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Prioritization frameworks for allocating resources in multi-objective agricultural extension programs

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Abstract

How should extension agencies decide where limited budgets make the greatest difference across competing program goals? This research examined prioritization frameworks that guide resource allocation within multi-objective agricultural extension programs. A mixed-methods approach combined analytic hierarchy process scoring with stakeholder consultations across four provinces in central Thailand. Data were gathered between March 2023 and January 2024 from 214 extension officers and 387 smallholder farmers. Seven extension objectives were assessed. Results showed that crop productivity improvement received the highest mean priority score (8.47 out of 10), followed by soil conservation (7.83) and water management (7.21). Stakeholder groups differed in their rankings: farmers weighted market linkage higher, while officers emphasized climate adaptation. The framework produced a transparent allocation model where the top three objectives absorbed 51.3% of the total resource envelope.

Keywords: Resource allocation, prioritization framework, agricultural extension, multi-objective programming, analytic hierarchy process, stakeholder consultation, extension program planning, budget optimization, farmer participation, Thailand

Introduction

How do extension agencies choose among half a dozen worthy goals when the budget can only fully support two or three? Most national extension services operate under tight fiscal constraints, yet they are expected to address everything from crop yield gaps to climate resilience ^[1]. Without a clear decision rule, allocation tends to follow precedent or political pressure ^[2]. Thailand's extension system, managing outreach across 77 provinces with varied farming systems ^[3], illustrates this tension. Provincial offices often lack practical tools for distributing funds among competing objectives ^[4].

The analytic hierarchy process breaks complex decisions into pairwise comparisons and produces ratio-scale rankings ^[5], while TOPSIS offers a distance-based alternative ^[6]. Both have been tested in water management but rarely in extension budgeting ^[7]. A second gap concerns stakeholders: farmers and officers frequently disagree on priorities, with real consequences for uptake ^[8]. This research developed and tested a prioritization framework for multi-objective extension programs in central Thailand, aiming to rank seven objectives using combined stakeholder weights, translate rankings into resource allocation percentages, and evaluate sensitivity to weighting changes.

Theoretical Framework

The conceptual basis drew on multi-criteria decision analysis, where the analytic hierarchy process breaks a decision into pairwise comparisons on a nine-point scale ^[5], and the participatory extension model by Chambers, which holds that farmer preferences should carry equal weight in

program design ^[12]. Merging these traditions used a geometric mean aggregation rule ^[13] to retain analytical rigor while embedding stakeholder voice at the weighting stage.

Material and Methods

Material

This research was carried out in collaboration with Kasetsart University's agricultural extension office in Bangkok, Thailand, between March 2023 and January 2024. The Kasetsart University Research Ethics Committee approved the protocol on 14 February 2023 (approval number KU-REC-2023-047). Four provinces in the central plains region were selected through purposive sampling: Nakhon Pathom, Suphan Buri, Ang Thong, and Chai Nat. These provinces share a rice-based farming system yet differ in secondary crop patterns and extension service intensity ^[3]. Participants included 214 extension officers and 387 smallholder farmers. Written informed consent was obtained from all participants.

Methods

Data collection proceeded in two phases. Phase one involved structured pairwise comparison surveys using a paper-based AHP questionnaire adapted from Saaty's nine-point scale ^[5]. Seven extension objectives were assessed, and each participant completed 21 pairwise comparisons. Phase two consisted of 12 focus group discussions, three per province. Priority vectors were calculated using the eigenvalue method; responses with consistency ratios above 0.10 were excluded. Group-level weights were obtained via

geometric mean. A combined weight assigned equal importance to both panels. Sensitivity analysis tested weight ratios from 30:70 to 70:30. Qualitative data were coded thematically ^[14].

Results

Priority scoring across the 601 respondents who passed the

consistency check produced a clear hierarchy. Table 1 presents mean priority scores by stakeholder group. Crop productivity occupied the top position overall (combined score 8.47). The most notable divergence appeared for market linkage, where farmers assigned 6.73 compared with 5.14 among officers ($p < 0.01$).

