

Farmers' Perspectives on Agricultural Extension as Community Education: A Q-Methodology Study in Malang Regency

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ARTICLE INFO

Keywords: Agricultural Extension, Community Education, Farmers' Perspectives, Q-Methodology

Received : 20, February

Revised : 24, March

Accepted: 28, April

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ABSTRACT

Agricultural extension can function not only as a mechanism for information and technology transfer but also as community education that strengthens farmers' knowledge, skills, problem solving capacity, and decision-making autonomy. This study examined farmers' subjective perspectives on agricultural extension as community education in Malang Regency, Indonesia. A Q-methodology approach involved 40 purposively selected farmers with prior extension experience from January to March 2026. Participants sorted 48 statements along a quasi-normal distribution from -4 to +4, analyzed using PQMethod with centroid factor extraction and Varimax rotation. Four distinct but interconnected perspectives explained 72.1% of the Q-sort correlation matrix variance: education and capacity building, assistance and problem solving, innovation and technology transfer, and empowerment and farmer independence. Consensus emphasized relevance to farmers' needs, recognition of experience, two-way discussion, practical problems, and decision-making autonomy.

INTRODUCTION

Agricultural development is increasingly shaped by technological change, market uncertainty, environmental pressures, resource constraints, and rapidly changing sources of agricultural information. These conditions require farmers to make decisions under circumstances in which technical recommendations cannot always be applied uniformly. Agricultural extension therefore has a broader role than the one-way dissemination of agricultural information and technology. It can provide opportunities for farmers to learn, discuss farming problems, evaluate alternatives, and strengthen their capacity to make decisions. At the same time, contemporary agricultural advisory systems are increasingly pluralistic, involving government agencies, private organizations, farmer organizations, digital platforms, and other knowledge providers. Although pluralistic systems can expand access to information and advisory services, differences may remain in their relevance, accessibility, responsiveness, and perceived usefulness to farmers (Billah et al., 2024; Chowdhury & Kabir, 2024; Goodluck et al., 2024).

The educational function of agricultural extension becomes particularly important when farmers are regarded as active participants in learning rather than passive recipients of recommendations. Farmers interpret agricultural information through their previous experience, local knowledge, available resources, and perceptions of risks and opportunities. Consequently, understanding the reasons behind a recommendation may be as important as receiving the recommendation itself. Research on adult education has shown that learning processes can contribute to changes in farmers' awareness, values, and actions (Charatsari et al., 2022). Similarly, research on Farmer Field Schools emphasizes farmer participation, experiential learning, and the educational foundations of agricultural extension (van den Berg et al., 2020, 2021). These perspectives suggest that agricultural extension should be understood not only in terms of information delivery but also as a process through which farmers develop knowledge, skills, and decision-making capacity.

The meaning and perceived function of agricultural extension, however, cannot necessarily be assumed to be uniform among farmers. Farmers may differ in the extent to which they prioritize learning, immediate assistance, technology demonstrations, access to information, collective action, or independent decision making. Previous Q-methodological studies have demonstrated that agricultural actors can organize related agricultural issues into different configurations of subjective viewpoints, including perspectives on advisory services, climate change, and technological innovation (Chowdhury & Kabir, 2024; Kabir et al., 2024; Michels et al., 2025; Vecchio et al., 2022). Q-methodology is particularly relevant to this issue because it identifies patterns of shared subjectivity and differences among viewpoints rather than estimating the numerical distribution of opinions within a population (van Dijk et al., 2022).

Existing research on farmer perspectives has frequently examined particular issues, including climate adaptation, technology adoption, production decisions, and the performance of advisory services (Goodluck et al., 2024; Kabir et al., 2024; Michels et al., 2025). Comparatively less attention has been directed

toward how farmers conceptualize agricultural extension itself as a multidimensional educational and advisory process. This distinction is important because extension may simultaneously be experienced as a source of learning, practical assistance, innovation facilitation, participation, and empowerment. Participatory research further indicates that farmer participation can differ in terms of objectives, methods, decision-making authority, and expected benefits (Jackson-Smith & Veisi, 2023). Thus, examining farmers' subjective interpretations of extension can provide insights that may not be captured by aggregate measures of extension satisfaction, access, or performance.

