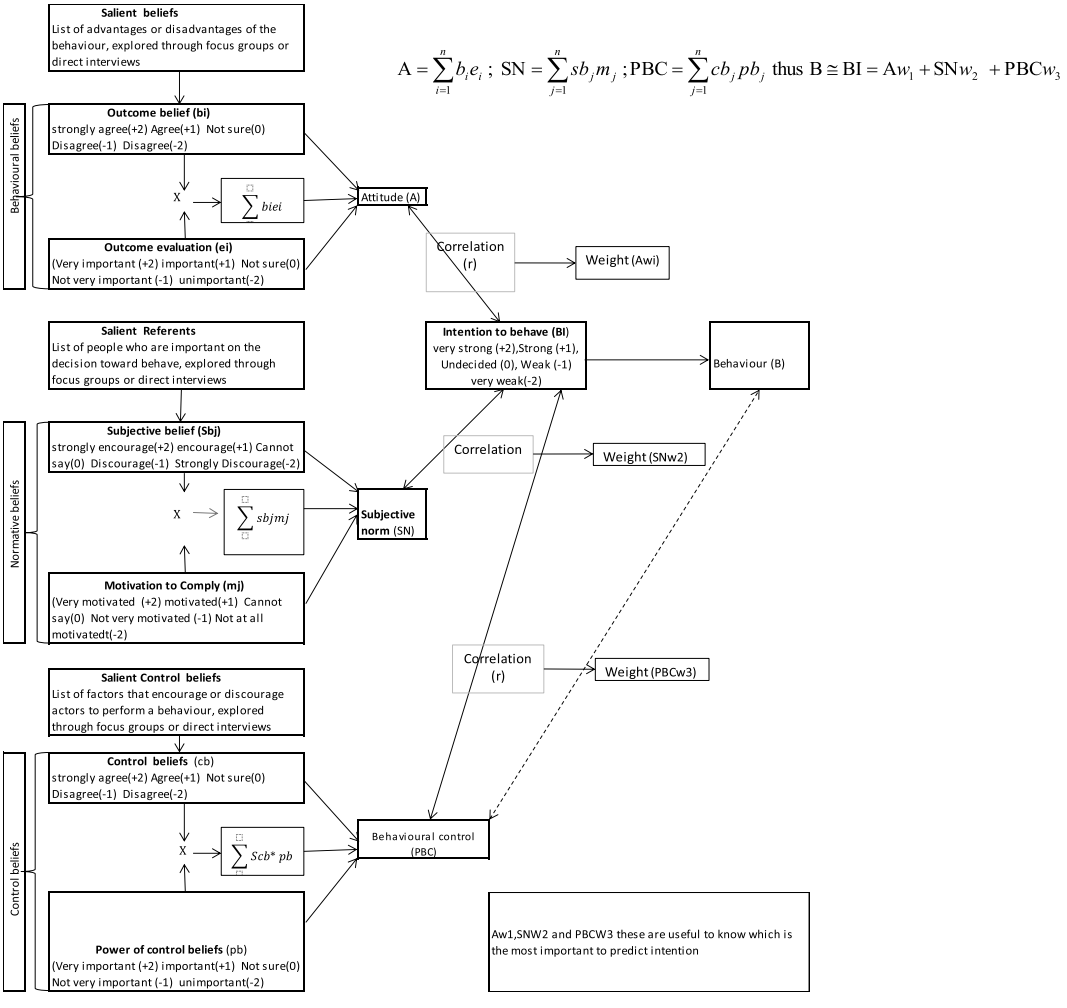

Figure 1. Analysis of the components of the theory of planned behaviour (TPB), Source: Constructed using information from Rehman et al. (2007).

attitudes and make it more challenging for extension professionals to adopt alternative extension approaches.

The findings revealed that women extension professionals were disproportionately represented, with only 32 per cent of the respondents being women. Furthermore, of the 58 women extension professionals, only 36.2 per cent were deployed as frontline extension workers (FEWs), whereas the majority were assigned to administrative roles or technical support positions, such as subject matter specialists (SMS) at the county or sub-county head offices (see Table 3).

