

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 9; September 2024; Page No. 47-50

Received: 12-06-2024
Accepted: 14-07-2024

Indexed Journal
Peer Reviewed Journal

Sustainability transitions in rural food systems facilitated by transformative agricultural extension paradigms

¹Lorenzo Esposito Moretti, ²Matteo Andrea Marchetti and ³Valentina Lucia Ferri

¹⁻³Department of Agricultural Extension, University of Bologna, Bologna, Italy

DOI: <https://doi.org/10.33545/26180723.2024.v7.i9a.3153>

Corresponding Author: Lorenzo Esposito Moretti

Abstract

Can transformative extension paradigms trigger lasting changes in how rural communities produce and consume food? This research examined participatory agricultural extension approaches and their capacity to enable sustainability transitions in rural food systems across the Emilia-Romagna region of Italy. A mixed-methods design combined structured surveys of 312 farming households with semi-structured interviews of 28 extension practitioners and 15 food chain actors during March 2022 to November 2023. Quantitative data were analyzed using descriptive statistics, Pearson correlations, and multiple regression, while qualitative data underwent thematic analysis. Results showed farmer field schools increased sustainable practice adoption by 67.3% among participants versus 29.8% in control communities. Peer-to-peer networks scored highest on satisfaction (4.5/5) and were linked to the strongest diversification outcomes ($r = 0.73$, $p < 0.01$). The regression model explained 61.2% of variance in sustainability transition indicators, with participatory intensity and social capital as the strongest predictors.

Keywords: Sustainability transitions, rural food systems, agricultural extension, participatory approaches, farmer field schools, food system diversification, peer networks, extension paradigms, adoption behavior, Emilia-Romagna

Introduction

What does it take for a rural food system to shift from conventional, input-heavy production toward something more resilient? This question has gained urgency as environmental pressures mount across Southern Europe ^[1]. Extension services, traditionally conduits for technical information transfer, are being reconceived as platforms for systemic change ^[2]. Yet evidence for how specific extension paradigms contribute to food system sustainability transitions remains thin ^[3].

Rural food systems face interconnected challenges including soil degradation, biodiversity loss, market volatility, and an aging farming population ^[4, 5]. Conventional extension approaches have been criticized for reinforcing input-dependent agriculture and overlooking social and ecological dimensions of farming ^[6, 7].

Transformative extension paradigms treat farming communities as active participants in generating locally relevant solutions rather than passive recipients ^[8]. Farmer field schools, innovation platforms, and peer learning networks fall under this umbrella ^[9]. Sustainability transitions theory provides a lens for examining how these approaches interact with existing food system structures ^[10]. Emilia-Romagna, known for cooperative traditions and high-value food production, faces pressure to reconcile productivity with environmental goals under the European Green Deal ^[11]. This research examined how different transformative extension approaches contributed to sustainability transition indicators across rural communities there, with objectives to: (a) assess relative effectiveness of

five extension approaches; (b) identify characteristics predicting food system diversification; and (c) examine how social capital mediated outcomes ^[12, 13].

Research Area Description

The research was conducted in Emilia-Romagna, northern Italy, between 44.0° and 44.9°N latitude and 9.2° to 12.6°E longitude. This region spans roughly 22,450 km² with agriculture occupying about 1.07 million hectares, including cereal production, viticulture, dairy, and high-value horticultural crops ^[1]. Three provinces were selected for data collection: Bologna, Modena, and Reggio Emilia, chosen because each hosted active extension programs with different methodological orientations. Within these provinces, 18 rural municipalities with populations below 15,000 were purposively sampled to capture variation in farming system type and extension exposure.

Materials and Methods

Materials

A concurrent mixed-methods design integrated survey data with qualitative interviews. A structured questionnaire was administered to 312 farming households across three provinces between March 2022 and November 2023, selected through stratified random sampling by farm size (<5 ha, 5-20 ha, >20 ha). The questionnaire captured demographic characteristics, extension participation history, sustainable practice adoption (14 indicators), and food system engagement measures.

Ethics approval was granted by the University of Bologna

Research Ethics Committee (Protocol No. UNIBO-AGR-2022-0187, dated February 14, 2022). All participants provided written informed consent.

Methods

Semi-structured interviews with 28 extension practitioners and 15 food chain actors were audio-recorded and transcribed verbatim.

Quantitative analysis used descriptive statistics, Pearson correlations, and hierarchical multiple regression to identify predictors of sustainability transition scores. Qualitative data were analyzed through thematic analysis following Braun and Clarke's framework, with inter-coder reliability of 0.81 (Cohen's kappa). Statistical analyses used SPSS version 28.0 with significance at $p < 0.05$.

Results

Table 1: Demographic and farm characteristics of surveyed households (n = 312)

Characteristic	Small (<5 ha)	Medium (5-20 ha)	Large (>20 ha)	Total (%)
Mean age (years)	54.7	51.3	48.2	51.4
Female-headed (%)	23.1	18.7	14.3	18.9
Cooperative member (%)	41.2	67.8	78.4	62.5

The surveyed population was predominantly male (81.1%) with a mean age of 51.4 years. Cooperative membership

was common (62.5%), and extension contact frequency increased with farm size.