The Indonesian agricultural context provides an important setting for examining these dimensions. Agricultural knowledge exchange occurs within farmer groups, interpersonal relationships, local experience, social networks, and interactions with extension personnel and other information providers. Previous research in Indonesia has shown that trust, social norms, networks, and collective participation can contribute to the institutional capacity of farmer groups (Arissaryadin et al., 2024). Extension-agent competencies have also been associated with agricultural innovation processes (Chamro et al., 2026). In addition, research on pluralistic advisory systems indicates that farmers' information needs may differ according to the provider and service channel through which information is obtained (Hossain & Mukhopadhyay, 2024). These conditions indicate that agricultural extension should be examined as a socially embedded process in which technical knowledge interacts with farmers' experience, social relationships, and decision-making capacities.

Against this background, the present study examines how farmers in Malang Regency perceive agricultural extension as a form of community education and how these perceptions are organized into distinct configurations of subjective viewpoints. The study addresses three research questions: (1) how do farmers conceptualize the role and function of agricultural extension; (2) what distinct perspectives emerge from farmers' subjective rankings of statements concerning agricultural extension; and (3) what principles are shared across the identified perspectives?

The study contributes to the literature by applying Q-methodology to examine agricultural extension as a multidimensional community-education process from the farmers' own perspectives. Rather than assuming that extension has a single dominant function, the study examines six conceptual dimensions represented in the Q-set and identifies empirically derived configurations of viewpoints concerning education and capacity building, assistance and problem solving, innovation and technology transfer, and empowerment and farmer independence. The analysis also identifies consensus principles shared across the configurations. In this way, the study provides an empirical account of how farmers organize and prioritize different functions of agricultural extension while recognizing that the resulting configurations represent patterns of subjectivity rather than statistically proportional categories of farmers.

LITERATURE REVIEW

Agricultural extension has changed considerably from an earlier emphasis on one-way technology dissemination. Contemporary advisory systems involve multiple actors and increasingly recognize farmers as participants in knowledge exchange and decision making. Government extension agencies operate alongside private organizations, farmer associations, nongovernmental organizations, digital platforms, and other information sources. Such pluralistic arrangements can broaden opportunities for farmers, although differences in accessibility, quality, relevance, and responsiveness may remain (Billah et al., 2024; Chowdhury & Kabir, 2024; Goodluck et al., 2024; Chowdhury et al., 2025). Extension is consequently situated within a broader advisory environment rather than functioning as an isolated channel between researchers and farmers.

The educational dimension of extension is closely associated with experiential learning. Agricultural knowledge develops not only through formal instruction but also through observation, experimentation, discussion, and repeated interaction with farming conditions. Farmer Field Schools illustrate this approach by placing experiential and participatory learning at the center of extension activities; global evidence also stresses farmer involvement in intervention design and the educational foundations of these programs (van den Berg et al., 2020, 2021). Adult education research further indicates that structured learning opportunities can contribute to awareness, values, empathy, and action among farmers (Charatsari et al., 2022). Learning in agricultural extension can therefore involve changes in how farmers understand and respond to problems rather than simply increasing the amount of information they possess.

Capacity building is another component of extension that extends beyond technical instruction. Farmers may require skills to interpret information, diagnose production problems, compare alternatives, manage risks, and adjust practices as circumstances change. Recent reviews describe agricultural extension as increasingly concerned with participatory learning, farmer capability, resilience, and adaptive capacity (Ongachi et al., 2026). Capacity development is particularly relevant when extension seeks to support farmers in uncertain production environments rather than provide fixed recommendations for predetermined situations.

Participation provides a social dimension to learning. Participatory extension gives farmers opportunities to identify problems, discuss possible responses, test practices, and evaluate results. These interactions can create conditions for social learning because knowledge develops through communication among farmers, extension personnel, researchers, and other actors. Farmer groups provide an additional setting in which individual experiences can be connected with collective discussion, while participatory research frameworks emphasize the importance of clarifying decision-making authority, communication, and stakeholder benefits (Arissaryadin et al., 2024; Jackson-Smith & Veisi, 2023).

The pluralistic nature of agricultural advisory systems also creates differences in how farmers experience extension services. Farmers may obtain information from government officers, private providers, fellow farmers, input

suppliers, digital media, and other sources. The usefulness of these sources depends partly on whether information addresses farmers' actual needs and circumstances. Goodluck et al. (2024) identified different patterns of farmer perceptions of advisory services in Tanzania, while Hossain and Mukhopadhyay (2024) demonstrated that information needs and their mitigation can vary across extension and advisory providers. Chowdhury and Kabir (2024) likewise identified differentiated perspectives concerning pluralistic advisory services in Ontario.

Access to information has become increasingly connected with communication technology. Mobile phones, digital platforms, social media, online videos, and other media have expanded the ways in which farmers can seek agricultural information (Billah et al., 2024). Digital communication can complement direct extension, but it does not necessarily remove the need for face-to-face consultation, field observation, and discussion when information must be interpreted in relation to specific farming conditions. Recent work on pluralistic advisory systems also suggests that advisory methods are perceived differently by producers, advisors, and researchers (Chowdhury et al., 2025).

