

Farmers' Perspectives on Agricultural Extension as Community Education

Arissaryadin¹, Wardatul Chamro², Aptika Hana Prastiwi Nareswari³

^{1,2,3}Fakultas Pertanian, Universitas Kediri, Kediri, Indonesia

¹ariessaryadin@unik-kediri.ac.id

Abstract

- Purpose** : This study examined farmers' perspectives on agricultural extension as community education by identifying patterns across six dimensions, determining the most prominent dimension, and assessing associations among them
- Method** : An explanatory sequential mixed-methods design was employed in Malang Regency, East Java, Indonesia. Quantitative data were collected from 40 purposively selected farmers using a 30-item questionnaire covering learning and education, communication with extension workers, trust, group learning, innovation adoption, and local knowledge. Item validity was assessed using the Pearson product-moment item-total correlation, and internal consistency using Cronbach's alpha. Descriptive statistics and Spearman's rank correlation were used for quantitative analysis. Ten respondents subsequently participated in semi-structured interviews analyzed thematically.
- Results** : Local knowledge had the highest mean score (19.7), followed by communication with extension workers and innovation adoption (18.4 each), trust and group learning (18.2 each), and learning and education (17.7). All 30 items met the validity criterion, with item-total correlations ranging from 0.319 to 0.659. None of the 15 pairwise correlations was statistically significant at $\alpha = .05$, although several positive numerical tendencies were observed. Interviews indicated that farmers interpreted extension information through previous experience, local conditions, peer interaction, perceived risks, and practical considerations.
- Conclusion** : Agricultural extension is best understood as a dialogic, participatory, and socially embedded form of community education. Extension programs should integrate local knowledge, peer learning, practical demonstrations, and sustained dialogue to strengthen meaningful learning.

Keywords: community education; agricultural extension; farmer perspectives; local knowledge; mixed methods

1. Introduction

Agriculture continues to constitute a fundamental pillar of rural livelihoods, food security, household income, and community sustainability. Nevertheless, farmers are increasingly required to make production decisions within circumstances influenced by climate variability, fluctuating markets, technological advancement, resource constraints, and rising expectations for sustainable production. These conditions require farmers to engage with agricultural information beyond simply receiving it. They need to interpret available information, evaluate its relevance, and

determine its applicability to their specific farming circumstances. From the educational perspective of agricultural extension advanced by van den Ban and Hawkins (1996), extension facilitates farmers' decision-making through processes of communication and learning. Accordingly, the effectiveness of extension is closely related to farmers' capacity to understand information and integrate it into their farming practices.

Over time, agricultural extension has shifted from a predominantly technology-transfer approach toward approaches that position farmers as active participants in the production and utilization of knowledge. Contemporary extension increasingly emphasizes dialogue, participation, co-learning, and sensitivity to local circumstances. In this regard, Cook et al. (2021) highlight the importance of incorporating service users' experiences and contextual conditions into the development of meaningful extension processes. Within this perspective, farmers are not merely recipients of recommendations delivered by extension workers. Rather, they compare new information with prior experience, consider available alternatives, and evaluate the suitability of recommended practices before determining whether to implement them. Scientific knowledge nevertheless remains an important foundation, particularly when farmers face unfamiliar technologies or emerging production risks. Its practical significance, however, may be constructed through interaction with farmers' existing knowledge and accumulated experience.

Farmer learning occurs through a combination of individual experience and social interaction. Initially, farmers may evaluate newly acquired information in relation to their previous farming experience before determining whether to experiment with or adopt it. Thus, this experiential process positions farmers as active agents in learning rather than passive recipients of extension messages.

Communication between farmers and extension workers likewise constitutes an essential component of agricultural extension. Through dialogue, farmers are able to clarify recommendations, explore problems, and connect information with their particular circumstances. Consequently, effective communication entails responsiveness and reciprocal exchange rather than merely one-directional information delivery. Trust is also closely related to the relationships established between farmers and extension workers. It may emerge through repeated interactions, credible explanations, responsiveness, and consistency over time. Nevertheless, trust does not necessarily result in unconditional acceptance, as farmers may continue to assess recommendations in relation to their experience, perceived risks, and local conditions.

