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Farmers' decision-making: iterative model validation and livelihood alternatives for agricultural land in peri-urban hanoi

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Abstract

This study examines how farming households in peri-urban Hanoi decide between maintaining agricultural production, renting land, or leaving land fallow in the face of rapid urbanisation, declining agricultural labour, and shifting livelihood opportunities. In previous work, we presented decision outcomes from a probabilistic model. This paper focuses on the methods used to iteratively validate and refine the model structure using literature and expert input. We applied a structured decision analysis framework combining causal modelling, expert elicitation, and Monte Carlo simulations to estimate the Net Present Value (NPV) and uncertainty of each decision pathway. We did not treat the model as fixed; instead, we engaged in iterative validation with local experts and farmers, updating model parameters and structure based on new literature, Value of Information and participatory feedback sessions. A scoping review of 15 peer-reviewed studies informed our initial conceptual model of costs, benefits, and risks. This was followed by gender-balanced focus group discussions with over 50 farmers across four communes in Ba Vi and Chuong My districts. To ensure robust parameter inputs, we introduced a lightweight calibration training adapted to the local context. Using culturally appropriate analogies and visual aids, participants were trained to express uncertainty with 90% confidence bounds, reducing common biases in expert estimates. After analysing the outputs—including NPV ranges and the value of information—we returned the results to farmers and local authorities. Their interpretation of outcomes led to refinements in variable definitions, functional forms, and scenario relevance. For example, social values and policy-related risks were adjusted based on real-world perceptions of land abandonment regulations. Our participatory, adaptive approach resulted in a living decision model, validated through triangulation across literature, expert knowledge, and simulation results. The process demonstrates how dynamic, context-sensitive decision models can support both household decision-making and evidence-based land policy in peri-urban settings.

Keywords: Fallow land, land use decision-making, peri-urban agriculture

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