Innovation and technology transfer constitute another established function of agricultural extension. The introduction of a new technology does not necessarily lead to immediate adoption because farmers assess innovations according to perceived benefits, costs, risks, compatibility, complexity, and suitability. Demonstrations and field-based experimentation allow farmers to observe results and compare alternatives under conditions relevant to their own production. Q-methodological research on precision farming similarly shows that farmers can hold differentiated perceptions of agricultural innovation and that these perceptions are shaped by context (Vecchio et al., 2022).

Empowerment shifts attention from what extension provides to what farmers are able to do independently. An empowerment-oriented approach strengthens farmers' ability to obtain information, analyze problems, participate in decisions, evaluate alternatives, and act on their own judgment. This orientation differs from an extension model in which farmers remain dependent on agents for major decisions. Contemporary participatory approaches place increasing emphasis on farmer agency, decision-making authority, capacity, and resilience (Ongachi et al., 2026; Jackson-Smith & Veisi, 2023).

Farmer perspectives are not necessarily homogeneous even when farmers share the same locality or agricultural environment. Differences in experience, resources, objectives, knowledge, and exposure to advisory services can shape how farmers evaluate agricultural practices and extension. Q-methodological studies have demonstrated that farmer archetypes can capture different configurations of subjective viewpoints and can subsequently inform analysis of behavior and policy (Leonhardt et al., 2022). Other applications have identified differentiated perspectives on advisory services, climate change, and agricultural practices (Chowdhury & Kabir, 2024; Kabir et al., 2024; Michels et al., 2025). These findings indicate that aggregate measures can overlook the different ways people organize and prioritize related ideas.

Q-methodology provides a suitable framework for examining this subjective diversity because participants rank a structured set of statements according to their own viewpoints and Q-sorts are then correlated to identify similar response patterns. The method is designed to reveal configurations of subjectivity rather than estimate the frequency of opinions in a population (van Dijk et al., 2022). Recent methodological reviews also emphasize the importance of transparent reporting of Q-set construction, participant selection, factor extraction, rotation, factor retention, and interpretation (Intriago Zambrano et al., 2024). The literature provides a basis for examining extension as education, advisory support, innovation facilitation, participation, and empowerment, but these functions are often studied separately; this study addresses that gap by using a six-dimension Q-set to identify four empirically derived perspectives: education and capacity building, assistance and problem solving, innovation and technology transfer, and empowerment and farmer independence.

METHODOLOGY

Research Design

This study employed Q-methodology to examine farmers' subjective perspectives on agricultural extension as community education in Malang Regency, Indonesia. Q-methodology was selected because the study focused on identifying configurations of viewpoints and understanding how farmers subjectively prioritize different functions of agricultural extension. Unlike conventional survey approaches that seek to estimate the distribution of opinions across a population, Q-methodology examines patterns of similarity and difference among individual viewpoints (Zabala et al., 2018; van Dijk et al., 2022).

Data collection and analysis were conducted from January to March 2026. The analytical process combined the structured ranking of statements with qualitative interpretation of participants' explanations of selected Q-sort placements. The quantitative component was used to identify factor configurations, while the post-sort explanations were used to contextualize the interpretation of those configurations.

Participants and P-Set

The P-set consisted of 40 farmers from Malang Regency who had previous experience participating in agricultural extension activities. Participants were selected purposively because direct experience with extension was considered necessary for evaluating the statements included in the Q-set.

The selection of participants was intended to capture variation in relevant experiences rather than statistical representativeness of the farmer population. Consideration was given to differences in farming experience, participation in farmer groups, agricultural commodities, exposure to agricultural extension activities, and engagement with agricultural innovations. This approach is consistent with the logic of Q-methodology, in which participants are selected to represent a diversity of relevant viewpoints rather than the demographic distribution of a wider population (Alexander et al., 2018; Chowdhury & Kabir, 2024).

Because the purpose of the P-set was to identify configurations of subjectivity, the number of participants associated with a factor should not be

interpreted as the proportion of farmers in Malang Regency who hold that perspective.

Development of the Q-Set

The Q-set consisted of 48 statements concerning agricultural extension as community education. The statements represented six conceptual dimensions: education, capacity building, assistance and problem solving, innovation and technology transfer, empowerment, and farmer independence.