The results in Table 4 indicate that most of the respondents (62 per cent, N = 180) had attended in-service training on PAs. Contrastingly, 37 per cent (N = 180) reported that they had not participated in such training, whereas 1 per cent did not provide a response. This suggests that most extension professionals were equipped with knowledge and skills related to PAs. Similarly, respondents were asked to rate the frequency with which they used PAs in their extension work to assess the extent of engagement with participatory methods amongst agricultural extension professionals. The results are summarised in Table 5 below.

Based on the data presented in Table 5, a significant majority of the respondents (64.7 per cent; N = 180) reported frequent use of PAs in their professional activities. This high frequency of agricultural

Table 3. Extension staff deployment by gender.

	Men		Women	
Deployment	Frequency	Percentage	Frequency	Percentage
Frontline Extension Workers (FEW)	39	32	21	36.2
Subject Matter Specialist (SMS)	57	46.7	26	44.8
Administrators/Management (CAO/CLPO)	8	6.6	11	19
Undeclared	18	14.8		
Total	122	68	58	32

Table 4. Attendance of extension professionals in in-service training on participatory approaches.

Response	Frequency	Per cent (%)
Yes	112	62
No	66	37
No response	2	1
Total	180	100

Table 5. Frequency of utilising participatory approaches amongst extension professionals.

Frequency	Number of Respondents	Per cent (%)
Never	6	2.7
Rarely	18	8.1
Frequently	143	64.7
No response	13	5.9
Total	180	81.4

extension professionals actively involving farmers in PAs is anticipated, as these methods have been extensively promoted in Kenya for decades. Given that only 2.7 per cent indicated they had never used PAs, it implies that many professionals are utilising these methods without possessing the relevant skills. Studies such as those by Leach, Stirling, and Scoones (2010) argue that relevant knowledge and skills in PAs are necessary to effectively facilitate co-created knowledge and tailored solutions that address farmers' specific needs. Facilitators must be adept at designing and implementing participatory processes that engage all stakeholders meaningfully (Leach, Stirling, and Scoones 2010). This may partly explain instances where extension professionals use PAs but fail to harness their benefits, such as facilitating equitable participation, managing diverse perspectives, and mediating conflicts amongst stakeholders.

3.2. Intentions to use PAs

The intention to use PAs amongst extension professionals was measured using three items, which asked respondents to indicate whether they: (1) intended to, (2) wanted to, and (3) expected to use PAs over the next year. The responses were scored on a 5-point bipolar Likert scale. Reliability analysis was conducted using Cronbach's alpha coefficient, which yielded a value of 0.848, indicating the scale's reliability. Further analysis was conducted using descriptive statistics. The mean stated intent was 1.62 (on a scale from −2 to +2), indicating that, on average, extension professionals had a significantly positive intent to use PAs.

Analysis by gender revealed that men agricultural extension professionals expressed more significant positive intentions to use PAs over the next year compared to women professionals. Although both genders expressed positive intentions, men respondents had considerably stronger intentions than women respondents. The mean stated intent for men respondents was 1.67, compared to 1.50 for women respondents (on a scale of −2 to +2). Additionally, the mean stated intention to use PAs amongst extension professionals with a diploma or certificate (extension technicians) was

significantly positive, with a mean score of 1.63, compared to 1.46 for those with a degree or post-graduate qualifications.

3.3. Calculated attitudes

The CA towards the use of PAs was determined by summing the responses to the 11 individual outcome attitude statements presented in Table 6. The individual outcome attitude score was obtained by multiplying the belief strength (b) values by the corresponding evaluation measure (e) values. The product of these values (bi*ei) generated the outcome attitude scores, which ranged from −4 to +4. The summation of these scores provided the CA score for extension professionals towards the use of PAs.

The CA scores are presented in Table 6, indicating that extension professionals generally displayed a positive attitude towards using PAs, with a mean CA score of 20.10 (on a scale of −44 to +44). A significant difference ($p < 0.01$) was observed between younger and older extension professionals' attitudes towards PAs, with the younger cohort exhibiting a more positive attitude than their older counterparts.

The ranking of outcome beliefs differed between the younger (<40 years) and older cohorts. The highest-ranked belief amongst younger respondents was that the needs of resource-poor farmers are more targeted, with a mean attitude score of 3.07 (on a scale of −4 to +4). In contrast, the older cohort's highest-ranked belief was compliance with funding agency requirements. However, both cohorts ranked the belief that PAs would raise unreasonable expectations amongst resource-poor farmers as the lowest, with an average mild agreement and a positive outcome evaluation score.

