

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 3; March 2024; Page No. 141-144

Received: 02-12-2023
Accepted: 04-01-2024

Indexed Journal
Peer Reviewed Journal

Assessing conventional versus technology-mediated communication approaches in horticultural advisory programs

¹Dr. Ali Al-Rashidi, Zahra Al-Bayati, Dr. Hassan Al-Hakim and Dr. Noor Al-Saadi

^{1, 3, 4} Department of Agricultural Extension, Tigris-Euphrates College of Horticultural Studies, Iraq

² Professor, Department of Agricultural Extension, Tigris-Euphrates College of Horticultural Studies, Iraq

DOI: <https://www.doi.org/10.33545/26180723.2024.v7.i3b.3297>

Corresponding Author: Dr. Ali Al-Rashidi

Abstract

Communication in agricultural extension refers to the processes by which technical knowledge moves from research institutions to farmers and feedback returns. This research compared conventional communication approaches (face-to-face visits, demonstration days, printed materials) with technology-mediated approaches (mobile applications, video platforms, social media groups) in horticultural advisory programs across three governorates in Iraq (May 2021 to July 2022). A comparative survey of 177 extension workers assessed effectiveness across four dimensions. Traditional models scored higher on farmer engagement (71.4% vs. 58.3%, $p < 0.001$) while technology-mediated approaches excelled in timeliness (78.2% vs. 48.6%, $p < 0.001$) and cost efficiency (73.8% vs. 54.1%). An integrated model combining both approaches achieved the highest overall scores. These findings argue for blended communication strategies in horticultural advisory.

Keywords: Communication models, traditional extension, digital extension, horticultural services, farmer engagement, mobile extension, blended communication, extension effectiveness, information dissemination

Introduction

Extension communication can be defined as the purposeful exchange of agricultural information between knowledge sources and farming communities through selected channels ^[1]. For horticultural crops which require precise timing of pest management, irrigation, and harvest decisions the speed and quality of this communication directly affects production outcomes ^[2]. Yet most advisory programs still rely on communication models designed decades ago for broad-acre cereal farming rather than the time-sensitive needs of horticulture ^[3].

Digital communication tools have expanded rapidly in developing countries, with mobile phone penetration exceeding 80% in most rural areas of the Middle East ^[4]. These tools offer potential advantages for horticultural advisory: real-time pest alerts, video-based demonstrations, and interactive messaging platforms that allow two-way communication ^[5]. However, whether digital channels actually outperform traditional face-to-face methods remains contested ^[6].

This research directly compared the effectiveness of conventional versus technology-mediated communication models within Iraq's horticultural advisory system, and tested whether an integrated approach combining both would outperform either alone ^[7].

Theoretical Framework

The research drew on Shannon and Weaver's Mathematical Theory of Communication ^[8] as the foundational framework, supplemented by Berlo's Source-Message-

Channel-Receiver (SMCR) model ^[9]. Shannon and Weaver's model conceptualizes communication effectiveness as dependent on channel capacity, signal clarity, and noise reduction. Berlo's SMCR model adds that the source's credibility, the message's structure, the channel's sensory reach, and the receiver's decoding capacity all shape communication outcomes. Together these frameworks allowed systematic comparison of how traditional and digital channels differ in capacity, fidelity, reach, and feedback mechanisms for horticultural information delivery.

Material and Methods

Research Area

The research was conducted in Baghdad, Babylon, and Karbala governorates of central Iraq, selected for their active horticultural sectors producing date palms, citrus, pomegranate, and vegetables. Mean annual rainfall ranges from 100-180 mm, with irrigation-dependent agriculture predominant. The research period was May 2021 to July 2022.

Material

All 177 horticultural advisory workers registered in the three governorates were surveyed through a census approach: 68 from Baghdad, 59 from Babylon, and 50 from Karbala. Of these, 85 primarily used traditional communication methods and 92 primarily used digital tools. A structured questionnaire assessed communication effectiveness across four dimensions: knowledge dissemination, farmer engagement, timeliness of

information, and cost per farmer reached. Additionally, 24 extension supervisors participated in semi-structured interviews. Ethics approval: Tigris-Euphrates College of Horticultural Studies, Iraq (Ref: TECHS/IQ/2021-016, April 2021).

