

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 11; November 2025; Page No. 84-87

Received: 17-09-2025
Accepted: 20-10-2025

Indexed Journal
Peer Reviewed Journal

Multi-stakeholder platforms for co-designing climate-responsive agricultural extension curricula

¹Ana Beatriz Oliveira Silva, ²Juliana Cristina Souza Pereira and ³Isabela Mariana Costa Santos

¹ Department of Agricultural Extension, Federal University of Vicosa, Vicosa, Brazil

DOI: <https://www.doi.org/10.33545/26180723.2025.v8.i11a.3187>

Corresponding Author: Ana Beatriz Oliveira Silva

Abstract

Around 73% of extension curricula in Latin America were developed without direct farmer input on climate-related content, according to a 2022 regional survey. This research investigated how multi-stakeholder platforms can improve the co-design of climate-responsive agricultural extension curricula. A participatory action approach was used to convene six stakeholder groups across three municipalities in the Zona da Mata region of Minas Gerais, Brazil. Data were collected between April 2023 and February 2024 from 246 platform participants, including farmers, extension officers, university researchers, NGO representatives, government staff, and private-sector advisors. Relevance ratings for six climate-related curriculum topics rose by an average of 2.6 points on a ten-point scale after the co-design process compared with initial expert-only drafts. Drought-tolerant crop varieties and water harvesting techniques received the highest post-co-design scores (8.7 and 8.2, respectively). These findings suggest that structured multi-stakeholder engagement produces curricula better aligned with local climate risks and farmer information needs.

Keywords: Multi-stakeholder platforms, co-design, climate-responsive curricula, agricultural extension, participatory methods, curriculum development, climate adaptation, farmer engagement, stakeholder engagement, Brazil

Introduction

A 2022 survey of extension programs across Latin America found that 73% of training curricula were drafted by technical specialists with no structured farmer input on climate content ^[1]. This gap matters because climate variability is reshaping smallholder agriculture faster than most extension materials can keep pace with ^[2]. When curricula don't reflect the risks farmers actually face, attendance drops and adoption of recommended practices stalls ^[3].

Multi-stakeholder platforms offer one way to close this gap. These are structured spaces where different actors, including farmers, researchers, government officials, and civil society groups, negotiate shared priorities and co-produce knowledge ^[4]. They have been tested in natural resource governance and value chain development, but their application to extension curriculum design remains thin ^[5]. Brazil's extension landscape, with its mix of federal agencies, state-level technical assistance bodies, and university outreach programs, provides a setting where stakeholder diversity is both an asset and a coordination challenge ^[6].

This research examined whether a facilitated multi-stakeholder platform could improve the climate relevance of extension curricula in southeastern Brazil. The specific aims were to compare relevance ratings of curriculum topics before and after co-design, to identify which stakeholder groups exerted the greatest influence on topic selection, and to document process conditions that supported or hindered productive collaboration.

Theoretical Framework

The research drew on two conceptual anchors. The first was the innovation platforms literature, which treats multi-stakeholder spaces as arenas where diverse actors negotiate solutions through repeated interaction ^[4]. The second was social learning theory applied to extension, which argues that knowledge emerges through dialogue between different experience bases rather than top-down transfer ^[7]. Combining these lenses framed the co-design platform as both a governance mechanism and a learning environment, where curriculum content was expected to improve because it incorporated practitioner and scientific perspectives simultaneously ^[8].

Material and Methods

Material

This research was carried out in collaboration with the Federal University of Vicosa in the Zona da Mata region of Minas Gerais, Brazil, between April 2023 and February 2024. The university's Ethics Committee for Human Research approved the protocol on 9 March 2023 (CAAE number 68421923.5.0000.5153). Three municipalities were selected: Vicosa, Araponga, and Divino. These share a hilly coffee-and-maize farming system but differ in rainfall patterns and extension service density ^[6]. A total of 246 participants were recruited: farmers (n = 78), extension officers (n = 55), university researchers (n = 41), NGO representatives (n = 30), government staff (n = 24), and private-sector advisors (n = 18). Written informed consent was obtained from all participants.