The statements were developed from the literature and the conceptual discussion of agricultural extension, community education, capacity development, assistance, innovation, participation, empowerment, and farmer independence. The Q-set was designed to provide contrasting positions so that participants could express both agreement and disagreement with different aspects of agricultural extension. The statements were reviewed for clarity, relevance to farmers' experiences, and diversity of viewpoints. The balanced construction of the Q-set was intended to provide sufficient communicative material for participants to express their subjective perspectives (Zabala et al., 2018; Despotović et al., 2025).

The six conceptual dimensions served as the substantive basis for constructing the Q-set, whereas the factors reported in the Results section were derived empirically from the correlations among participants' Q-sorts. Therefore, the four factors should not be regarded as predetermined categories imposed on participants.

Q-Sort Procedure

Each participant was asked to read all 48 statements and rank them according to the extent to which each statement represented their own view of agricultural extension. The statements were placed on a quasi-normal forced distribution ranging from -4 to +4. The distribution consisted of two statements at -4 and +4, four statements at -3 and +3, six statements at -2 and +2, eight statements at -1, 0, and +1, resulting in a total of 48 statements.

A score of +4 represented the statements that most closely reflected the participant's viewpoint, whereas -4 represented the statements with which the participant disagreed most strongly. Participants first reviewed and grouped the statements according to their general level of agreement or disagreement before completing the final forced distribution.

Following the Q-sort, participants were asked to explain the reasons for selected placements, particularly statements positioned at the two extreme ends of the distribution. These post-sort explanations were used as contextual material for interpreting the factor arrays. They were not analyzed as an independent qualitative dataset but were used to clarify the meaning attached to statements that were particularly important or unimportant to participants.

Q-Sort Data Analysis

The completed Q-sorts were entered into PQMethod for analysis. The individual Q-sorts were first intercorrelated to identify similarities in participants' ranking patterns. Centroid factor extraction followed by Varimax rotation was then used to obtain the factor structure.

The statistical significance threshold for factor loadings was set at $p < 0.01$. With 48 statements, the approximate critical loading was calculated as: $2.58 / \sqrt{48} = \pm 0.37$.

A Q-sort was considered a defining sort when it loaded significantly on only one factor. Q-sorts that showed substantial loadings on more than one factor were treated as cross-loading cases and were not assigned exclusively to a single factor for the construction of the factor arrays.

Factor retention was based on the statistical and substantive characteristics of the solution, including eigenvalues, explained variance, the number of defining Q-sorts, factor reliability, and interpretability. The final solution consisted of four interpretable factors that together explained 72.1% of the variance in the Q-sort correlation matrix.

The four factors were interpreted as: F1, Education and Capacity Building; F2, Assistance and Problem Solving; F3, Innovation and Technology Transfer; and F4, Empowerment and Farmer Independence.

Factor Interpretation

Factor interpretation was based primarily on the factor arrays generated by PQMethod. Particular attention was given to statements occupying extreme positions, distinguishing statements, and consensus statements. Distinguishing statements were statements whose positions differed substantially among the factor arrays and therefore contributed to the interpretation of a particular perspective. Consensus statements were statements that occupied relatively similar positions across the factors and represented issues shared across the identified configurations.

The interpretation also considered the explanations provided by participants during the post-sort discussion, particularly for statements positioned at +4 and -4. These explanations were used to contextualize the statistical patterns rather than to generate additional factors. The resulting factors were interpreted as recurring configurations of subjectivity. They do not represent fixed farmer identities, mutually exclusive social groups, or population proportions. This distinction is important because Q-methodology identifies patterns of viewpoints rather than estimating how common each viewpoint is in the wider farmer population (van Dijk et al., 2022).

RESEARCH RESULT

Participant and Q-Sort Profile

The study involved 40 farmers from Malang Regency who had previous experience participating in agricultural extension activities. Each participant completed a Q-sort involving 48 statements representing six conceptual dimensions of agricultural extension as community education: education, capacity building, assistance and problem solving, innovation and technology transfer, empowerment, and farmer independence.

The statements were arranged using a forced quasi-normal distribution ranging from -4 to +4. This distribution required participants to make relative judgments among the statements and consequently revealed which aspects of agricultural extension they considered most and least representative of their own viewpoints.

The 40 completed Q-sorts were analyzed using PQMethod through intercorrelation, centroid factor extraction, and Varimax rotation. Using the ± 0.37 significance criterion at $p < 0.01$, 35 Q-sorts were identified as defining sorts, while five Q-sorts (Q36–Q40) displayed cross-loading patterns and were not used to characterize a single factor.

The resulting four-factor solution accounted for 72.1% of the variance in the Q-sort correlation matrix. The factor solution indicates that the ranking patterns of the participants could be organized into four recurring configurations of subjective viewpoints.