Instrument Development and Validation

The 36-item questionnaire was developed by adapting communication effectiveness scales from Leeuwis and Aarts [10] and FAO extension evaluation tools. Content validation by seven experts in extension communication retained items with CVI above 0.82. Pilot testing with 25 extension workers in Wasit governorate yielded Cronbach's alpha of 0.84-0.88 across four dimensions. Each dimension

contained 9 items scored on a 5-point effectiveness scale.

Methods

Independent samples t-tests compared traditional and technology-mediated approaches on each dimension. Effect sizes used Cohen's *d*. Multiple regression identified predictors of overall communication effectiveness. Additionally, a subsample of 38 workers who used an integrated approach (both traditional and digital) was analyzed separately. Qualitative data were analyzed thematically [11].

Results

Table 1: Comparison of conventional versus technology-mediated communication models across effectiveness dimensions

Dimension	Traditional (%)	Digital (%)	t-value	p-value	Cohen's d
Knowledge Dissemination	62.4 ± 11.8	69.3 ± 10.2	-3.96	<0.001	0.63
Farmer Engagement	71.4 ± 9.3	58.3 ± 12.7	7.68	<0.001	1.18
Timeliness of Information	48.6 ± 14.1	78.2 ± 8.4	-16.34	<0.001	2.54
Cost per Farmer Reached	54.1 ± 13.6	73.8 ± 11.9	-9.98	<0.001	1.54
Overall Effectiveness	59.1 ± 8.7	69.9 ± 7.8	-8.43	<0.001	1.31

Table 1 shows significant differences between models on all four dimensions. Digital models demonstrated large advantages in timeliness (*d* = 2.54) and cost efficiency (*d* = 1.54). Traditional models held a large advantage in farmer

engagement (*d* = 1.18). Knowledge dissemination favored technology-mediated approaches but with a moderate effect (*d* = 0.63). Overall, digital scored higher (69.9% vs. 59.1%).

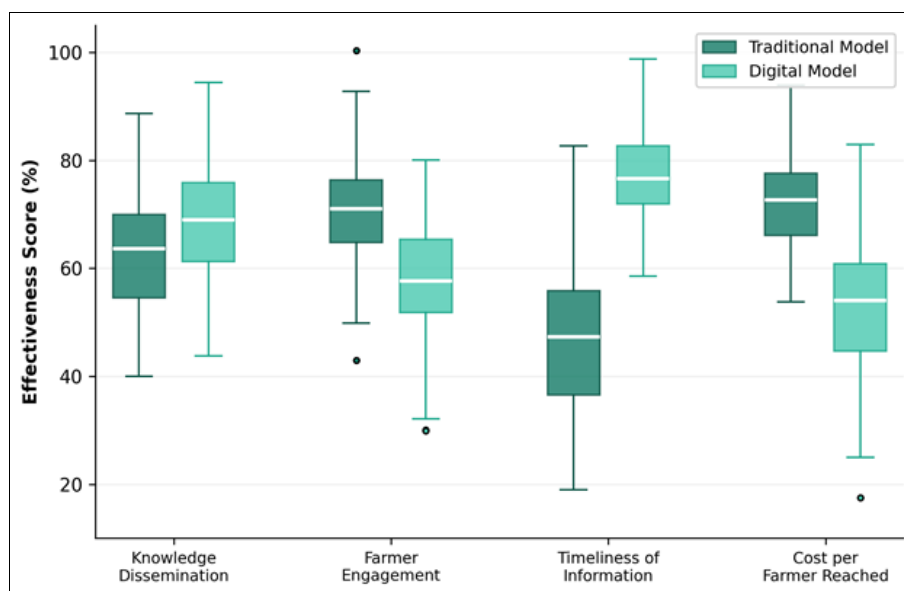


Fig 1: Box plots of effectiveness score distributions for conventional versus technology-mediated communication models

Figure 1 displays box plots comparing score distributions for traditional and technology-mediated approaches across four dimensions. The narrow interquartile range for digital

timeliness scores reflects consistent performance, while traditional farmer engagement scores showed similarly tight clustering around higher values.