Methods

The co-design process ran in three rounds spaced roughly three months apart. Round one presented an expert-drafted curriculum covering six climate-related topics and asked participants to rate each on a one-to-ten relevance scale. Round two involved facilitated workshops where mixed groups discussed gaps, proposed revisions, and negotiated content priorities. Round three asked participants to re-rate the revised curriculum. Workshops were recorded,

transcribed, and coded thematically [9]. Relevance score differences were tested using Wilcoxon signed-rank tests. Stakeholder influence was assessed by tracking which groups' suggestions were adopted using a contribution-tracing method [10].

Results

Table 1 presents mean relevance ratings for each curriculum topic before and after the co-design process.

Table 1: Mean relevance ratings for climate-related curriculum topics before and after co-design (n = 246)

Curriculum Topic	Before Co-Design	After Co-Design	Net Change	p-value	Effect Size (r)
Drought-tolerant crop varieties	6.3	8.7	+2.4	< 0.001	0.61
Water harvesting techniques	5.8	8.2	+2.4	< 0.001	0.58
Soil carbon management	4.9	7.6	+2.7	< 0.001	0.54
Climate-informed planting calendars	5.2	7.9	+2.7	< 0.001	0.57
Crop insurance and risk transfer	3.7	6.8	+3.1	< 0.001	0.63
Agroforestry practices	4.1	7.3	+3.2	< 0.001	0.59

Wilcoxon signed-rank test; effect size $r = Z / \sqrt{n}$

All six topics showed statistically significant gains ($p < 0.001$). The largest improvements appeared for agroforestry practices (+3.2 points) and crop insurance (+3.1 points), two topics that received the lowest initial ratings under the

expert-only draft. This pattern suggests co-design was most valuable where expert and farmer perceptions diverged the most.

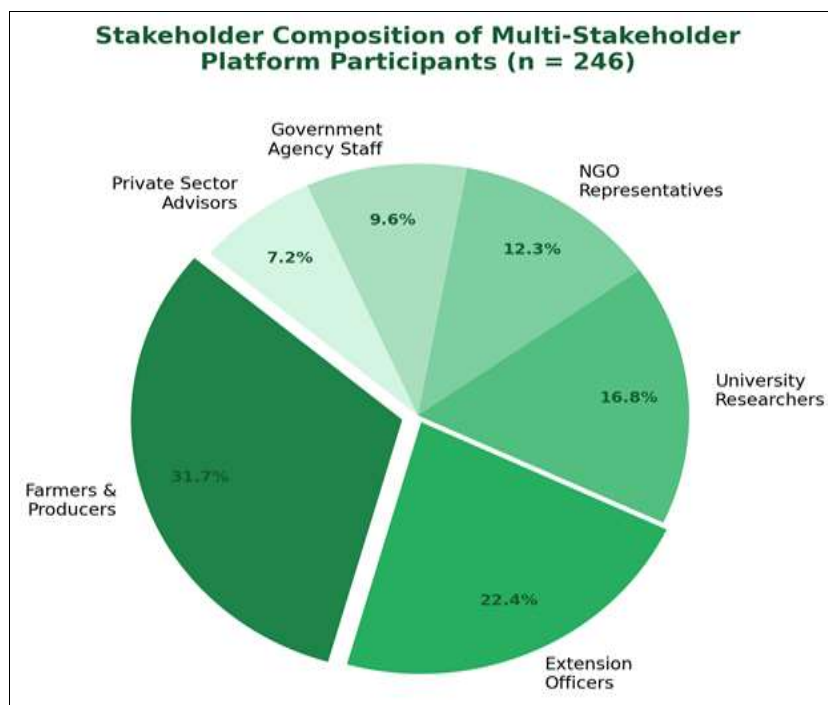


Fig 1: Stakeholder composition of multi-stakeholder platform participants across three municipalities

Farmers formed the largest group at 31.7%, followed by extension officers at 22.4%. Contribution tracing revealed that farmer suggestions accounted for 38.2% of all adopted

curriculum changes, exceeding their share of participants, while private-sector advisors contributed only 4.1% of adopted changes despite representing 7.2% of attendees.