Farmer groups constitute another important arena for the exchange of knowledge and experience. Within these groups, members can observe farming practices, compare outcomes, discuss challenges, and learn from peers who have previously experimented with innovations. Furthermore, such groups can serve as community learning spaces when interactions involve discussion, practical demonstrations, sharing of experiences, and reflection.

Local knowledge is deeply embedded in farmers' everyday production decisions. Farmers rely on accumulated experience concerning soil conditions, seasonal patterns, weather, ecological circumstances, and established farming practices. Recent studies have demonstrated that local knowledge continues to play a relevant role in agricultural extension and crop-management decisions (Hainzer et al., 2022; Nyambo et al., 2025; Hopid et al., 2025).

Recent scholarship has examined farmers' perceptions, access to advisory services, communication, learning, and innovation adoption from a range of analytical perspectives. For instance, Goodluck et al. (2024) applied complementary quantitative approaches to investigate farmers' perceptions of advisory services, while Dwijatenaya et al. (2024) examined farmers' perceptions regarding the role of extension workers. Similarly, Gwala et al. (2024) investigated farmers' perceptions of the accessibility of extension support. Collectively, these studies provide valuable evidence regarding farmers' experiences with extension services, although their analytical orientations generally differ across specific dimensions of extension. Accessibility, communication, advisory quality, and technology adoption have often been investigated as distinct aspects. However, farmers' experiences within rural communities involve interactions among several of these dimensions as part of their everyday farming activities.

The existing body of evidence therefore provides an opportunity for further examination of how learning and education, communication with extension workers, trust, group learning, innovation adoption, and local knowledge coexist within farmers' perspectives on agricultural extension. Previous research has generated valuable findings regarding individual dimensions and their associations with particular outcomes. Nevertheless, comparatively limited attention has been directed toward understanding how multiple dimensions are simultaneously experienced by the same farmers and how farmers' contextual explanations may account for quantitative patterns. This concern is particularly relevant in rural contexts where formal extension services coexist with farmer groups, informal knowledge exchange, personal experimentation, and locally developed farming practices. Examining these dimensions collectively therefore offers an opportunity to understand agricultural extension from the standpoint of farmers' everyday learning and decision-making experiences.

The present study conceptualizes farmers' perspectives on agricultural extension as a multidimensional phenomenon. Specifically, it aims to (1) identify patterns in farmers' perspectives on agricultural extension activities, (2) determine the most prominent extension dimension from farmers' perspectives, and (3) examine the direction and strength of associations among the six dimensions. In doing so, the study is expected to advance a more comprehensive understanding of agricultural extension as an educational and social process by integrating learning and education, communication with extension workers, trust, group learning, innovation adoption, and local knowledge within a single analytical framework. Furthermore, the findings may provide an empirical foundation for developing extension approaches that are more responsive to farmers' experiences, social relationships, learning processes, and locally grounded knowledge.

2. Method

Research Design

This study used an explanatory sequential mixed-methods design. Quantitative data were collected and analyzed first to identify patterns across six dimensions and examine their statistical associations. Qualitative data were then collected to contextualize the quantitative findings and explain how farmers experienced and interpreted the dimensions in everyday farming activities (Creswell & Plano Clark, 2017; Toyon, 2021).

The two phases were integrated during interpretation. The quantitative phase established descriptive patterns and statistical associations, whereas the qualitative phase explored farmers' learning, communication, trust, group interaction, innovation-related decisions, and use of local knowledge.

Study Setting, Participants, and Sampling

The study was conducted from January to June 2026 in Malang Regency, East Java, Indonesia. The site was purposively selected because of its farming diversity, farmer-group participation, interaction with extension workers, and exposure to agricultural innovations. The quantitative phase involved 40 purposively selected farmers who were actively engaged in farming, had farming experience and experience with agricultural extension or learning activities, and were willing to participate.

After the survey, 10 respondents were selected from the same sample for in-depth interviews. Selection considered variation in overall perspective scores, the six-dimensional profile, farming experience, farmer-group participation, communication with extension workers, and experience accepting, testing, or rejecting innovations. The strategy prioritized information-rich cases capable of explaining notable quantitative patterns (Onwuegbuzie & Collins, 2007).