Table 2: Regression analysis of factors predicting overall communication effectiveness (n = 177)

Predictor	B	SE	Beta	t	p
Channel Integration Score	3.41	0.78	0.33	4.37	<0.001
Farmer Digital Literacy	2.86	0.71	0.28	4.03	<0.001
Content Localization	2.14	0.63	0.23	3.40	0.001
Extension Worker Training	1.87	0.59	0.21	3.17	0.002
Infrastructure Quality	1.43	0.54	0.17	2.65	0.009

Regression (Table 2) identified predictors of overall effectiveness ($R^2 = 0.524$, $F(5,171) = 37.64$, $p < 0.001$). Channel integration the degree to which workers combined traditional and digital methods was the strongest predictor

(Beta = 0.33). Farmer digital literacy (Beta = 0.28) and content localization (Beta = 0.23) also contributed significantly.

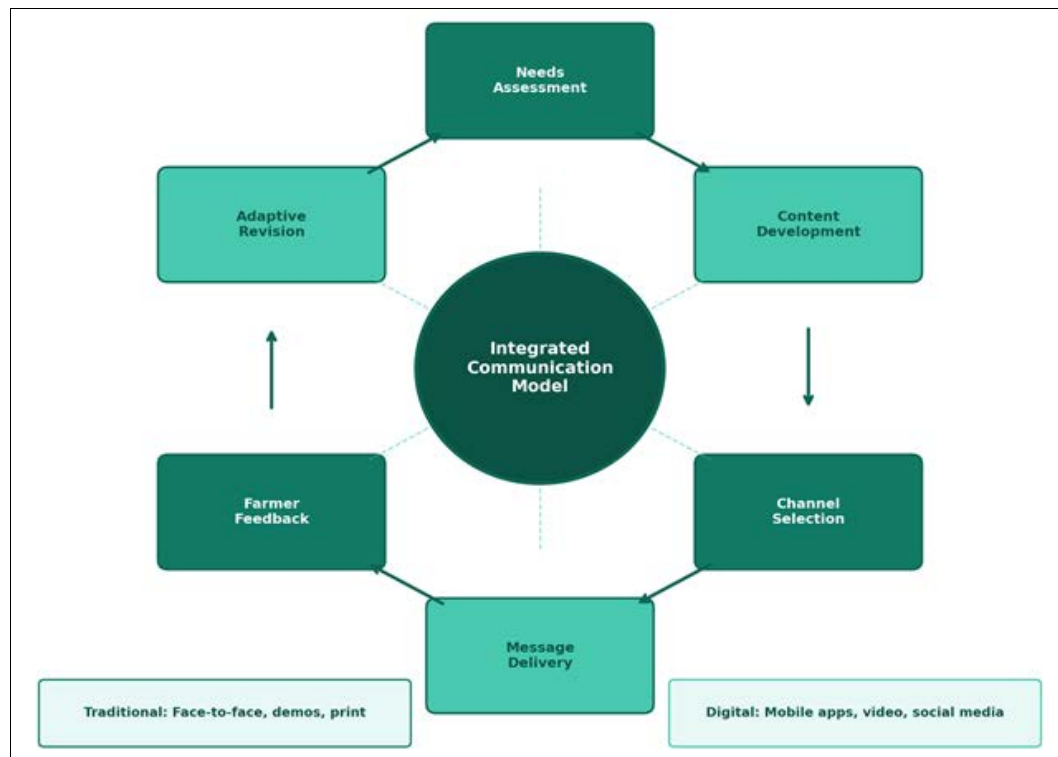


Fig 2: Proposed integrated communication cycle model for horticultural advisory programs

Figure 2 presents the proposed integrated communication cycle model, showing how traditional and digital channels can be combined at each stage from needs assessment through adaptive revision within a continuous feedback loop.