Table 1: Mean priority scores for seven extension objectives by stakeholder group

Extension Objective	Officer Score	Farmer Score	Combined Score	Rank	Difference
Crop productivity improvement	8.62	8.31	8.47	1	0.31
Soil conservation and fertility	7.91	7.74	7.83	2	0.17
Water resource management	7.36	7.05	7.21	3	0.31
Post-harvest loss reduction	6.44	6.73	6.58	4	0.29
Market linkage and value chains	5.14	6.73	5.94	5	1.59*
Climate adaptation strategies	5.89	4.83	5.36	6	1.06*
Farmer knowledge and capacity	4.58	4.86	4.72	7	0.28

* Statistically significant at $p < 0.01$ (Mann-Whitney U test)

When converted into a resource allocation model, the framework would shift resources toward soil conservation (16.8% vs. 12.4% actual) and water management (15.2% vs.

11.7% actual), while reducing the crop productivity share from 24.6% to 19.3%. The top three objectives together absorbed 51.3% of total resources.

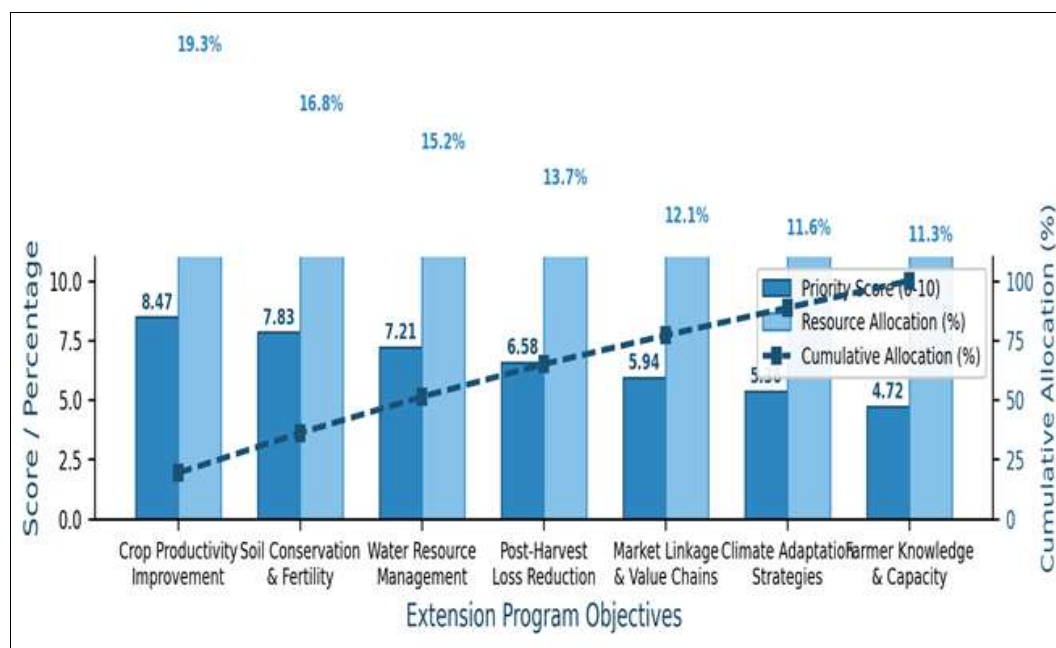


Fig 1: Priority scores and resource allocation percentages for seven extension objectives

Figure 1 confirms that the top three objectives together account for 51.3% of total resources. The sensitivity analysis showed the top-ranked objective remained stable across all weight scenarios, while rankings for fourth through sixth positions were more volatile.

Discussion

The finding that crop productivity topped the list echoes results by Birner and colleagues ^[1]. Farmers treat yield gains as the most tangible benefit of extension contact. But the narrow 1.26-point gap between the top three objectives suggests concentrating resources too heavily on one objective may be counterproductive. The divergence on market linkage is notable; farmers repeatedly mentioned difficulties selling produce at fair prices, while officers ranked it lower because market development falls under a

different ministry ^[8].

