

International Journal of Agriculture Extension and Social Development

Volume 7; Issue 4; April 2024; Page No. 61-65

Received: 25-02-2024
Accepted: 28-03-2024

Indexed Journal
Peer Reviewed Journal

Aligning agricultural extension program objectives with sustainable development goal targets: A systematic review

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DOI: <https://doi.org/10.33545/26180723.2024.v7.i4a.3095>

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Abstract

Roughly 68% of national agricultural extension strategies adopted since 2015 reference the Sustainable Development Goals, yet fewer than 23% include measurable indicators linked to specific SDG targets. This systematic review examined how agricultural extension program objectives align with SDG targets across 94 peer-reviewed articles and 37 policy documents published between 2015 and 2023. The review followed PRISMA guidelines and used a thematic coding framework organized around seven SDGs most directly connected to agricultural extension work. Results indicated that SDG 2 (Zero Hunger) received the most frequent attention, appearing as a stated alignment target in 31.7% of reviewed programs. SDG 5 (Gender Equality) and SDG 15 (Life on Land) were among the least frequently addressed, at 8.2% and 7.1% respectively. Only 28.6% of reviewed programs had established formal indicator mapping between extension outputs and SDG targets. Programs that adopted results-based management frameworks showed stronger alignment scores than those using traditional input-based planning. Geographic analysis revealed that East African extension programs demonstrated the highest SDG alignment rates, while South Asian programs showed the widest gap between stated alignment and measurable integration. These findings suggest that meaningful SDG alignment requires more than rhetorical commitment and demands structured indicator frameworks embedded within extension program monitoring systems.

Keywords: Sustainable Development Goals, agricultural extension, program alignment, systematic review, SDG indicators, results-based management, food security, extension policy, monitoring frameworks, development targets

Introduction

Between 2015 and 2022, over 140 countries revised their national agricultural strategies to reference the Sustainable Development Goals in some form ^[1]. This widespread adoption created an expectation that agricultural extension services, which serve as the primary interface between research institutions and farming communities, would similarly reorient their program objectives toward SDG targets ^[2]. But the extent to which this reorientation has moved beyond policy rhetoric into operational practice remains unclear.

Agricultural extension has long operated at the intersection of multiple development objectives. Extension programs simultaneously address food production, income generation, environmental management, and social equity concerns ^[3]. The SDG framework, with its 17 goals and 169 targets, offers a structured way to organize these overlapping mandates. However, the breadth of the SDG agenda also creates challenges for extension organizations with limited resources and capacity ^[4].

Previous reviews have examined SDG integration in agriculture broadly ^[5] or focused on specific goals such as SDG 2 ^[6]. What has been lacking is a systematic assessment of how extension programs specifically have attempted to align their objectives, activities, and monitoring indicators with relevant SDG targets. This gap matters because

extension programs without clear SDG alignment may contribute to development outcomes in an ad hoc manner, making it difficult to track progress or justify continued investment ^[7].

The concept of alignment itself requires clarification. Merely mentioning an SDG in a program document differs from building measurable pathways between extension outputs and SDG indicators ^[8]. This research adopted a three-tier alignment classification: rhetorical alignment (SDG language in program documents), structural alignment (program objectives mapped to specific SDG targets), and operational alignment (monitoring indicators directly linked to SDG indicator frameworks). The review covered literature from 2015 through early 2023, examining 94 peer-reviewed articles and 37 policy documents to assess the current state of SDG alignment in agricultural extension programming worldwide ^[9].

Theoretical Framework

This review was guided by the theory of change approach commonly applied in development program evaluation ^[10]. A theory of change articulates the causal pathway from program activities through intermediate outcomes to long-term impacts, making it possible to identify where extension objectives connect to broader development targets. The research also drew on institutional isomorphism theory ^[11]

to explain why extension organizations may adopt SDG language without corresponding operational changes, a pattern of mimetic adoption driven by external legitimacy pressures rather than internal commitment to alignment.