Furthermore, beliefs that could be linked to extension professionals' development of closer relationships with smallholder farmers or those that could make a difference in farmers' livelihoods were highly ranked (Table 6). These include the belief that using PAs would enhance trust with farmers, lead to tailored technologies, and build farmers' capacity to analyse complex situations.

3.4. Correlation of extension professionals' intentions with calculated attitudes towards the use of PAs

This section analyses the correlation between intentions and attitudes to determine whether positive attitudes towards PAs are associated with a greater intention to implement these approaches in practice. A significant correlation suggests that interventions aimed at improving attitudes towards PAs would likely lead to increased adoption intention, and potentially actual adoption in the long run. The study utilised the Spearman correlation coefficient to assess the relationship between the components of the TPB. The CA scores were correlated with extension professionals' intentions to use PAs, as presented in Table 7.

The results showed that six out of the 11 belief statements were significantly associated with extension professionals' intentions to use PAs. This suggests that most of the attitude components impacted the intention to use PAs. Amongst the beliefs showing the most significant associations with intention ($p < .001$) were the beliefs that PAs empower target communities, that resource-poor farmers' needs are more targeted, that illiterate farmers can participate in technology development, and that grassroots communities have a sense of ownership. On the contrary, three beliefs showed a negative correlation, although not significant ($p < .005$). These beliefs were that PAs are more demanding, that farmers would be able to analyse more complex situations, and that using PAs is time consuming. These findings provide valuable insights into potential barriers to the use of PAs. Overall, the CA measures were significantly associated with extension professionals' intentions to use PAs.

3.5. Calculated subjective norm

In this study, the calculated subjective norm (CSN) was used to assess extension professionals' attitudes towards the use of PAs. The CSN was derived by multiplying the strength of normative beliefs

Table 6. Comparison of belief strength (b_i), outcome evaluation (e_i), and attitude (b_i*e_i) categorised by age.

	40 years and below			41 years and above			All respondents		
Outcome belief statements	Belief strength (b_i)	Outcome evaluation (e_i)	Attitude (b_i*e_i)	Belief strength (B_i)	Outcome evaluation (e_i)	Attitude (b_i*e_i)	Belief strength (B_i)	Outcome evaluation (e_i)	Attitude (b_i*e_i)
1. Farmers gain more trust in the extension staff.	1.02	1.07	2.8	0.81	0.83	1.79	1.045	0.82	2.295
2. Resource-poor farmers' needs are targeted more.	1.32	1.2	3.07	−0.76	−0.45	1.48	1.26	−0.605	2.275
3. Farmers can analyse complex situations.	1.37	1.1	2.68	−1.02	−0.78	1.58	1.235	−0.9	2.13
4. Will comply with funding agency requirements.	0.62	1.18	2	0.47	0.62	2.25	0.9	0.545	2.125
5. It is time consuming.†	1.47	1.57	2.8	0.54	0.84	1.31	1.52	0.69	2.055
6. Allows illiterate farmers to participate more in the technology development process.	0.77	1.1	2.07	0.7	0.68	1.72	0.935	0.69	1.895
7. Grassroots communities have a sense of ownership.	0.2	0.47	2.43	0.18	−0.1	1.32	0.335	0.04	1.875
8. More demanding, requires one to do much more work.†	1.1	1.2	2.53	0.77	0.43	1	1.15	0.6	1.765
9. Enables target communities to be empowered.	0.85	0.92	2.35	0.48	0.41	1.02	0.885	0.445	1.685
10. Technical advice is more relevant to the end users' needs.	1.13	1.12	1.65	0.82	0.24	0.78	1.125	0.53	1.215
11. Raises unreasonable expectations amongst resource-poor farmers.†	0.77	0.68	0.97	0.95	0.32	0.61	0.725	0.635	0.79
Calculated attitude ($\sum b_i$*e_i):(range −44 to +44)			**25.35**			**14.86**			**20.10**

†The scores for these belief statements were reverse coded given that the statements were negatively worded.