Instrument and Measurement

Quantitative data were collected through a 30-item questionnaire, with five items for each of six dimensions: learning and education, communication with extension workers, trust, group learning, innovation adoption, and local knowledge. The dimensions were informed by research conceptualizing extension as a process involving learning, communication, social interaction, knowledge exchange, innovation facilitation, and farmers' existing knowledge (Khan et al., 2025; Irdiana et al., 2024; Li et al., 2024; Nyambo et al., 2025). Learning and education concerned understanding and practical capacity; communication concerned information exchange and consultation; trust concerned perceived credibility and reliability; group learning concerned peer exchange; innovation adoption concerned acceptance, trial, continued use, or evaluation of innovations; and local knowledge concerned farmers' accumulated understanding of land, seasons, ecological conditions, and established practices.

The six dimensions were treated as complementary components rather than interchangeable concepts. All statements used a five-point Likert scale from 1 = strongly disagree to 5 = strongly agree. Because each dimension contained the same number of items and response range, dimension scores were compared using total or mean scores, with higher scores indicating stronger agreement. The qualitative instrument was a semi-structured interview guide covering the same six dimensions.

These dimensions were treated as complementary components of farmers' perspectives rather than as interchangeable concepts. All statements were measured using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree. Because each dimension contained the same number of items and used an identical response range, dimension scores could be compared directly using their total or mean values. Higher scores indicated stronger agreement with statements representing the respective dimension. The questionnaire was administered after the participants had received an explanation of the study purpose and procedures. Completed questionnaires were examined for coding consistency, missing responses, and plausible score

ranges before statistical analysis. The qualitative instrument consisted of a semi-structured interview guide covering the same six dimensions.

Item Validity

Before the main analysis, the 30 items were tested with 40 respondents using the Pearson product-moment item-total correlation. With 38 degrees of freedom at the 5% significance level, the critical correlation value was 0.312. All calculated coefficients exceeded this value, ranging from 0.319 to 0.659, and all significance values were below .05. Thus, all 30 items met the predetermined validity criterion and were retained.

Instrument Reliability

Internal consistency was assessed using Cronbach's alpha for each dimension. Coefficients ranged from 0.864 to 0.931, indicating high internal consistency across the six dimensions. Reliability coefficients were not treated as evidence of construct validity by themselves.

Data Collection and Analysis

Survey responses were entered and examined using Jamovi. Descriptive statistics summarized respondent characteristics and the six dimension scores using mean, median, standard deviation, minimum, and maximum values. The relative prominence of dimensions was determined from mean scores because all dimensions contained equal numbers of items. Spearman's rank correlation coefficient (ρ) was used to examine monotonic associations among the six dimensions at $\alpha = .05$. Correlations were interpreted as statistical associations rather than causal effects.

The qualitative phase involved semi-structured interviews with the 10 selected respondents, lasting approximately 30–45 minutes. Interviews addressed the six dimensions and were analyzed thematically through familiarization, transcription, coding, grouping of related codes, theme development and review, and interpretation. Credibility was supported through source triangulation, member checking, documentation of coding procedures, an audit trail, and comparison with respondents' quantitative profiles.

Integration occurred after both strands had been analyzed. A joint display compared statistical findings with qualitative themes to identify convergence, expansion, and divergence. Quantitative evidence established the numerical patterns, while qualitative evidence explained how farmers experienced and interpreted those patterns (Abowitz & Toole, 2010; Bryman, 2007; Creswell & Tashakkori, 2007).

Ethical Considerations

Participation was voluntary, and respondents received information about the study purpose and procedures before data collection. Confidentiality was maintained during processing, analysis, and reporting, and participants could decline questions or discontinue participation. Qualitative information was used to contextualize, rather than alter, the quantitative findings.

3. Result

Respondent Characteristics

The quantitative phase involved 40 farmers who met the study eligibility criteria and had previous experience with agricultural extension activities. The respondents varied in age, educational attainment, farming experience, and level of participation in farmer groups. This

variation provided a heterogeneous respondent profile for describing farmers' perspectives across the six dimensions examined in the study. The distribution of respondents is presented in Table 1.