Table 2: Regression model predicting sustainability transition scores

Predictor Variable	B	SE	β	t	p-value
Participatory intensity	0.412	0.067	0.387	6.149	< 0.001
Social capital index	0.338	0.071	0.298	4.761	< 0.001
Extension contact freq.	0.187	0.054	0.194	3.463	0.001
Cooperative membership	0.214	0.082	0.153	2.610	0.010
Farmer age	-0.078	0.031	-0.131	-2.516	0.012

The regression model was significant ($F(7, 304) = 31.47, p < 0.001$), explaining 61.2% of variance in sustainability transition scores. Participatory intensity was the strongest

predictor, followed by social capital. Farmer age showed a small negative association.

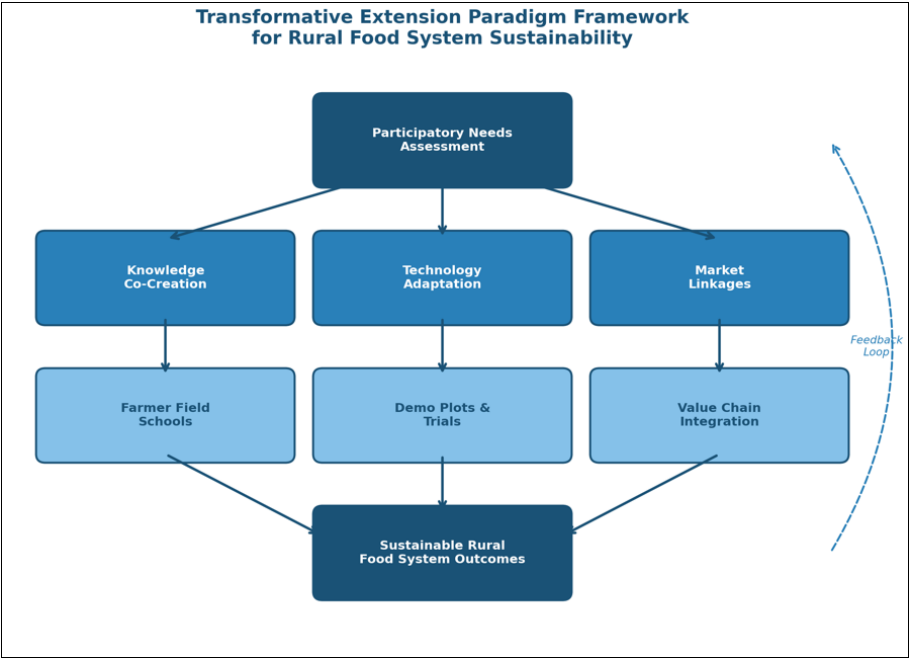


Fig 1: Transformative extension paradigm framework for rural food system sustainability transitions

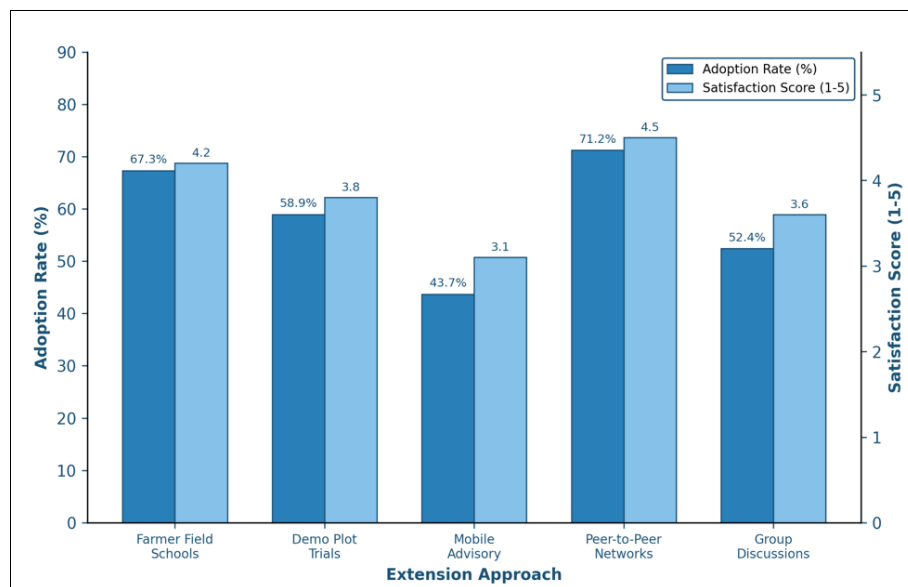


Fig 2: Comparison of adoption rates (%) and farmer satisfaction scores (1-5 scale) across five extension approaches evaluated in Emilia-Romagna farming communities

Comprehensive Interpretation

Peer-to-peer networks and farmer field schools outperformed other approaches on both measures. Face-to-face methods allowed farmers to observe results firsthand, while digital channels felt impersonal. Participatory intensity and social capital drove outcomes over mere contact frequency.