Table 7. Correlation between extension professionals' intentions to use participatory approaches and their calculated attitudes

#	Outcome beliefs for the use of PAs	Outcome belief (b_i) r_s	Outcome evaluation (e_i) r_s	Outcome attitude (b_i*e_i) r_s
1	Enables target communities to be empowered.	0.214**	0.207**	0.414**
2	Resource-poor farmers' needs are targeted more.	0.032	−0.339**	0.380**
3	Allows illiterate farmers to participate more in the technology development process.	0.245**	0.423**	0.355**
4	Grassroots communities have a sense of ownership.	0.219**	0.424**	0.318**
5	Farmers gain more trust in extension staff.	−0.256**	−0.270**	0.267**
6	Will comply with funding agencies' requirements.	−0.238**	−0.153*	0.199**
7	Unreasonable expectations amongst resource-poor farmers.†	−0.040	−0.240**	0.184
8	Technical advice is more relevant to the end users' needs.	0.192**	0.017	0.074
9	More demanding, requires much more work.†	−0.281**	−0.259**	−0.069
10	Farmers can analyse complex situations.	−0.111	−0.032	−0.104
11	It is time consuming.†	−0.501**	0.225**	−0.105
	Calculated attitude ($\sum \mathbf{b_i}$*$\mathbf{e_i}$):(range −44 to +44)			0.302**

* Indicates Spearman correlation significant at $p \leq 0.05$. (two tailed).
** Indicates Spearman correlation significant at $p \leq 0.01$. (two tailed).
†The scores for these belief statements were reverse coded given that the statements were negatively worded.

(sbj) with the motivation to comply (mj), resulting in a product score ranging from −4 to +4. The sum of all normative beliefs was used to calculate the CSN score.

The results indicated that local communities were the most influential referent for extension professionals in terms of their approval of using PAs, followed by employers and supervisors (Figure 2). Family members were the least likely to influence their use of PAs. The study also found that colleagues were the highest-ranked referents, whose advice respondents were most likely to follow. Surprisingly, supervisors ranked lowest in terms of whose advice they would comply with regarding the use of PAs.

Figure 3 below shows the referents whose advice respondents were most likely to comply with. Respondents were more likely to comply with advice from professional colleagues (81 per cent) and supervisors (81 per cent), followed by employers, local communities, and family members, in that order.

3.6. Correlation between subjective norms and extension professionals' intentions to use PAs

Table 8 presents the results of the correlation between the CSN and the intention to use PAs. The results indicate that only one of the five referents, namely, supervisors, were significantly associated ($p < 0.05$) with the intention to use PAs. The employer and supervisor showed a negative association, although only the association with the supervisor was significant. The overall mean of the CSN, which was mildly positive at 3.73 on a possible range of −20 to +20, was not significantly associated with the intention to use PAs.

3.7. Perceived behavioural control

The indirect measure of PBC was used to assess extension professionals' control beliefs regarding the use of PAs. This involved calculating control beliefs and the power of control beliefs. Control beliefs refer to the perceived factors or barriers that influence an individual's ability to engage in certain behaviours. These may include internal factors, such as self-efficacy, skills, and knowledge, as well as external factors, such as resources, support, and external constraints. The calculation of control beliefs involved assessing the strength of these perceived factors. Respondents were asked to indicate how much they believed each of the stated factors would either facilitate or hinder their use of PAs. Similarly, the power of control beliefs refers to the perceived importance or influence of each control belief on an individual's decision-making and behaviour.