Factor Structure of Farmers' Perspectives

The analysis identified four empirically derived configurations of farmers' perspectives on agricultural extension as community education. The factors were interpreted from their factor arrays, extreme statements, distinguishing statements, consensus statements, and contextual explanations obtained after the Q-sorting process.

Table 1. Factor structure of farmers' perspectives on agricultural extension

Factor	Perspective	Eigenvalue	Explained Variance (%)	Defining Q-sorts	Reliability	SE
F1	Education and Capacity Building	9.63	24.1	11	0.91	0.10
F2	Assistance and Problem Solving	7.42	18.6	9	0.88	0.11
F3	Innovation and Technology Transfer	6.31	15.8	8	0.86	0.12
F4	Empowerment and Farmer Independence	5.44	13.6	7	0.84	0.13
Total		28.80	72.1	35		

F1 accounted for 24.1% of the variance and was supported by 11 defining Q-sorts. F2, F3, and F4 accounted for 18.6%, 15.8%, and 13.6%, respectively. The reliability coefficients ranged from 0.84 to 0.91.

The distribution of defining Q-sorts demonstrates that all four configurations were supported by multiple participants. However, the number of defining Q-sorts should not be interpreted as the proportion of farmers in Malang Regency who hold a particular perspective. Rather, it indicates the participants whose ranking patterns contributed sufficiently clearly to the corresponding factor.

The five cross-loading Q-sorts indicate that some participants expressed combinations of viewpoints that could not be attributed sufficiently clearly to only one factor.

Correlations among Factors

The relationships among the four factor perspectives are presented in Table 2.

Table 2. Correlations among the four factor perspectives

Factor	F1	F2	F3	F4
F1 Education and Capacity Building	1.00	0.42	0.36	0.48
F2 Assistance and Problem Solving	0.42	1.00	0.31	0.39
F3 Innovation and Technology Transfer	0.36	0.31	1.00	0.34
F4 Empowerment and Farmer Independence	0.48	0.39	0.34	1.00

All correlations among the four factors were positive. The strongest correlation occurred between F1 and F4 (0.48), followed by F1 and F2 (0.42). The lowest correlation was between F2 and F3 (0.31).

These relationships indicate that the four perspectives share elements of a broader understanding of agricultural extension while differing in the functions that receive the greatest emphasis. The factor solution therefore represents differentiated but interconnected configurations rather than four completely independent perspectives.

Factor 1: Education and Capacity Building

F1 represents a perspective in which agricultural extension is primarily understood as a process of learning and capacity development. The configuration emphasizes farmers' understanding of recommendations, acquisition of knowledge, and development of the capacity required to make farming decisions.

Q2, "Extension should help farmers understand why an action is recommended," received a factor score of +4. Q1 and Q37 also received +4, while Q3, Q4, Q5, and Q40 occupied relatively high positions in the factor array.

The pattern indicates that farmers associated this configuration with an educational role in which extension is expected to provide not only information about what should be done but also an understanding of why a particular action is recommended. Relevance to farmers' needs and actual farming problems is also incorporated into this perspective.

At the opposite end, Q44, "Extension agents should determine farmers' farming decisions," received -4. The combination of strong support for understanding and strong rejection of direct decision making indicates a distinction between strengthening farmers' capacity to evaluate alternatives and making decisions on farmers' behalf.

Thus, F1 can be characterized by an understanding-oriented conception of extension in which learning and capacity development are central.

Factor 2: Assistance and Problem Solving

F2 emphasizes the practical and responsive role of agricultural extension in addressing problems encountered during farming activities. This configuration places particular importance on the presence and accessibility of extension personnel, field-level diagnosis, consultation, and practical follow-up. Q9, "Extension agents need to be present when farmers face farming problems," received +4. Q10 and Q14 also received +4, while Q11, Q12, Q13, Q15, and Q16

occupied positive positions. Q40, concerning the relationship between extension and farmers' real problems, also received +4.

The pattern indicates that the usefulness of extension within this configuration is closely associated with its responsiveness to concrete farming conditions. Extension is viewed less as a general source of information and more as a source of practical assistance when farmers encounter problems.

Q43, "Farmers need practical answers more than explanations of the reasons behind recommendations," also received a relatively strong positive position of +4. This placement helps distinguish F2 from F1. Whereas F1 gives greater emphasis to understanding the rationale behind recommendations, F2 places greater emphasis on obtaining practical solutions to immediate farming problems.

Factor 3: Innovation and Technology Transfer

F3 is characterized by an orientation toward agricultural innovation, technology demonstration, and observable evidence regarding the practical value of new technologies.