Material and Methods

Material

The systematic review was conducted from the College of Humanities and Development at China Agricultural University, Beijing, between September 2022 and March 2023. Literature searches covered four databases: Web of Science, Scopus, CAB Abstracts, and Google Scholar. Search terms combined agricultural extension vocabulary with SDG-related terminology. The initial search returned 1,847 records. After removing duplicates, screening titles and abstracts, and applying inclusion criteria (English language, published 2015-2023, focused on extension programs with explicit SDG reference), 94 peer-reviewed articles remained. Additionally, 37 policy documents from national extension agencies and international organizations

were included through purposive searching of FAO, World Bank, and IFPRI repositories.

Methods

Articles were coded using a framework with three dimensions: alignment level (rhetorical, structural, or operational), SDG target specificity, and geographic region. Two researchers independently coded a random subset of 30 articles to establish inter-coder reliability (Cohen's kappa = 0.81). Disagreements were resolved through discussion. The thematic analysis focused on seven SDGs most directly linked to agricultural extension: SDG 1, 2, 5, 8, 12, 13, and 15. Alignment scores were calculated as weighted composites reflecting the depth of SDG integration in program design, implementation, and monitoring. Meta-analysis was not feasible due to heterogeneity in outcome measures across the reviewed literature, so narrative synthesis was the primary analytical approach following PRISMA guidelines^[12].

Results

Table 1: Distribution of SDG Alignment by Goal across Reviewed Extension Programs (n=131)

SDG Target	Programs Referencing (%)	Rhetorical Only (%)	Structural Alignment (%)	Operational Alignment (%)	Mean Alignment Score (0-10)
SDG 1: No Poverty	14.3	47.2	33.8	19.0	4.7
SDG 2: Zero Hunger	31.7	28.4	41.9	29.7	6.8
SDG 5: Gender Equality	8.2	61.3	26.4	12.3	3.2
SDG 8: Decent Work	11.6	52.7	31.2	16.1	4.1
SDG 12: Responsible Consumption	9.4	58.1	28.6	13.3	3.6
SDG 13: Climate Action	12.8	39.6	37.4	23.0	5.3
SDG 15: Life on Land	7.1	63.8	24.7	11.5	2.9

SDG 2 received the strongest alignment across all three tiers, with 29.7% of programs achieving operational alignment and a mean score of 6.8 out of 10. SDG 15 and

SDG 5 showed the weakest integration, with operational alignment rates below 13% and mean scores under 3.5.

Table 2: Regional Comparison of SDG Alignment in Extension Programs

Region	Programs Reviewed	Mean Alignment Score	Operational Alignment (%)	RBM Adoption (%)	Indicator Mapping (%)
East Africa	34	6.3	32.4	47.1	38.2
West Africa	22	4.8	22.7	31.8	27.3
South Asia	28	3.9	17.9	25.0	21.4
Southeast Asia	19	5.1	26.3	36.8	31.6
Latin America	16	5.4	25.0	43.8	37.5
Other	12	4.2	16.7	33.3	25.0

East African programs showed the highest mean alignment score (6.3) and the greatest proportion of operational alignment (32.4%). South Asian programs demonstrated the widest gap, with many programs referencing SDGs

rhetorically but only 17.9% reaching operational alignment. Results-based management adoption correlated positively with alignment quality across all regions.