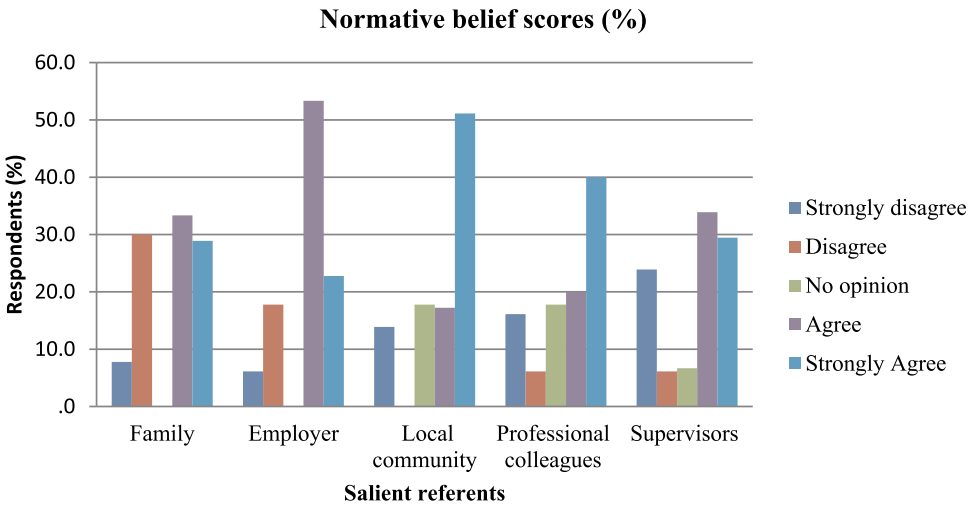

Figure 2. Normative belief scores for various referents.

The five control beliefs assessed were: lack of resources, shortage of field staff, dependence on free handouts, lack of co-operation from resource-poor farmers, and inadequate management support. Participants rated these beliefs on a 5-point Likert scale. The findings showed that most respondents agreed that the shortage of field staff hindered their use of PAs. Inadequate management support was also a significant obstacle. The overall calculated PBC score was mildly negative, with a value of −8.032 (in a possible range of −20 to +20). This highlights significant barriers to the use of PAs.

3.8. Correlation of intention with PBC on the use of PAs

The findings revealed that, out of the five control factors used to measure perceived behavioural control, only two factors were significantly associated with intention (Table 9). These two factors

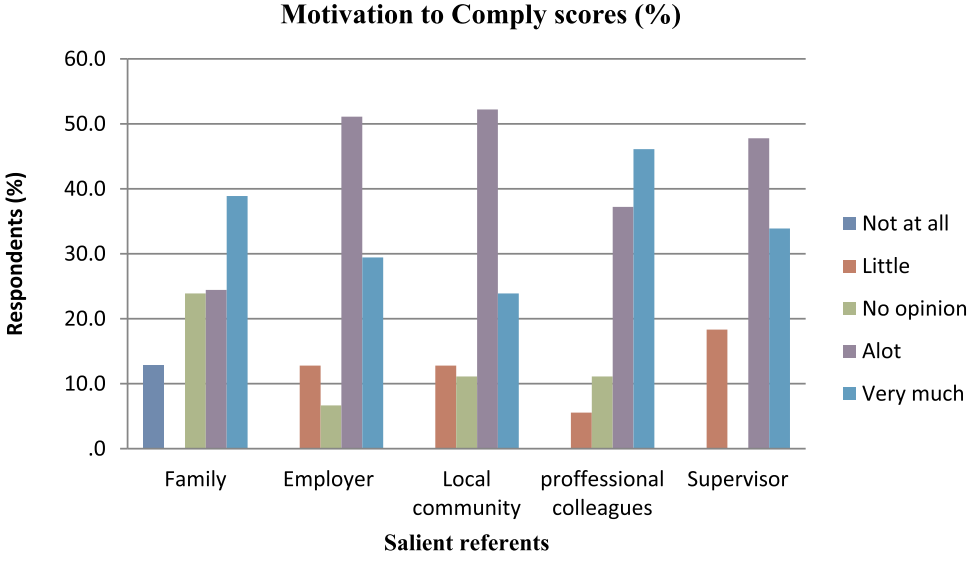

Figure 3. Scores for motivation to comply with various referents.

Table 8. Correlation between subjective norms and extension professionals' intentions to use participatory approaches.

Referents (n = 180)	Strength of subjective belief (sb_j) Mean	Motivation to comply (m_j) Mean	Subjective norms (sb_j*m_j) Mean	Correlation (*r*) with intention r
Family members (including extended family)	0.77	0.46	0.83	0.115
Employer	0.97	0.69	0.62	−0.005
Professional colleagues	0.87	0.92	0.78	0.093
Local community	1.24	0.62	0.81	0.042
Supervisors	0.97	0.39	0.71	−0.162*
Calculated subjective norm ($\sum$sbj*mj), (range −20 to +20)			3.73	0.008

*Indicates Spearman correlation significant at $p \leq 0.05$. (two tailed).
** Indicates Spearman correlation significant at $p \leq 0.01$. (two tailed).

were the shortage of field staff (r = −0.228, $p < 0.01$) and inadequate management support (r = −0.210, $p < 0.01$). The other three control factors were not significantly associated with intentions. Correlation analysis using Spearman's rank correlation did not show a significant association between PBC and intentions (r = 0.60, $p < 0.05$). This implies that respondents' intentions to use PAs were not significantly influenced by the PBC factors as a whole. Table 9 provides a summary of respondents' scores on control beliefs, the power of control beliefs, and the summated products representing the PBC construct.