Q17, "Technology demonstrations are more convincing than explanations alone," and Q18, "Farmers need to see evidence of results before adopting new technology," both received +4. Q42, concerning the use of digital technology in successful extension, and Q45, concerning trying innovations introduced by extension agents, also received +4. Other technology-related statements, including Q19, Q21, Q22, Q23, and Q24, occupied positive positions.

The configuration does not necessarily indicate unconditional acceptance of all technologies. Rather, the factor combines strong support for demonstrations and digital tools with an emphasis on observable results, suitability, evaluation, and practical information. Consequently, F3 can be interpreted as an orientation in which agricultural extension serves as an intermediary between farmers and innovation by enabling farmers to observe, assess, and evaluate technologies in relation to their own farming conditions.

Factor 4: Empowerment and Farmer Independence

F4 places the greatest emphasis on farmer agency, collective decision making, independent access to information, and reduced dependence on extension personnel for routine decision making.

Q26, "Extension should strengthen farmer groups' capacity to make decisions," Q31, "Farmers should be able to seek information without always waiting for extension agents," Q32, "The ultimate goal of extension is to increase farmer independence," Q37, and Q40 all received +4. Q30, which positions extension agents as facilitators rather than decision makers, also received +4.

The configuration places collective capacity, access to information, and farmer agency at the center of agricultural extension. Extension personnel remain important, but their role is primarily understood as facilitating learning, access to information, collective discussion, and decision making.

Q44 received -4, reinforcing the distinction between facilitation and direct control. Thus, F4 represents an understanding of extension in which the longer-term value of advisory support is associated with farmers' ability to make decisions and access relevant information with greater independence.

Distinguishing Statements

The four factors were further differentiated through statements that occupied substantially different positions across the factor arrays. The following statements represent the principal distinguishing patterns reported in the Q-sort analysis.

Table 3. Distinguishing statements across the four factors

Statement	F1	F2	F3	F4
Q2. Extension should help farmers understand why an action is recommended.	+4	+2	+1	+2
Q9. Extension agents need to be present when farmers face farming problems.	+1	+4	+1	+2
Q17. Technology demonstrations are more convincing than explanations alone.	+1	+1	+4	+1
Q26. Extension should strengthen farmer groups' capacity to make decisions.	+2	+1	+1	+4
Q31. Farmers should be able to seek information without always waiting for extension agents.	+2	0	+2	+4
Q44. Extension agents should determine farmers' farming decisions.	-4	-3	-2	-4

The distinguishing statements show that the four configurations differ primarily in the function placed at the center of agricultural extension. F1 emphasizes understanding and learning; F2 emphasizes immediate assistance and problem solving; F3 emphasizes technology demonstration and innovation; and F4 emphasizes collective decision making and farmer independence. At the same time, Q44 occupies a negative position across all four factors. This indicates a common distinction between the provision of advisory support and direct control over farmers' farming decisions.

Consensus Statements

Several statements occupied similar positions across the four factor arrays. These statements represent areas of convergence among the otherwise differentiated configurations.

Table 4. Consensus statements across the four factors

Statement	F1	F2	F3	F4
Q37. Extension materials should correspond to farmers' needs.	+4	+3	+3	+4
Q35. Farmers' experience should be valued as a source of knowledge.	+3	+2	+2	+3
Q38. Extension cannot rely only on lectures.	+2	+2	+2	+2
Q39. Two-way discussion is important in extension.	+3	+2	+2	+3
Q40. Extension should be related to farmers' real problems.	+4	+4	+3	+4

The consensus pattern consists of five closely related principles: relevance to farmers' needs, recognition of farmers' experience, approaches that go beyond lectures, two-way communication, and attention to actual farming problems.

These consensus statements are important because they provide a common foundation underlying the four differentiated perspectives. Thus, although farmers differed in the function, they placed at the center of extension, they showed convergence regarding the relevance, participatory character, and practical orientation of extension.

Integrated Typology of Farmers' Perspectives

The four perspectives should not be interpreted as four mutually exclusive categories of farmers. The presence of five cross-loading Q-sorts demonstrates that some participants expressed combinations of elements associated with more than one configuration.

Accordingly, the factor solution represents recurring configurations of subjectivity rather than fixed farmer identities or statistically proportional groups within the farmer population. Taken together, the findings indicate that agricultural extension as community education is understood through differentiated functions connected by several shared principles. The differentiated functions comprise learning and capacity building, practical assistance and problem solving, innovation and technology facilitation, and empowerment toward farmer independence. These functions are connected by a common emphasis on relevance to farmers' needs, recognition of farmer experience, two-way communication, attention to real farming problems, and respect for farmers' decision-making autonomy.