Table 1. Characteristics of the respondents

Characteristic	Category	n	%
Age	< 40 years	12	30.0
	40–59 years	22	55.0
	≥ 60 years	6	15.0
Education	Elementary school	5	12.5
	Junior secondary school	15	37.5
	Senior secondary school	10	25.0
	Higher education	10	25.0
Farming experience	< 10 years	14	35.0
	10–20 years	14	35.0
	> 20 years	12	30.0
Farmer-group activity	Low	8	20.0
	Moderate	15	37.5
	High	17	42.5

As reported in Table 1, respondents aged 40–59 years constituted the largest age group, accounting for 55.0% of the sample. Junior secondary education was the most common educational category at 37.5%. Farming experience was distributed relatively evenly, with 35.0% reporting less than 10 years, 35.0% reporting 10–20 years, and 30.0% reporting more than 20 years of experience. Regarding farmer-group activity, 42.5% of respondents were classified as having high participation, followed by 37.5% with moderate participation and 20.0% with low participation.

Item Validity and Reliability of the Research Instrument

The Pearson product-moment item-total correlation showed that all 30 questionnaire items exceeded the critical correlation value of 0.312, with coefficients ranging from 0.319 to 0.659. All corresponding significance values were below .05, indicating that the 30 items met the predetermined item-validity criterion. The internal consistency analysis further showed that Cronbach's alpha coefficients ranged from 0.864 to 0.931 across the six dimensions, indicating high internal consistency.

Table 2. Reliability of the research instrument

Dimension	Cronbach's α	Interpretation
Learning and education	0.931	High internal consistency
Communication with extension workers	0.864	High internal consistency
Trust	0.897	High internal consistency

Group learning	0.885	High internal consistency
Innovation adoption	0.895	High internal consistency
Local knowledge	0.918	High internal consistency

Table 2 presents the Cronbach's alpha coefficients for each dimension. The coefficients indicate high internal consistency across the six dimensions.

Relative Position of the Six Dimensions

The descriptive analysis showed differences in the relative position of the six dimensions. Local knowledge recorded the highest total mean score (19.7), followed by communication with extension workers and innovation adoption (18.4 each), trust and group learning (18.2 each), and learning and education (17.7).

Table 3. Descriptive statistics of farmers' perspectives

Dimension	Total mean	Mean/item	Median	SD	Position
Local knowledge	19.7	3.94	20	3.64	Highest
Communication with extension workers	18.4	3.68	19	2.83	High
Innovation adoption	18.4	3.68	19	3.20	High
Trust	18.2	3.64	19	3.40	Moderate
Group learning	18.2	3.64	19	3.24	Moderate
Learning and education	17.7	3.54	18	3.99	Relatively lowest

Because each dimension consisted of five items measured using the same five-point scale, the scores in Table 3 could be compared directly. Local knowledge occupied the highest relative position, whereas learning and education had the lowest relative score. The difference between the highest and lowest total mean was 2.0 points, indicating that the six dimensions were relatively close rather than widely separated.

The qualitative accounts provided additional descriptions of how respondents experienced the six dimensions. Respondents described local knowledge in relation to land conditions, seasonal patterns, previous farming experience, and established practices. Learning and education appeared through practical demonstrations, examples, discussions, and opportunities to ask questions. Communication with extension workers was associated with clarification and exchange of information, while decisions concerning innovation also involved production costs, capital, labor, risk, and evidence of expected results. Farmer groups were described as spaces for exchanging experiences, although the perceived usefulness of group activities varied according to member participation.

Associations Among the Six Dimensions

To address the third research objective, Spearman's rank correlation coefficient was used to examine the direction and strength of monotonic associations among the six dimensions. A total of 15 pairwise associations were examined. The analysis was evaluated using $\alpha = .05$, with the results presented in Table 4.

Table 4. Pairwise associations among farmers' perspective dimensions

Dimension pair	Spearman's ρ	p-value	Decision
Learning and education – Communication with extension workers	-0.078	.633	Not significant
Learning and education – Trust	0.134	.410	Not significant
Learning and education – Group learning	0.306	.055	Not significant
Learning and education – Innovation adoption	0.153	.347	Not significant
Learning and education – Local knowledge	0.168	.300	Not significant
Communication with extension workers – Trust	0.170	.295	Not significant
Communication with extension workers – Group learning	0.122	.454	Not significant
Communication with extension workers – Innovation adoption	0.285	.075	Not significant
Communication with extension workers – Local knowledge	0.063	.699	Not significant
Trust – Group learning	0.113	.487	Not significant
Trust – Innovation adoption	0.030	.857	Not significant
Trust – Local knowledge	0.305	.056	Not significant
Group learning – Innovation adoption	-0.171	.291	Not significant
Group learning – Local knowledge	0.311	.051	Not significant
Innovation adoption – Local knowledge	0.080	.625	Not significant

