Business Decision Analysis Principles in Research for Agricultural Development

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Abstract

Most research for agricultural development aims at informing intervention decisions, but the information it delivers is normally insufficient for comprehensive decision support. This is because few research activities manage to adequately consider the complex nature of agricultural systems, which are influenced by a range of ecological, socioeconomic, cultural and political factors. Severe lack of data on most of these factors contributes to the frequent failure of research to supply decision-makers with robust science-based information to support particular decisions.

Since it is not feasible to close all knowledge gaps or to fully capture complex system dynamics in integrated deterministic models, new approaches are needed for supplying decision-makers with usable information. Business decision analysis methods offer a promising way forward, because they have been designed for aiding businesses in decision-making on risky projects with imperfect information and limited research budgets. A key strategy in decision analysis is capturing the current state of uncertainty about particular variables of interest, before any measurements are taken, and using this knowledge for probabilistic simulations of the full range of plausible system outcomes of particular interventions. Exploring the outputs of this procedure allows identifying high-value variables, whose measurements would most improve certainty about how a decision should be taken. These then emerge as priorities for further investigation. Having the research process guided by such analysis facilitates efficient allocation of research funds and helps researchers focus their efforts where they are most useful.

Application of these principles is demonstrated with three case studies: 1) probabilistic participatory modelling of the business case for a water pipeline in northern Kenya, 2) use of Bayesian Networks for targeting water interventions in Tanzania and 3) analysis of the nutritional implications of replacing homegarden-based small-scale farming in Uganda with larger scale commercial food production. In all cases, robust guidance on decision-making, or at least on data collection needs or prominent intervention risks were possible without expensive long-term data collection. The principles of business decision analysis offer one of the most promising approaches to meeting the challenges of system complexity and data scarcity that appear ubiquitous in agricultural development.

Keywords: Applied information economics, Bayesian Networks, holistic modelling, transdisciplinary modelling, uncertainty

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