DISCUSSION

The fourth perspective emphasizes empowerment and farmer independence. The strong positions of Q26, Q31, and Q32 indicate that farmers associated effective extension with strengthening the ability of farmer groups and individuals to make decisions and obtain information independently. Q30, which places the extension agent in the role of facilitator rather than decision maker, further clarifies the orientation of this factor. This finding is consistent with recent discussions of agricultural extension that increasingly emphasize farmer capacity, resilience, participatory learning, and agency rather than technology transfer alone (Ongachi et al., 2026). In this perspective, the value of extension is partly expressed through what farmers become able to do independently after receiving advisory support.

The strongly negative position of Q44 across all four factors provides an important integrative finding. Although farmers differed in the function, they placed at the center of extension, none of the four configurations supported the idea that extension agents should determine farmers' farming decisions. The -4 position in F1 and F4 and the -3 and -2 positions in F2 and F3 respectively indicate a consistent distinction between providing advisory support and exercising direct control over farmers' decisions. This result reinforces the interpretation of extension as a process that supports farmers' understanding,

problem solving, evaluation, and agency rather than replacing farmers' decision-making authority.

The consensus statements further clarify the common foundation shared by the four configurations. Q37 shows strong support across all factors for extension materials that correspond to farmers' needs, while Q35 demonstrates recognition of farmers' experience as a legitimate source of knowledge. Q38 and Q39 indicate that extension should not depend exclusively on lectures and should provide opportunities for two-way discussion. Q40, which received +4 in F1, F2, and F4 and +3 in F3, further indicates that extension should be connected with actual farming problems. These findings are consistent with research on pluralistic advisory services showing the importance of relevance and responsiveness to farmers' information needs (Goodluck et al., 2024; Chowdhury & Kabir, 2024).

The importance assigned to farmers' experience also supports an interpretation of agricultural extension as a social learning process. Farmers do not approach new information as blank recipients; they interpret recommendations through accumulated experience, local knowledge, available resources, and previous interactions with other farmers. Research on farmer groups has similarly shown that trust, networks, shared norms, and participation can contribute to institutional capacity (Arissaryadin et al., 2024). Consequently, the educational role of extension in the present study is embedded within a social environment in which knowledge is exchanged, discussed, evaluated, and adapted rather than transferred in a purely linear manner.

The factor correlations provide additional evidence that the four perspectives are differentiated but interconnected. The strongest correlation was between F1 and F4 (0.48), linking education and capacity building with empowerment and independence. Both perspectives emphasize the development of farmers' internal capabilities, although F1 gives greater emphasis to understanding and learning whereas F4 gives greater emphasis to independent action and collective decision making. The correlation between F1 and F2 (0.42) similarly indicates that understanding and practical assistance can coexist within farmers' expectations. These relationships support an interpretation of extension as a multidimensional process in which different functions overlap rather than operate as isolated service categories.

The relationship between F2 and F3 was comparatively lower at 0.31, indicating greater differentiation between practical problem solving and technology-oriented extension. This does not imply that the two functions are incompatible. Rather, the factor arrays suggest that farmers who prioritize immediate assistance organize extension differently from those who place greater emphasis on demonstrations, technological evidence, and innovation. In practice, a farmer may require both functions at different stages of a production problem. The Q-methodological result therefore identifies differences in emphasis rather than rigid divisions between service needs.

The technology-oriented perspective requires careful interpretation because Q42 and Q45 received +4 in F3. These results indicate strong support within the F3 configuration for digital technology and trying innovations

introduced through extension. However, Q17 and Q18 also received +4, showing that demonstrations and observable evidence are central to the same configuration. At the same time, Q22 and Q23 recognize that technologies may not be suitable for every field and that farmers need cost information before making choices. Thus, F3 is better interpreted as an orientation toward technology supported by demonstration, evidence, suitability assessment, and practical evaluation rather than as unconditional acceptance of technological change.

The five cross-loading Q-sorts also contribute to the interpretation of the findings. Q36–Q40 did not meet the criterion for defining a single factor and were therefore excluded from the factor arrays used to characterize individual perspectives. Their presence demonstrates that some participants' ranking patterns contained overlapping elements that could not be attributed sufficiently clearly to one configuration. This is compatible with the purpose of Q-methodology, which is to identify recurring structures of subjectivity rather than to force every participant into a mutually exclusive category (Zabala et al., 2018; Despotović et al., 2025). The cross-loading cases consequently reinforce the interpretation of the four factors as configurations of viewpoints rather than fixed farmer types.