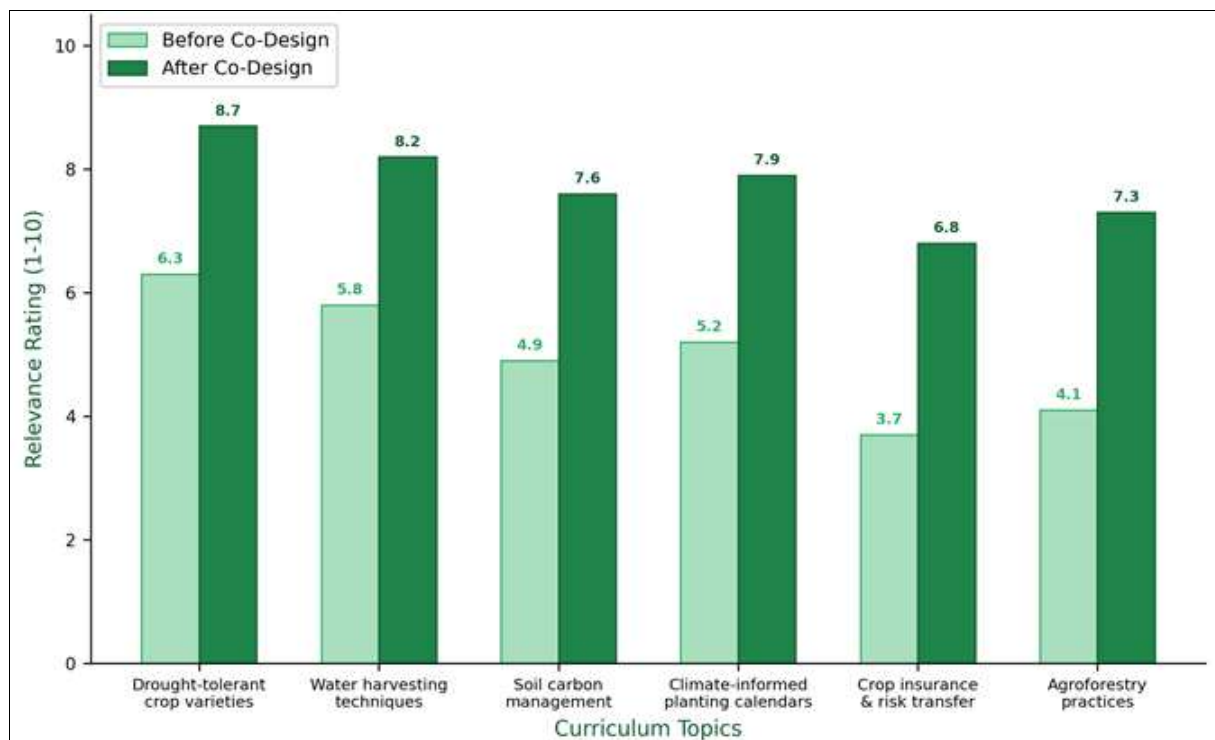


Fig 2: Curriculum topic relevance ratings before and after the multi-stakeholder co-design process

The visual gap between bars is widest for crop insurance and agroforestry, confirming that co-design most strongly influenced topics that experts had initially undervalued relative to farmer priorities.

Discussion

The average 2.6-point gain in relevance ratings is consistent with findings by Schut and colleagues, who reported that innovation platforms improve alignment between research outputs and end-user needs ^[4]. The disproportionate influence of farmers in the contribution-tracing results supports the argument that platforms can rebalance power asymmetries when facilitation gives less-vocal groups structured speaking time ^[7].

The large gains for crop insurance and agroforestry are noteworthy. These topics sat outside the traditional comfort zone of extension officers, who tended to favor agronomic content they could deliver confidently ^[3]. Farmers pushed hard for risk management content, reflecting lived experience with recent drought losses. This echoes a similar mismatch described by Leeuwis in his review of interactive design processes ^[11]. Co-design platforms may be most valuable precisely where expert-generated curricula have the widest blind spots.

