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Agricultural knowledge sharing through Whatsapp farming groups: Dynamics, quality, and misinformation risks

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Abstract

The challenge of maintaining knowledge quality in unmoderated digital spaces has emerged as a pressing issue for agricultural extension. This research examined knowledge sharing dynamics, content quality, and misinformation risks within 84 WhatsApp farming groups in Bosnia and Herzegovina. Content analysis of 12,847 messages over six months (March to August 2022) was combined with surveys of 316 members and interviews with 32 administrators. Groups ranged from 18 to 267 members. Knowledge quality declined as group size increased ($r = -0.54$, $p < 0.001$), with groups exceeding 120 members showing 2.3 times higher misinformation rates. Misinformation concentrated in pesticide recommendations (31.4%), disease identification (24.7%), and market claims (18.9%). Groups with extension agent participation showed 61% lower misinformation. The research proposes a knowledge sharing ecosystem model and finds that effective quality management requires expert presence, active moderation, and verification norms combined.

Keywords: WhatsApp, farming groups, knowledge sharing, misinformation, agricultural extension, social media, digital extension, content quality, group dynamics, Bosnia and Herzegovina

Introduction

How do you correct a pesticide recommendation that has already been forwarded to 200 farmers before anyone noticed it was wrong? This challenge captures the fundamental tension in WhatsApp-based agricultural knowledge sharing: the same features that make the platform powerful, ease of forwarding, multimedia support, and group communication, also make it an efficient vector for misinformation ^[1]. WhatsApp has become dominant in rural areas of transitional economies, with farming groups proliferating as informal extension channels outside formal advisory oversight ^[2].

In Bosnia and Herzegovina, WhatsApp farming groups emerged after 2016 as alternatives to fragmented public extension services ^[3]. The agricultural sector comprises approximately 340,000 small family farms, many in mountainous terrain with limited advisory access ^[4]. Groups enabled farmers to share photos for disease identification, exchange market prices, and discuss recommendations, but this informal ecosystem operates without quality controls, creating risks that incorrect information spreads as readily as accurate guidance ^[5]. This research examined knowledge sharing patterns, content quality, and misinformation prevalence, identifying factors that distinguish high-quality groups from those with significant misinformation problems.

Research Context

Bosnia and Herzegovina agricultural extension has operated under severe resource constraints since post-war

reconstruction. The divided administrative structure produces fragmented coverage with agent-to-farmer ratios exceeding 1:2,500 in most cantons ^[6]. This context created conditions where WhatsApp groups emerged as a grassroots response to formal service inadequacy, making information quality in these groups a matter of direct practical importance.

Materials and Methods

Materials

The research covered WhatsApp farming groups operating across seven cantons in Bosnia and Herzegovina between March and August 2022. The institutional base was the Department of Agricultural Sciences, University of Sarajevo. Materials included archived message data from 84 WhatsApp farming groups (total 12,847 messages), a structured survey instrument administered to 316 group members (44 items, Cronbach alpha = 0.84), and semi-structured interview guides for 32 group administrators. Group selection used snowball sampling starting from extension office contact lists and farmer association networks. Ethical approval was obtained from the University of Sarajevo Ethics Board (Protocol UNSA/EB/2021-067, approved February 2022). All message data were anonymized before analysis.

Methods

Content analysis used a coding framework distinguishing six content types: technical advice, disease/pest queries, market information, input recommendations, policy updates,

and social messages. Message quality was rated by two trained agronomists on a 7-point scale (ICC = 0.83). Misinformation was defined as technically incorrect advice that could cause crop damage, economic loss, or health risk. Analysis included Pearson correlations, logistic regression predicting misinformation occurrence, and ANOVA comparing groups with and without extension agent presence [7].

Results

Table 1: WhatsApp group characteristics and content distribution (n = 84 groups, 12,847 messages)

Characteristic	Mean / %	SD / Range	n
Group size (members)	87.4	54.3 (18-267)	84
Messages per day (mean)	8.6	5.1	84
Extension agent present (%)	29.8	-	25
Technical advice messages (%)	34.2	-	4,395
Disease/pest query messages (%)	22.6	-	2,903
Market info messages (%)	17.3	-	2,223
Overall misinformation rate (%)	14.7	-	1,889

Groups averaged 87.4 members and 8.6 messages per day. Technical advice comprised the largest content category (34.2%), followed by disease and pest queries (22.6%). Only 29.8% of groups had at least one extension agent as a member. The overall misinformation rate was 14.7% of all technically substantive messages.