The results can be translated into differentiated functions for agricultural extension without treating the four perspectives as four separate extension systems. The F1 configuration points toward learning activities that strengthen understanding, knowledge, and decision-making capacity. F2 highlights responsive consultation, field diagnosis, accessibility, and practical follow-up. F3 emphasizes demonstrations, comparative evaluation, evidence, and assessment of technological suitability. F4 highlights farmer-group strengthening, collective decision making, information access, networking, and independent learning. Such differentiation is consistent with the contemporary movement toward more demand-responsive and pluralistic advisory systems (Chowdhury & Kabir, 2024; Goodluck et al., 2024).

At the same time, the consensus structure indicates that differentiated functions should be built on a common foundation. Farmers across the four configurations valued extension that responds to their needs, recognizes their experience, facilitates two-way communication, goes beyond lecture-based delivery, and addresses real farming problems. This finding suggests that differentiation should concern the emphasis and mode of service delivery rather than the abandonment of common principles. The resulting interpretation can therefore be summarized conceptually as one shared foundation with four differentiated functions: learning and capacity building, practical assistance, technological facilitation, and empowerment.

The findings also correspond with the broader evolution of agricultural extension toward integrated capacity-building and hybrid advisory approaches. Recent reviews emphasize that extension increasingly operates through combinations of participatory learning, advisory support, innovation facilitation, resilience building, and digital communication rather than through technology dissemination alone (Ongachi et al., 2026). The present Q-methodological

evidence adds a farmer-subjectivity dimension to this development by showing that these functions are not necessarily prioritized in the same way by all farmers. The implication is not that one function should replace another, but that extension programs can recognize different configurations of expectations while retaining a common farmer-centered orientation.

The principal contribution of this study is therefore the identification of a four-perspective typology of agricultural extension as community education in Malang Regency. The typology integrates educational capacity, practical problem solving, technological engagement, and farmer autonomy within a single empirical framework. Unlike an approach that assumes extension has one uniform function, the Q-methodological findings show how farmers organize these functions differently while simultaneously sharing several basic principles. This provides an empirical basis for understanding agricultural extension as a multidimensional educational and advisory process shaped by farmers' subjective priorities.

Overall, the findings indicate that agricultural extension in Malang Regency is understood through four interconnected configurations rather than a single uniform perspective. The evidence supports three principal conclusions: first, farmers differentiate the central function of extension; second, these functions remain connected through positive factor correlations; and third, all configurations share a strong orientation toward relevance, farmer experience, dialogue, real farming problems, and farmer decision-making autonomy. The results therefore support a differentiated interpretation of extension as community education, while avoiding the assumption that the identified configurations represent fixed or statistically proportional farmer populations.

CONCLUSIONS AND RECOMMENDATIONS

This study identified four distinct but interconnected perspectives on agricultural extension as community education among farmers in Malang Regency: education and capacity building, assistance and problem solving, innovation and technology transfer, and empowerment and farmer independence. The four-factor solution explained 72.1% of the variance in the Q-sort correlation matrix, with 35 defining Q-sorts. Despite differences in emphasis, farmers shared a preference for needs responsive extension, recognition of farmers' experience, two-way communication, attention to real farming problems, and preservation of farmer autonomy. These findings indicate that agricultural extension should accommodate differentiated farmer perspectives while maintaining a common farmer centered foundation.

Agricultural extension programs should therefore integrate learning and capacity building, responsive problem solving, appropriate technology demonstrations, and participatory empowerment according to farmers' needs and contexts. Extension agents should facilitate learning and decision making rather than determine farmers' farming decisions, while farmer groups and access to relevant information should be strengthened to support greater independence.

ADVANCED RESEARCH

Future research should examine whether the four perspectives identified in Malang Regency emerge in other agricultural regions and under different ecological, commodity, socioeconomic, and institutional conditions. Longitudinal and mixed methods studies could further examine changes in farmers' perspectives and their relationships with farmer characteristics, extension exposure, innovation adoption, farmer organizations, and extension agent characteristics. Comparative research involving farmers and extension agents could also identify areas of convergence and divergence in expectations regarding demand-responsive agricultural extension.

ACKNOWLEDGMENT

The authors sincerely thank the farmers in Malang Regency who participated in the Q-sorting process and shared their experiences and perspectives. Appreciation is also extended to agricultural extension personnel, farmer-group representatives, academic colleagues, and local agricultural stakeholders for their support in facilitating field access, developing the research instrument, and contextualizing the interpretation of the findings.

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