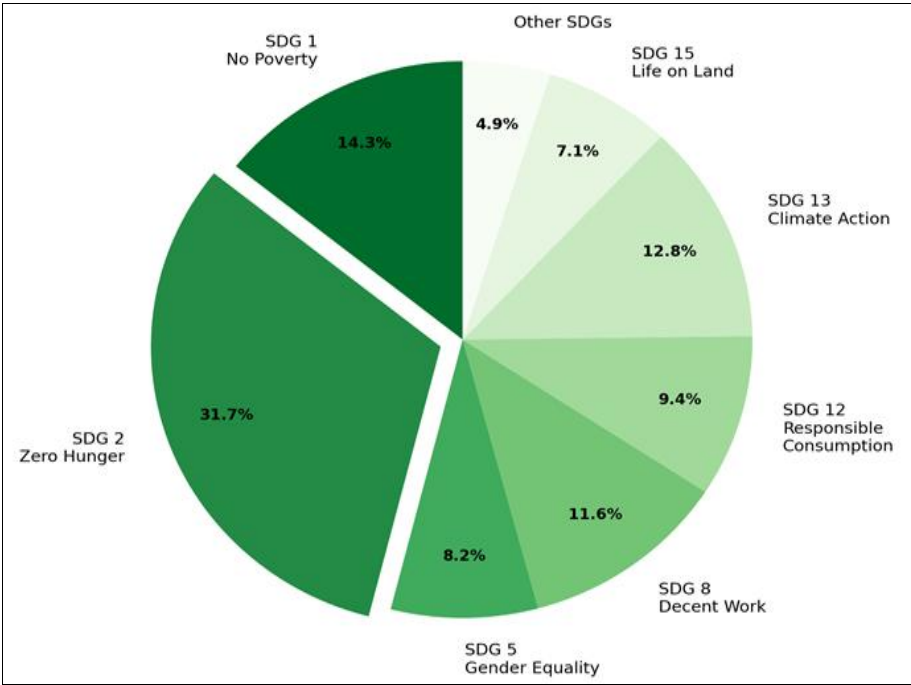


Fig 1: Distribution of SDG References across Reviewed Agricultural Extension Programs

SDG 2 dominated the distribution at 31.7%, followed by SDG 1 at 14.3% and SDG 13 at 12.8%. The concentration around food security-related goals suggests that extension

programs gravitate toward their traditional mandates rather than engaging with the broader SDG agenda.