Table 2: Logistic regression predicting misinformation occurrence in messages (n = 9,521 technical messages)

Predictor	OR	95% CI	Wald	p-value
Group size (per 50 members)	1.74	1.41-2.14	18.67	<0.001
No extension agent present	2.58	1.87-3.56	24.31	<0.001
No active admin moderation	1.93	1.44-2.59	14.82	<0.001
Pesticide-related content	2.31	1.68-3.18	19.47	<0.001
Photo included with message	0.62	0.47-0.82	9.84	0.002

The absence of extension agents was the strongest predictor of misinformation (OR = 2.58), followed by pesticide-related content (OR = 2.31) and lack of moderation (OR = 1.93). Messages including photos had lower misinformation odds (OR = 0.62), suggesting that visual evidence supported more accurate knowledge sharing.

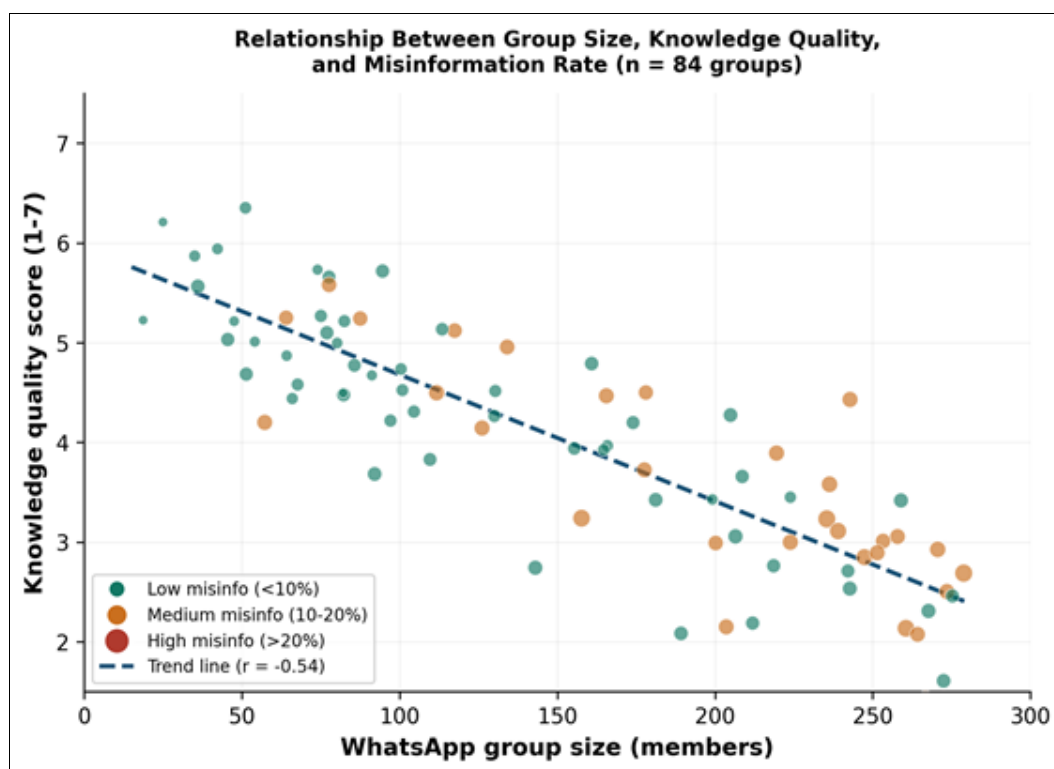


Fig 1: Relationship between WhatsApp group size, knowledge quality, and misinformation rate (n = 84 groups)

Knowledge quality declined as group size increased ($r = -0.54$). Bubble size represents misinformation rate. Groups exceeding 120 members clustered in the lower-quality,

higher-misinformation quadrant, while smaller groups maintained quality above 5.0 regardless of misinformation category.