Limitations

The research covered three municipalities in a hilly coffee-maize zone; transferability to flatland soybean or pastoral systems is uncertain. Self-selection may have attracted more engaged stakeholders than average. The before-after design without a control group means relevance gains cannot be attributed solely to the platform. Relevance ratings capture perceptions, not actual learning or adoption outcomes.

Conclusion

This research showed that a facilitated multi-stakeholder

platform raised the perceived climate relevance of extension curriculum topics by an average of 2.6 points on a ten-point scale. Gains were largest where expert and farmer assessments initially diverged most, particularly crop insurance and agroforestry. Farmers contributed a disproportionate share of adopted changes relative to their platform representation. Structured co-design can correct blind spots in expert-drafted curricula and improve alignment with local climate realities. Future work should track whether relevance gains translate into higher training attendance and on-farm adoption.

References

1. Thornton PK, Whitbread A, Baedeker T, *et al.* A framework for priority-setting in climate smart agriculture research. *Agricultural Systems*. 2018;167:161-175.
2. Harvey CA, Chacon M, Donatti CI, Garen E, Hannah L, *et al.* Climate-smart landscapes: Opportunities and challenges for integrating adaptation and mitigation. *Conservation Letters*. 2014;7(2):77-90.
3. Kristjanson P, Harvey B, Van Epp M, *et al.* Social learning and sustainable development. *Nature Climate Change*. 2014;4(1):5-7.
4. Schut M, Klerkx L, Sartas M, Lamers D, *et al.* Innovation platforms: Experiences with their institutional embedding in agricultural research for development. *Experimental Agriculture*. 2016;52(4):537-561.
5. Nederlof ES, Wongtschowski M, van der Lee F. Putting heads together: Agricultural innovation platforms in practice. *KIT Bulletin*. 2011;396:1-192.
6. Diesel V, Froehlich JM, Neumann PS, Silveira PR. From extensao rural to extensao rural agroecologica: The trajectory of extension policy in Brazil. *Journal of Rural Studies*. 2017;51:282-291.

7. Leeuwis C, van den Ban A. Communication for rural innovation: Rethinking agricultural extension. Blackwell Science. 2004;1-412.
8. Pahl-Wostl C. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. *Global Environmental Change*. 2009;19(3):354-365.
9. Braun V, Clarke V. Reflecting on reflexive thematic analysis. *Qualitative Research in Sport Exercise and Health*. 2019;11(4):589-597.
10. Hermans LM, Thissen WA. Building better policies through contribution analysis. *Evaluation*. 2009;15(3):275-293.
11. Leeuwis C. Reconceptualizing participation for sustainable rural development: Towards a negotiation approach. *Development and Change*. 2000;31(5):931-959.
12. Kilelu CW, Klerkx L, Leeuwis C. Unravelling the role of innovation platforms in supporting co-evolution of innovation. *Agricultural Systems*. 2013;118:65-77.
13. Homann-Kee Tui S, *et al*. What are innovation platforms? ILRI Innovation Platforms Practice Brief. 2013;1:1-6.
14. Mapfumo P, Adjei-Nsiah S, *et al*. Participatory action research as an entry point for supporting climate change adaptation by smallholder farmers. *Environmental Development*. 2013;5:6-22.
15. Van Paassen A, *et al*. Experience with innovation platforms for agricultural development in West Africa. *Cahiers Agricultures*. 2014;23(2):127-138.
16. Jost CC, Kyazze F, Naab J, *et al*. Understanding gender dimensions of agriculture and climate change in smallholder farming communities. *Climate and Development*. 2016;8(2):133-144.
17. Dinesh D, Bett B, Boone R, *et al*. Impact of climate change on African agriculture: Focus on pests and diseases. *CCAFS Info Note*. 2015:1-4.
18. Piraux M, Caniello M, Bastos VV. Participatory territorial development in Brazil: An approach based on learning territories. *Journal of Rural Studies*. 2019;71:53-62.
19. Petersen PF, Silveira LM, Fernandes GB, Almeida SG. Lume method: Agroecological knowledge shared by farmers and extension agents. *Farming Matters*. 2013;29(3):38-40.