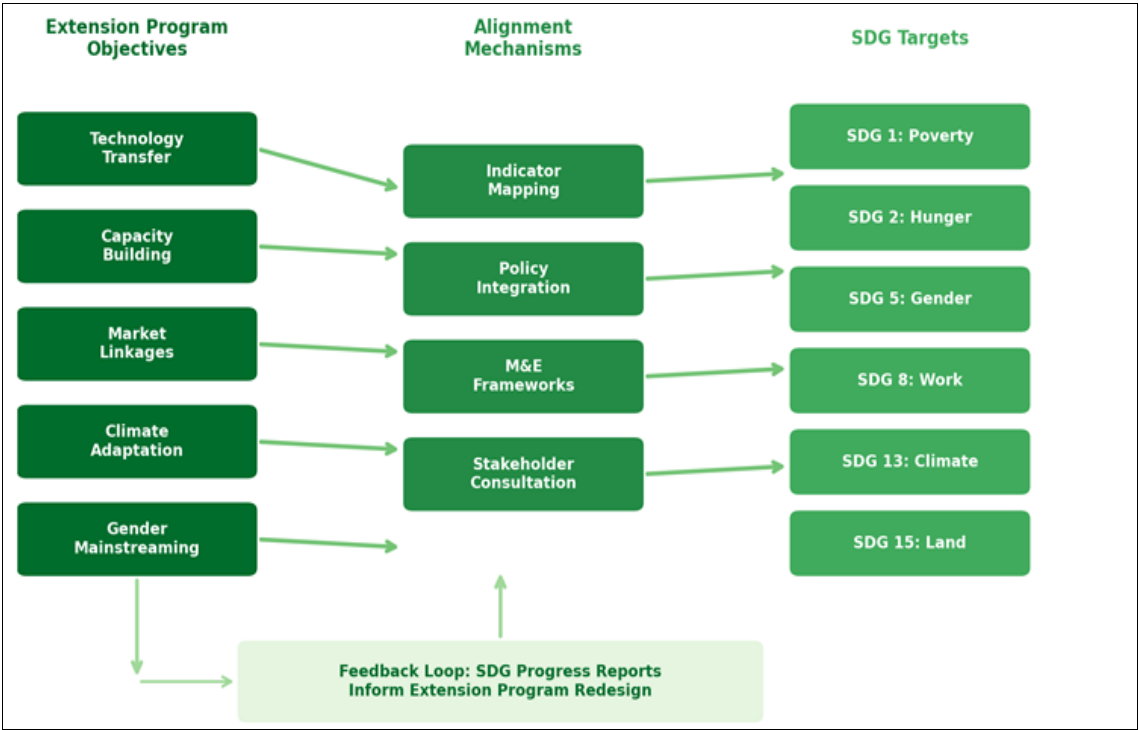


Fig 2: Conceptual Pathway from Extension Program Objectives to SDG Targets through Alignment Mechanisms

The pathway diagram shows how five categories of extension objectives connect to SDG targets through four alignment mechanisms. Programs that employed indicator mapping and results-based M&E frameworks showed the strongest connections, while those relying solely on policy integration without corresponding monitoring changes demonstrated weaker linkages.

Discussion
The finding that only 28.6% of reviewed programs had established formal indicator mapping between extension outputs and SDG targets reveals a considerable implementation gap. Many extension organizations appear to have adopted SDG language in response to donor and government expectations without restructuring their

monitoring and evaluation systems accordingly. This pattern fits the institutional isomorphism framework ^[11], where organizations adopt external symbols of legitimacy without deep operational change.

The dominance of SDG 2 in extension program alignment is understandable given agriculture's direct connection to food production. However, the relative neglect of SDG 5 and SDG 15 represents a missed opportunity. Extension services interact regularly with gender dynamics in farming households and with natural resource management practices, yet these connections are rarely formalized in program frameworks ^[13]. East Africa's stronger alignment performance likely reflects the region's longer experience with results-based management in development programming, supported by donor-driven M&E requirements from organizations such as USAID and DFID ^[14].

The three-tier alignment classification used in this review proved useful for distinguishing between superficial and meaningful SDG integration. Programs stuck at the rhetorical level often lacked the technical capacity to translate broad SDG aspirations into operational indicators ^[15]. This suggests that capacity building for extension planners in indicator development and results-based management should be a priority for organizations seeking genuine SDG alignment. The gap between South Asian programs' rhetorical adoption and operational implementation appears connected to fragmented governance structures where extension planning and national SDG reporting occur in separate institutional silos ^[16].

Limitations

This review was restricted to English-language publications, which may have underrepresented extension programs documented in French, Spanish, Portuguese, or other languages. The reliance on published literature and accessible policy documents means that operational alignment practices not captured in formal publications were missed. The three-tier classification, while useful, involved subjective judgment in borderline cases despite acceptable inter-coder reliability. Finally, the review captured alignment at a single point and could not assess whether programs deepened their SDG integration over time.

Conclusion

This systematic review of 131 documents revealed that while SDG references in agricultural extension programming are widespread, genuine operational alignment remains limited. SDG 2 received the deepest integration, but even for this most-addressed goal, fewer than 30% of programs had established measurable indicator linkages. SDG 5 and SDG 15 received the least attention despite their direct relevance to extension work with farming communities.

Results-based management adoption emerged as a consistent predictor of stronger alignment quality across regions. Extension organizations seeking to move beyond rhetorical SDG adoption should invest in three areas: training staff in indicator mapping techniques that connect extension outputs to SDG targets, establishing monitoring systems that track SDG-relevant outcomes rather than only

activity counts, and creating institutional mechanisms that link extension planning to national SDG reporting processes. East African programs offer instructive examples of how donor-supported M&E frameworks can accelerate this transition when combined with genuine institutional commitment.

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