4. Discussion

4.1. Characteristics of agricultural extension services

The Kenyan public agricultural extension system has historically been characterised by a top-down, technology-driven approach. However, a significant shift has been observed towards bottom-up, demand-driven methodologies, influenced by policy changes and the devolution of government services (Mbeche, Mose, and Ateka 2021; Osumba, Recha, and Oroma 2021). Despite these efforts, the traditional top-down structures, as described by Chambers and Ghildyal (1985), remain deeply entrenched in the Kenyan agricultural sector. This persistence of hierarchical knowledge dissemination and control continues, despite the growing recognition and appreciation of PAs amongst agricultural extension professionals (Osumba, Recha, and Oroma 2021).

This study identified significant socioeconomic and demographic trends amongst agricultural extension professionals. First, a notable gender imbalance exists, with 67.8 per cent being men, and women are often relegated to administrative roles rather than frontline positions. Secondly, the workforce is generally well educated, with 84 per cent holding a diploma or higher, and has

Table 9. Correlation of intention with control beliefs, power of control beliefs, and perceived behavioural control on the use of participatory approaches.

Control beliefs (n = 180)	Control belief (c_k) Mean	Power of control beliefs (pk_b) Mean	Behavioural control (Σc_k* p_k) Mean	Correlation (*r*) with intention *R*
Dependence on free handouts	1.43	−1.43	−2.74	0.058
Lack of adequate resources	0.67	−0.67	−3.01	0.064
Shortage of field staff	1.16	−1.10	−1.53	−0.228**
Inadequate practical skills on PAs	0.55	−0.14	−0.08	0.018
Inadequate management support	0.96	−0.72	−0.672	−0.210**
Calculated behavioural control (Σc_k*p_k) (range −20 to +20)			−8.032	−0.060

**Indicates Spearman correlation significant at $p \leq 0.01$. (two tailed).

extensive experience, with over 11 years on average. Although this experience can enhance expertise, it may also hinder the adoption of new methods, such as PAs, which require moving away from traditional practices. This finding aligns with literature indicating that the success of PAs is closely linked to structural institutional conditions and the competencies of the individuals involved, highlighting the importance of specific skills and participatory competencies (Disterheft et al. 2015).

Participatory approaches have been widely adopted, with 62 per cent of professionals receiving training and 64.7 per cent consistently using these methods in their work. However, 37 per cent have not received training, indicating a need for professional development. Although the frequent use of participatory methods is encouraging, the literature highlights the importance of theoretical knowledge and practical skills to engage stakeholders effectively and address the diverse needs of agricultural communities. Gaps in skills can impede the full potential of PAs, such as promoting equitable participation and managing diverse perspectives. Continuous training and support are essential to enhance the adoption and effectiveness of PAs (Rafique, Habib, and Rosilawati 2023).

4.2. Intention to use PAs

The findings revealed that most respondents expressed a positive intention to use PAs. This indicates a positive disposition towards implementing farmer-centred PAs and a strong inclination amongst extension professionals to adopt methods that address the needs of the poor and promote active stakeholder participation. It also highlights the potential for broader adoption and integration of PAs into extension practices. These findings align with those of Sadighi and Mohammadzadeh (2002), who assessed the attitudes of extension professionals towards participatory technology development (PTD) in Iran's West Azerbaijan province and found that a significant majority held a positive attitude towards PTD. However, this contrasts with other studies that have reported negative attitudes amongst public extension professionals towards the use of PAs (Anandajayasekeram, Davis, and Workneh 2007; Mahon, Farrell, and McDonagh 2010).

