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## Empowering rural farm women in agricultural development: A decision analysis approach with a focus on gender

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### Abstract

Despite being extremely important for holistic research, gender is often overlooked in agricultural and development-related studies. Rural farm women in low- and middle-income countries are the main subject of rural agriculture development interventions for women’s empowerment. We study factors influencing their empowerment in agricultural development to support researchers in capturing gender in development-oriented agricultural modelling efforts. We generated a literature-derived decision model by applying Monte Carlo simulation, a random sampling method, to include the uncertainty and riskiness of the decision outcome. The underlying Decision Analysis impact pathway describes women’s empowerment within their social environments through gains in the areas where they are disadvantaged, i.e., education and training, economic strength, agricultural resources, health care and nutritious food, further strengthening their ability to work and, thus, financial resources. Safety is a crucial constraint for rural women since they can face danger within families and communities. We programmed the model as a Shiny app (<https://femiaculture.shinyapps.io/femiaculture/>) tool to be used by research teams for estimating the gains in rural women’s empowerment resulting from any research efforts. The app can also support individual women using their own inputs. Based on research on prior empowerment interventions and the system of empowerment, we show that increasing gains for women and supporting empowerment is superior to the status quo if violence against women does not increase. Further holistic, system-oriented thinking and trans- and interdisciplinary research can reduce bias and include women as decision-makers over their empowerment. Such inclusive studies of female empowerment could produce actionable future models and web apps that can potentially empower rural women in different areas.

**Keywords:** Agricultural development, decision analysis model, empowerment, gender, rural farm women, transdisciplinary research