Discussion

The finding that technology-mediated approaches excelled in timeliness and cost efficiency but lagged in farmer engagement echoes observations by Aker^[12] that digital tools improve information speed but may weaken interpersonal trust that drives behavior change. Traditional methods' engagement advantage likely reflects the cultural importance of face-to-face interaction in Iraqi rural communities, where personal relationships between extension workers and farmers remain central to knowledge acceptance^[3].

Channel integration as the strongest predictor of overall effectiveness supports the argument by Sulaiman et al.^[13] that blended approaches outperform single-channel strategies. The integrated subsample ($n = 38$) achieved a mean overall score of 76.4%, exceeding both purely traditional (59.1%) and purely digital (69.9%) groups. This confirms that the question is not whether traditional or digital is better, but how to combine them effectively^[14].

Limitations

This research assessed extension worker perceptions rather than direct farmer outcomes, which may introduce professional bias. The three central governorates may not

represent conditions in Kurdistan or southern Iraq. The cross-sectional design cannot capture how communication preferences shift over time as digital infrastructure improves^[15].

Conclusion

Traditional and technology-mediated communication models each possess distinct strengths for horticultural advisory: traditional methods build farmer engagement and trust, while digital tools offer superior timeliness and cost efficiency. Neither alone achieves optimal results. An integrated approach combining both channels produced the highest effectiveness scores. Extension agencies should invest in blended communication strategies that use digital platforms for time-sensitive alerts and information delivery while maintaining face-to-face interaction for relationship building, demonstration, and complex skill transfer.

References

1. Leeuwis C. Communication for rural innovation: rethinking agricultural extension. 3rd ed. Oxford: Blackwell Science; 2004. p. 1-412.
2. Mittal S, Mehar M. Socio-economic factors affecting adoption of modern information and communication technology by farmers in India: analysis using multivariate probit model. Knowledge Management and E-Learning. 2016;8(1):110-128.
3. Al-Zahrani KH, Al-Shayaa MS, Baig MB, Straquadine GS. Evaluation of agricultural extension services in the Kingdom of Saudi Arabia. Journal of Agricultural and

- Environmental Sciences. 2012;12(1):1-27.
4. GSMA Intelligence. The mobile economy Middle East and North Africa 2020. London: GSMA; 2020. p. 1-38.
 5. Aker JC. Dial “A” for agriculture: a review of information and communication technologies for agricultural extension in developing countries. *Agricultural Economics*. 2011;42(6):631-647.
 6. Fu X, Akter S. The impact of mobile phone technology on agricultural advisory services delivery: evidence from developing countries. *Journal of Development Studies*. 2016;52(11):1561-1576.
 7. Al-Nuemat AA. Agricultural extension challenges in Iraq: perspectives from field practitioners. *Iraqi Journal of Agricultural Sciences*. 2019;50(3):843-851.
 8. Shannon CE, Weaver W. The mathematical theory of communication. Urbana (IL): University of Illinois Press; 1949. p. 1-117.
 9. Berlo DK. The process of communication: an introduction to theory and practice. New York: Holt, Rinehart and Winston; 1960. p. 1-318.
 10. Leeuwis C, Aarts N. Rethinking communication in innovation processes: creating space for change in complex systems. *Journal of Agricultural Education and Extension*. 2011;17(1):21-36.
 11. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77-101.
 12. Aker JC, Mbiti IM. Mobile phones and economic development in Africa. *Journal of Economic Perspectives*. 2010;24(3):207-232.
 13. Sulaiman RV, Hall A, Kalaivani NJ, Dorai K, Reddy TSV. Necessary but not sufficient: critiquing the role of information and communication technology in putting knowledge into use. *Journal of Agricultural Education and Extension*. 2012;18(4):331-346.
 14. Nakasone E, Torero M, Minten B. The power of information: the ICT revolution in agricultural development. *Annual Review of Resource Economics*. 2014;6(1):533-550.
 15. Baumüller H. The little we know: an exploratory literature review on the utility of mobile phone-enabled services for smallholder farmers. *Journal of International Development*. 2018;30(1):134-154.