This study also demonstrated that men agricultural extension professionals exhibited stronger intentions to use PAs compared to their women counterparts. Several factors may explain these differences. First, women extension professionals, similar to other women – including farmer – often face social sanctions throughout their work. These sanctions range from subtle biases and stereotypes to overt discrimination or exclusion. Such gender-based sanctions are frequently rooted in societal norms, gender roles, and cultural expectations that define what is considered "appropriate" or "acceptable" behaviour or work for women (Eckman et al. 2022).

Secondly, disparities in awareness, training, and exposure to PAs may contribute to the differences in intention. Women are often underrepresented in these areas, consistent with prior literature (e.g. Somanje, Mohan, and Saito 2021), which highlights lower participation of women in extension, research, and development activities in most developing countries. According to the UNESCO Institute for Statistics (UIS), women accounted for only 28.8 per cent of researchers worldwide as of 2018, with even lower representation in regions such as sub-Saharan Africa.

The importance of increasing the representation of women as extension professionals cannot be overstated. Women are vital in reaching underserved smallholder farmers in rural areas, most of whom are women themselves. The underrepresentation of women in frontline and management-level extension work may be partly attributed to sociocultural barriers and a lack of support from families and communities, which have historically constrained women's access to formal education and professional training opportunities (Kiptot and Franzel 2012; Ragasa et al. 2013).

This study demonstrated that having a technical qualification was significantly associated with the intention to use PAs in their work, compared to those with a degree or postgraduate qualifications. This finding raises questions about the training curricula and methodologies used at both levels of extension personnel education. Given the limited literature on this topic, a study reviewing the training approaches employed at both levels is necessary to determine the causes of the significant disparities observed in this study.

These findings unveiled that the training and education received by extension professionals may influence their attitudes and intentions regarding the use of PAs. This underscores the importance of reviewing training curricula to ensure that extension professionals are not only equipped with the necessary technical knowledge but also receive comprehensive training that addresses their attitudes and behaviours. Incorporating elements such as self-awareness, effective communication, conflict resolution, adaptability, ethical decision-making, and teamwork into the training programs can better prepare professionals to implement inclusive and pro-poor extension strategies successfully. This comprehensive approach ensures that professionals are competent in their technical skills and possess the right attitudes and behaviours to foster positive relationships, understand the needs of diverse communities, and effectively engage with marginalised groups.

4.3. Intention and indirect measures of attitude, subjective norms, and perceived behavioural control

This study primarily aimed to examine the influence of attitude, subjective norms, and PBC on the intentions of extension professionals to use PAs. To achieve this, correlations between the indirect measures of TPB and intention were analysed. The results indicate that six out of the 11 belief statements had a significant positive association with extension professionals' intentions. The beliefs with the most significant associations ($p < .001$) were: PAs would empower target communities, resource-poor farmers' needs are more effectively addressed, illiterate farmers can participate in technology development, and grassroots communities develop a sense of ownership.

The positive and significant correlation between the CA and intention indicates that extension professionals' evaluation of the use of PAs influenced their intention to adopt these practices. The more favourably extension professionals evaluated PAs, the higher their intention to use them in their work. These findings align with previous literature that highlights the significant influence of attitudes towards technology on the intention to adopt it (Borges et al. 2014; Garforth et al. 2004; Kamara et al. 2019; Martínez-García, Dorward, and Rehman 2013). For example, Kamara et al. (2019) found a significant positive association between research and extension professionals' intention to use the Agricultural Innovation System (AIS) and their beliefs about its benefits in a study conducted in Sierra Leone.

Subjective norms influence individuals' intentions given that people do not act independently of cultural and social influences; instead, they continually reference their behaviour against important social referents (Burton 2004). In this study, the overall calculated subjective norm (CSN) was not significantly associated with intention. Similar findings were reported by Bruijnis et al. (2013), who found no significant correlation between intention and the indirect subjective norms. However, one out of the five referents, namely, supervisors, showed a significant negative association ($r = -0.162$, $p < 0.001$) with extension professionals' intentions to use PAs.

Supervisors, as government agents, were identified as potential barriers to the intention to adopt PAs. This finding is anticipated, as supervisors often operate within rigid bureaucratic structures that hinder the adoption of flexible and adaptive extension methods. Government organisations typically follow a top-down management style, which limits the involvement of extension workers in decision-making processes and restricts their ability to customise services for farmers and communities. Additionally, resistance to change is common within government institutions, making it challenging to transition from traditional extension methods to the more innovative and collaborative nature of PAs.