The results in Table 4 show that none of the 15 pairwise associations reached statistical significance at $\alpha = .05$. The largest positive coefficient was observed between group learning and local knowledge ($\rho = 0.311$, $p = .051$), followed by learning and education with group learning ($\rho =$

0.306, $p = .055$), trust with local knowledge ($\rho = 0.305$, $p = .056$), and communication with extension workers with innovation adoption ($\rho = 0.285$, $p = .075$). Although these coefficients indicate positive numerical tendencies, their p -values exceeded the predetermined significance level.

The only negative coefficients were found for learning and education with communication with extension workers ($\rho = -0.078$, $p = .633$) and group learning with innovation adoption ($\rho = -0.171$, $p = .291$). Both associations were weak and statistically nonsignificant. The remaining relationships showed positive coefficients ranging from very weak to moderate in numerical magnitude, but none met the $\alpha = .05$ criterion.

Integration of Quantitative and Qualitative Findings

The integration of the two phases was conducted by comparing the quantitative patterns with the qualitative accounts of the selected respondents. Table 5 summarizes the principal areas in which the two forms of evidence were considered together.

Table 5. Integration of quantitative and qualitative findings

Quantitative finding	Interview explanation	Integrative meaning
Highest local knowledge score (19.7)	Farmers compared new information with land conditions, seasons, previous experience, and local practices.	Local knowledge functioned as an adaptive reference in evaluating new information.
Group learning–local knowledge ($\rho = .311$; $p = .051$)	Farmer groups provided opportunities to exchange experiences and compare farming outcomes.	A positive numerical tendency was observed, but it was not statistically significant.
Communication–innovation adoption ($\rho = .285$; $p = .075$)	Communication supported understanding, while adoption decisions also involved cost, risk, capital, and labor.	Communication was relevant to decision-making but did not statistically demonstrate a significant association with adoption.
Relatively lowest learning and education score (17.7)	Educational functions appeared through practical activities, discussion, examples, and opportunities for questioning.	Extension-related education was expressed through practical interaction rather than only formal learning activities.

The integrated findings show that the quantitative phase identified the relative position of the six dimensions and their numerical associations, whereas the qualitative phase provided accounts of how these dimensions were experienced by farmers. The qualitative findings were used to contextualize the statistical patterns without altering the statistical decisions.

4. Discussion

The findings indicate that farmers' perspectives toward agricultural extension are multidimensional, although the six dimensions did not differ substantially in their descriptive scores. Local knowledge occupied the highest position (mean = 19.7), followed by communication

with extension workers and innovation adoption (both mean = 18.4), trust and group learning (both mean = 18.2), while learning and education recorded the lowest score (mean = 17.7). The relatively close scores suggest that farmers experience extension through several complementary elements rather than through a single dominant function. This finding supports the broader shift from technology transfer toward extension approaches that emphasize participation, learning, communication, and farmers' own knowledge (van den Ban & Hawkins, 1996; Khan et al., 2025).

The prominence of local knowledge is particularly important. Farmers described evaluating new information against their experience of soil conditions, seasons, ecological characteristics, and established farming practices. This finding is consistent with Hainzer et al. (2022) and Nyambo et al. (2025), who emphasize the continuing role of local knowledge in farmers' interpretation of agricultural and environmental conditions. Hopid et al. (2025) similarly demonstrate its relevance to crop-management practices. In the present study, however, local knowledge appears not simply as accumulated traditional knowledge but as an interpretive resource through which farmers assess whether externally provided information is relevant to their own circumstances. Arissaryadin et al. (2026) further demonstrate the potential of participatory approaches to identify and mobilize such knowledge in community-based problem solving. The combined evidence suggests that extension learning becomes more meaningful when scientific and experiential knowledge are brought into dialogue rather than positioned as competing forms of knowledge.