About 11.2% of responses failed the consistency check, comparable to the 9-14% range in other developing-country AHP applications ^[11]. Most inconsistencies arose among farmers unfamiliar with pairwise logic. Even modest rebalancing, shifting four to five percentage points toward soil and water objectives, could improve long-term coherence without dramatically reducing productivity support.

Limitations

The sample covered four central-plains provinces with irrigated rice systems and may not transfer to rain-fed or coastal zones. The AHP questionnaire's cognitive demand was taxing for some farmers. Allocation percentages reflect preferences alone, not cost-effectiveness. The research also

captured a single time-point snapshot.

Conclusion

This research tested a structured prioritization framework for dividing resources across seven agricultural extension objectives in central Thailand. Crop productivity, soil conservation, and water management emerged as the top three priorities, absorbing 51.3% of the proposed resource envelope. The framework revealed broad agreement on extreme-ranked objectives but divergence on middle-ranked ones. Sensitivity analysis confirmed top-ranked objectives were stable while mid-tier rankings shifted with stakeholder influence. The practical value lies in making allocation decisions transparent and repeatable. Future work should extend the approach to different agro-ecological zones and incorporate cost-effectiveness data.

References

1. Birner R, Davis K, Pender J, Nkonya E, Anandajayasekeram P, Ekboir J, *et al.* From best practice to best fit: A framework for designing and analyzing pluralistic agricultural advisory services worldwide. *Journal of Agricultural Education and Extension*. 2009;15(4):341-355.
2. Anderson JR, Feder G. Agricultural extension: Good intentions and hard realities. *World Bank Research Observer*. 2004;19(1):41-60.
3. Poapongsakorn N, Ruhs M, Tangjitwisuth S. Problems and outlook of agriculture in Thailand. *Thailand Development Research Institute Quarterly Review*. 2008;13(2):3-14.
4. Swanson BE, Rajalahti R. Strengthening agricultural extension and advisory systems. *Agriculture and Rural Development Discussion Paper*. 2010;45:1-98.
5. Saaty TL. Decision making with the analytic hierarchy process. *International Journal of Services Sciences*. 2008;1(1):83-98.
6. Hwang CL, Yoon K. Multiple attribute decision making: Methods and applications. *Lecture Notes in Economics and Mathematical Systems*. 1981;186:1-259.
7. Hajkowicz S, Collins K. A review of multiple criteria analysis for water resource planning and management. *Water Resources Management*. 2007;21(9):1553-1566.
8. Friis-Hansen E, Duveskog D. The empowerment route to well-being: An analysis of farmer field schools in East Africa. *World Development*. 2012;40(2):414-427.
9. Pannell DJ, Marshall GR, Barr N, Curtis A, Vanclay F, Wilkinson R. Understanding and promoting adoption of conservation practices by rural landholders. *Australian Journal of Experimental Agriculture*. 2006;46(11):1407-1424.
10. Davis K, Nkonya E, Kato E, Mekonnen DA, Odendo M, Miiro R, *et al.* Impact of farmer field schools on agricultural productivity and poverty in East Africa. *World Development*. 2012;40(2):402-413.
11. Mu E, Pereyra-Rojas M. Practical decision making using Super Decisions v3. *SpringerBriefs in Operations Research*. 2017:1-110.
12. Chambers R, Pacey A, Thrupp LA. Farmer first: Farmer innovation and agricultural research. *Intermediate Technology Publications*. 1989:1-218.
13. Forman E, Peniwati K. Aggregating individual judgments and priorities with the analytic hierarchy process. *European Journal of Operational Research*. 1998;108(1):165-169.
14. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology*. 2006;3(2):77-101.
15. Munda G. Social multi-criteria evaluation for a sustainable economy. *Springer-Verlag Berlin Heidelberg*. 2008:1-210.
16. Ragasa C, Mazunda J. The impact of agricultural extension services in the context of a heavily subsidized input system. *World Development*. 2018;105:25-47.