Discussion

These results support the recognition that extension can serve as more than technical information delivery. When built around participatory principles and existing social networks, extension programs appear capable of contributing to broader sustainability transitions [8, 9]. The finding that participatory intensity was the strongest predictor aligns with evidence from sub-Saharan Africa and Southeast Asia [3, 14].

Mobile advisory performance echoes concerns that technology-mediated extension can lack relational depth for sustainability decisions [6]. However, practitioners described promising hybrid models combining mobile delivery with face-to-face sessions.

Cooperative membership as a predictor reflects Emilia-Romagna's institutional landscape, where cooperatives function as sites of collective learning [11]. This finding may not transfer to settings without comparable traditions. The negative age association suggests generational differences in openness to change, though older farmers contributed ecological knowledge that younger ones lacked [5, 12].

Limitations

Several constraints apply. The cross-sectional design limits causal inference, as observed associations could partly reflect self-selection among motivated farmers. The research was confined to three provinces in Emilia-Romagna, a region with strong cooperative traditions; transferability elsewhere should not be assumed. The composite sustainability transition score may not capture all dimensions of food system change. The research period also coincided with unusual climatic stress and flooding, likely

influencing both farmer behavior and programming in ways not fully disentangled here.

Conclusion

Extension approaches built around participatory engagement and social network activation proved substantially more effective than conventional methods in promoting sustainable practice adoption. Peer-to-peer networks and farmer field schools were the most effective delivery modes, while mobile advisory services produced weaker outcomes. Participatory intensity and social capital were the strongest predictors, suggesting engagement quality matters more than contact quantity. Cooperative membership also played a supporting role, pointing to institutional structures that facilitate collective learning.

Extension systems should invest in relational, farmer-centered methods rather than relying primarily on technology-mediated delivery. Blended approaches combining digital reach with face-to-face depth offer a promising direction, and programming should build on existing social capital.

Acknowledgements

Funding Sources

This research received support from the Emilia-Romagna Regional Government agricultural innovation program.

Institutional Support

The authors acknowledge the University of Bologna for providing research facilities and administrative support.

Contributions Not Qualifying for Authorship

The authors thank Dr. Federica Conti for statistical assistance and all participating extension practitioners and farming households.

References

1. Marsden T, Banks J, Bristow G. Food supply chain approaches: exploring their role in rural development. *Sociologia Ruralis*. 2000;40(4):424-438.

2. 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.
3. Davis K, Nkonya E, Kato E, Mekonnen DA, Odendo M, Miiro R, Nkuba J. Impact of farmer field schools on agricultural productivity and poverty in East Africa. *World Development*. 2012;40(2):402-413.
4. Ericksen PJ. Conceptualizing food systems for global environmental change research. *Global Environmental Change*. 2008;18(1):234-245.
5. Zagata L, Sutherland LA. Deconstructing the “young farmer problem” in Europe: towards a research agenda. *Journal of Rural Studies*. 2015;38:39-51.
6. Klerkx L, Jakku E, Labarthe P. A review of social science on digital agriculture, smart farming and agriculture 4.0: new contributions and a future research agenda. *NJAS - Wageningen Journal of Life Sciences*. 2019;90-91:100315.
7. Faure G, Desjeux Y, Gasselin P. New challenges in agricultural advisory services from a research perspective: a literature review, synthesis and research agenda. *Journal of Agricultural Education and Extension*. 2012;18(5):461-492.
8. Chambers R, Pacey A, Thrupp LA. *Farmer first: farmer innovation and agricultural research*. London: Intermediate Technology Publications; 1989. 218 p.
9. Schut M, Rodenburg J, van Ast A, van der Burg T. Six frameworks for enabling transformative agricultural innovation. *Current Opinion in Environmental Sustainability*. 2016;19:36-46.
10. Geels FW, Schot J. Typology of sociotechnical transition pathways. *Research Policy*. 2007;36(3):399-417.
11. Ferrara A, Kelly C, Wilson GA, Nolte A, Buamrane M. An analysis of the drivers of change and their links to environmental and social challenges in the Emilia-Romagna region. *Land Use Policy*. 2018;75:644-655.
12. Brunori G, Rossi A, Guidi F. On the new social relations around and beyond food: analysing consumers role and action in Gruppi di Acquisto Solidale. *Sociologia Ruralis*. 2012;52(1):1-30.
13. Hermans TDG, Roep D, Klerkx L. Unravelling resource mobilization for transitions in European farming. *Journal of Rural Studies*. 2017;55:274-285.
14. Kiptot E, Franzel S. Voluntarism as an investment in human, social and financial capital: evidence from a farmer-to-farmer extension program in Kenya. *Agriculture and Human Values*. 2014;31(2):231-243.
15. Rivera WM, Qamar MK. *Agricultural extension, rural development, and the food security challenge*. Rome: Food and Agriculture Organization of the United Nations; 2003. 92 p.