Communication with extension workers occupied a relatively high position, with a mean of 18.4. Farmers associated communication with opportunities to clarify information, discuss farming problems, and obtain explanations relevant to their circumstances. This interpretation corresponds with Irdiana et al. (2024), Antika et al. (2025), and Billah et al. (2024), who highlight communication and access to advisory information as important elements of agricultural extension. Nevertheless, the Spearman analysis showed no statistically significant association between communication and innovation adoption ($p = .285$, $p = .075$). The positive coefficient indicates a numerical tendency rather than statistical evidence of association. Interview accounts provide an important explanation: farmers did not make adoption decisions solely from information received from extension workers but also considered production costs, capital, labor, risk, technical suitability, and evidence of expected results. This finding is consistent with the multidimensional nature of innovation decisions reported by Romadi et al. (2025) and Adnan et al. (2025).

Trust shows a similar pattern. Its association with local knowledge was positive ($p = .305$), but the relationship did not reach statistical significance ($p = .056$). Farmers described trust as developing through repeated interaction, credible explanations, openness to questions, and recommendations perceived as appropriate to their circumstances. Wang et al. (2025) likewise identifies trust as an important relational element in extension-related technology decisions. The present finding suggests that trust should not be interpreted as unconditional acceptance of extension recommendations. Rather, it may create a relational environment in which farmers feel sufficiently confident to question, evaluate, and discuss information. This interpretation also corresponds with Arissaryadin et al. (2025), who demonstrate the importance of trust, social norms, and networks for farmer-group institutional capacity. From a community-education perspective, trust therefore functions as a social condition that supports dialogue and learning rather than as a direct determinant of adoption.

Group learning also illustrates the difference between a substantive tendency and statistical significance. The strongest positive coefficient in the correlation matrix occurred between group learning and local knowledge ($\rho = .311$, $p = .051$), while learning and education was positively associated numerically with group learning ($\rho = .306$, $p = .055$). Neither relationship was statistically significant at $\alpha = .05$. Nevertheless, the interview evidence indicated that farmers used groups to exchange experiences, compare farming outcomes, discuss problems, and evaluate new practices. This interpretation is supported by Li et al. (2024) and Hill and Pamphilon (2024), who emphasize farmer-to-farmer learning and local knowledge networks. The finding suggests that farmer groups can operate as community learning spaces, although their educational value depends on the quality of interaction rather than merely on the existence or frequency of group meetings.

The relatively low score for learning and education (mean = 17.7) should not be interpreted as evidence that farmers perceive extension as educationally unimportant. Rather, educational functions appeared to be embedded in practical activities such as demonstrations, discussion, questioning, observation, and experimentation. This finding is consistent with the educational perspective of agricultural extension proposed by van den Ban and Hawkins (1996), while recent work by Khan et al. (2025) emphasizes the movement toward more participatory and collaborative extension services. The present study extends this perspective by connecting formal advisory processes with informal learning occurring among farmers. Agricultural extension can consequently be understood as a form of community education, in which farmers learn not only from extension workers but also from peers, farming experience, local environments, and collective reflection.

The absence of statistically significant relationships across all 15 pairwise comparisons is also an important finding rather than a weakness to be concealed. With 40 purposively selected respondents, the study was designed to identify patterns and provide contextual explanation rather than to establish population-level causal relationships. The numerical tendencies particularly group learning with local knowledge, learning and education with group learning, trust with local knowledge, and communication with innovation adoption provide useful indications for further investigation, but they cannot be interpreted as statistically established relationships. The qualitative findings help explain why these dimensions may coexist in farmers' experiences without changing the statistical conclusion. This illustrates the complementary value of explanatory sequential mixed methods: quantitative analysis identifies the pattern, whereas qualitative inquiry helps explain how and in what context that pattern is experienced (Creswell & Plano Clark, 2017; Toyon, 2021).

The main theoretical contribution of the study lies in positioning agricultural extension as a contextual, dialogic, experiential, and socially embedded educational process. Rather than viewing extension as a linear pathway from communication to adoption, the findings indicate that farmers interpret information through local knowledge, social interaction, trust, group learning, and practical assessment. This modifies a purely transmission-oriented understanding of extension by emphasizing the role of farmers as active interpreters of knowledge. It also extends recent studies of farmers' perceptions of advisory services, which have examined issues such as advisory perceptions, extension-worker roles, and accessibility from different perspectives (Goodluck et al., 2024; Dwijatenaya et al., 2024; Gwala et al., 2024). The present study brings these dimensions

together within a single analytical framework and demonstrates their relevance to the educational character of extension.