The literature (Denney et al. 2018) highlights a shift in power dynamics towards PAs, which facilitate more effective and sustainable development outcomes. However, this shift can be challenging for extension workers and organisations accustomed to a top-down approach. Thus, providing training and support to extension workers on the implementation of PAs and establishing institutional policies and guidelines that encourage and sustain their use are imperative. Such measures can foster a collaborative and empowering environment for extension services.

The study findings also revealed no significant association between intention and PBC ($r = 0.60$, $p < 0.05$). However, two of the five control beliefs, namely, inadequate management support ($r = -0.210$, $p < 0.01$) and a shortage of field staff ($r = -0.228$, $p < 0.01$), showed a significant negative association with the intention to use PAs. These factors were perceived as significant barriers to the adoption of PAs by extension professionals.

These findings align with previous studies (Chowdhury, Hambly Odame, and Leeuwis 2014) that emphasise the importance of organisational support, such as training and resource allocation, as a critical control factor influencing the adoption of PAs. Similarly, Maulu et al. (2021) found that extension agents who receive greater organisational support are more likely to adopt PAs given that they have increased confidence in their ability to use these approaches effectively.

The second control factor that showed a significant negative correlation with the intention to adopt PAs was the shortage of field extension staff. A limited number of extension workers often require existing personnel to serve more farmers and cover larger geographical areas. Consequently, implementing PAs in the context of heavier workloads may become less appealing to extension workers. PAs are inherently demanding and time intensive, as they involve consultations, discussions, and the adaptation of interventions to meet the specific needs and contexts of individual farmers or communities. This increased workload can make PAs unattractive to many field extension workers.

These findings align with existing literature, which suggests that heavy workloads amongst extension personnel negatively impact their effectiveness and job satisfaction, ultimately reducing the quality of extension services provided (Mbeche, Mose, and Ateka 2021). Other studies have consistently demonstrated that a higher ratio of farmers to extension workers adversely affects farmers' access to extension services. When extension workers are overwhelmed, they struggle to provide personalised attention and guidance to individual farmers (Mbo'o-Tchouawou and Colverson 2014).

Thus, a lower ratio of farmers to extension workers is crucial for improving access to extension services and promoting agricultural development (Busungu et al. 2019). Additionally, maintaining a manageable workload for extension workers enhances their performance and job satisfaction, leading to improved service delivery. Conversely, heavy workloads can pressure workers to take shortcuts, undermining the effective implementation of PAs (Mbeche, Mose, and Ateka 2021).

5. Conclusion

This study demonstrates that extension professionals generally hold a positive attitude towards the use of PAs. However, their intentions to adopt PAs are significantly hindered by systemic barriers, including a shortage of field staff and inadequate management support. These challenges stem from institutional shortcomings in agricultural extension programs, such as the absence of supportive policies, insufficient resources, limited institutional capacity, and a lack of incentive frameworks to encourage the use of PAs.

The intentions of extension professionals to adopt PAs were significantly associated with their beliefs regarding the efficacy of these approaches. Specifically, beliefs about empowering target communities, addressing the needs of resource-poor farmers, and facilitating the participation of illiterate farmers and grassroots communities were positively correlated with their intention to use PAs.

The study also identified demographic factors, such as gender disparities, educational level, and specific beliefs, as influential in shaping extension professionals' intentions. Men extension professionals demonstrated stronger intentions to use PAs compared to women professionals. Furthermore, those with certificate or diploma qualifications exhibited greater intent to adopt PAs compared to those with higher academic degrees, potentially due to differences in the training and orientation provided at different educational levels.

To promote the adoption of PAs, gender disparities must be addressed by encouraging and supporting greater participation of women in extension, research, and development programs.

Additionally, targeted efforts should be made to provide extension professionals with adequate training and organisational support. Strategies must also prioritise addressing staff shortages and institutional barriers to enable the effective implementation of PAs with smallholder farmers. Future research should prioritise emerging trends in the use of digital platforms for extension service, particularly focusing on exploring how PAs can be effectively integrated into digital advisory platforms to enhance accessibility and impact.

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