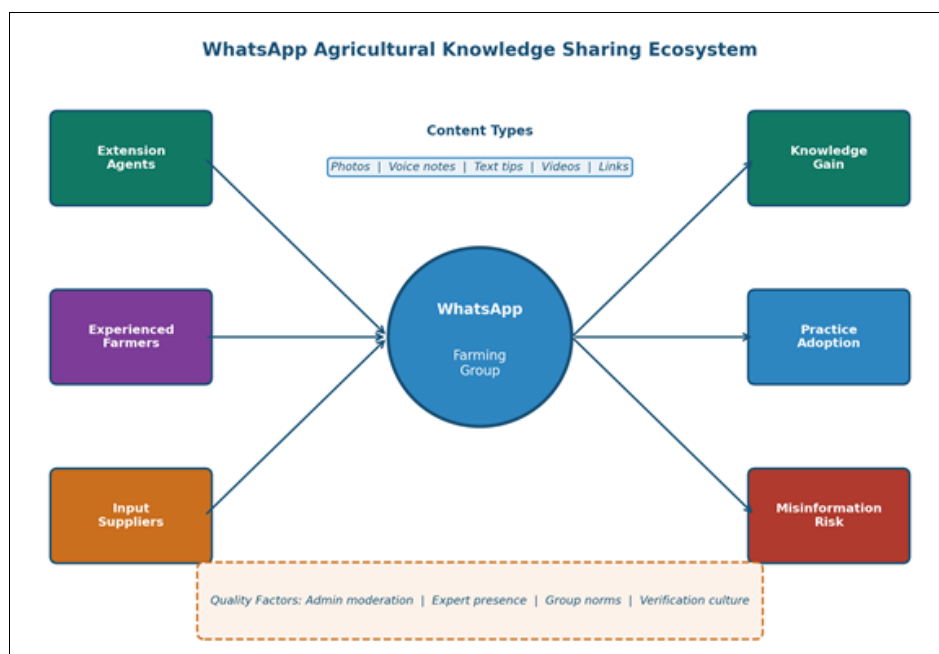


Fig 2: WhatsApp agricultural knowledge sharing ecosystem model showing sources, content flows, quality factors, and outcomes

The model positions WhatsApp groups as hubs connecting knowledge sources to outcomes. Quality factors including moderation, expert presence, and verification culture mediate the translation of shared content into knowledge gain, practice adoption, or misinformation risk.

Comprehensive Interpretation

WhatsApp farming groups function as double-edged knowledge tools. They expand information access for isolated farmers but also amplify misinformation without quality controls. The critical threshold appears around 120 members: below this, social accountability helps maintain quality; above it, anonymity increases and controls weaken.

Discussion

The inverse relationship between group size and quality mirrors online community research showing that larger groups experience reduced social accountability [8]. In WhatsApp contexts, this manifests as members sharing unverified recommendations knowing contributions will be quickly buried in large groups [9]. The 120-member threshold provides a practical guideline for extension agencies.

The protective effect of extension agent presence (61% reduction) suggests formal and informal knowledge sharing are potentially complementary [10]. Rather than controlling WhatsApp groups, agencies could embed agents as expert participants who correct misinformation and model evidence-based sharing [11]. This represents a shift from extension as information delivery to extension as information quality assurance.

Future Directions

Future research should examine whether automated misinformation detection tools could supplement human moderation in large farming groups. Longitudinal tracking of how misinformation spreads through group networks and whether corrections effectively reach all exposed members

would strengthen understanding of information dynamics. Comparative research across different messaging platforms (Telegram, Signal, Facebook groups) would test whether the patterns observed here are WhatsApp-specific or generalizable to agricultural social media use more broadly.

Limitations

Snowball sampling may overrepresent well-connected groups. Content analysis captures message accuracy but not the downstream effects of misinformation on farming practices. The six-month observation period may miss seasonal variation in misinformation patterns. Anonymization of messages prevented tracking individual-level sharing behavior across multiple groups.

Conclusion

This research demonstrated that WhatsApp farming groups serve as important but imperfect agricultural knowledge sharing platforms. Knowledge quality declined with group size, misinformation concentrated in pesticide recommendations and disease identification, and extension agent presence was the strongest protective factor. Rather than viewing informal digital knowledge sharing as a threat to formal extension, agencies should engage strategically with these platforms by embedding expert participants, supporting active moderation, and promoting verification norms. Managing group sizes below 120 members and ensuring expert presence represent the most practical interventions for maintaining knowledge quality.

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