The practical implication is that extension programs should not rely exclusively on information delivery or assume that improved communication will automatically produce innovation adoption. Extension workers can strengthen learning by combining technical explanations with field demonstrations, opportunities for small-scale experimentation, peer discussion, and follow-up assistance. Farmer groups can be developed as spaces for experience sharing and collective reflection, while local knowledge can be incorporated into the identification of problems, adaptation of recommendations, and evaluation of results. Such practices are particularly relevant to community education because learning is generated through interaction between formal expertise and farmers' lived experience. The findings therefore support an extension model in which farmers participate actively in interpreting, testing, adapting, and sharing agricultural knowledge.

The study also contributes methodologically by demonstrating the value of integrating statistical patterns with farmers' accounts rather than treating quantitative and qualitative evidence as competing sources. The quantitative phase established that none of the 15 associations was statistically significant, while the qualitative phase showed that the six dimensions nevertheless had clear meanings in farmers' everyday experiences. This distinction is essential: qualitative evidence can explain a statistical tendency but should not be used to transform a nonsignificant relationship into a significant one. The integrated interpretation therefore preserves the statistical boundaries of the findings while providing a richer account of farmers' experiences. In this respect, the study demonstrates how mixed methods can be used to investigate agricultural extension as both a measurable set of dimensions and a socially situated learning process.

The findings should nevertheless be interpreted within several limitations. The sample consisted of 40 purposively selected farmers from Malang Regency, limiting statistical power and generalizability. The cross-sectional design also prevents causal interpretation, while self-reported measures may not fully represent observed extension behavior or actual innovation adoption. Future research could test the six-dimensional framework with larger samples and different agricultural contexts, while longitudinal or multilevel designs could examine whether communication, trust, group learning, and local knowledge influence subsequent learning and innovation decisions. Further research could also investigate indirect relationships, such as whether communication operates through perceived relevance or whether group learning strengthens farmers' confidence to experiment with new practices.

Overall, the findings show that farmers' perspectives toward agricultural extension are best understood as a combination of learning, communication, trust, social interaction, innovation assessment, and local knowledge. Local knowledge emerged as the most prominent dimension, but the correlation analysis did not establish statistically significant associations among the six dimensions. The novelty of the study lies in integrating these dimensions within an explanatory sequential mixed-methods framework and interpreting them through the concept of agricultural extension as community education. The resulting perspective places farmers not merely as recipients of extension messages but as active participants who interpret, question, test, adapt, and share knowledge within their social and farming environments.

5. Conclusion

This study shows that farmers' perspectives toward agricultural extension in Malang Regency are multidimensional, encompassing learning and education, communication with extension workers, trust, group learning, innovation adoption, and local knowledge. The qualitative findings indicate that farmers interpret extension information through previous experience, local conditions, social interaction, perceived risks, and practical considerations rather than simply accepting information as delivered.

Among the six dimensions, local knowledge recorded the highest mean score (19.7), followed by communication with extension workers and innovation adoption (18.4 each), trust and group learning (18.2 each), and learning and education (17.7). The relatively close scores indicate that farmers' experiences of extension involve several dimensions simultaneously, although local knowledge has a particularly prominent role in how farmers assess and interpret new information.

The Spearman analysis identified no statistically significant association among the 15 pairs of dimensions at $\alpha = .05$. The strongest numerical tendency occurred between group learning and local knowledge ($\rho = .311$, $p = .051$), followed by learning and education with group learning ($\rho = .306$, $p = .055$) and trust with local knowledge ($\rho = .305$, $p = .056$). These tendencies provide contextual directions for further investigation but do not support causal claims or conclusions of statistical significance.

The findings strengthen the understanding of agricultural extension as a form of community education when learning is dialogic, participatory, contextual, and grounded in farmers' experience. Extension workers can facilitate processes through which farmers question, test, adapt, and evaluate information, while farmer groups can provide spaces for social learning and knowledge exchange. Future research should test the six-dimensional framework with larger and more diverse samples, examine its construct validity, and use longitudinal or broader mixed-methods designs to determine whether the observed patterns remain consistent across agricultural settings.

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