

Application of bio-economical farm model 'FarmDESIGN' in improving the livelihood of the small scale farmers in the developing countries

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Abstract

FarmDESIGN is a bio-economical farm model which allows evaluation of the productive, economic, and environmental farm performance to generate a large set of alternative farming systems through multi-objective optimization process (Groot et al., 2012). In this case study in Madagascar, the performance of the four representative farming systems was measured using the FarmDESIGN model and presented through three different indicators; economic profit, labor requirement, and soil organic matter balance to reflect economic, social and environmental performances of the farm. In the exploration of alternative farming systems, the optimization process of the model was set to maximize the economic profit and soil organic matter balance, and minimize labor requirement of the farm. The interrelations among those performance indicators were analyzed, which can be either trade-offs or synergies, depending on the characteristics of the farm structure. Understanding these interrelations is important as it helps farmers making balanced decisions based on their own priorities while finding a way to improve the farming system or adopting new technologies into their current farming system. As the main results of the study, the whole-farm model suggests growing larger areas of specific crops (in this case millet and sorghum) in a drought year indicating the importance of both crops owing to their drought tolerance. In most of the cases, an apparent trade-off trend between labor requirement and economic profit was observed. However, the model showed potential to improve both economic profit and labor requirement of the current farms up to certain degrees, which could provide insights to the smallholder farmers for a better understanding of the potentials of their own farming systems.

Keywords: *farming system analysis, farm model, FarmDESIGN*

References

- [1] Groot, J.C., Oomen, G.J. and Rossing, W.A. (2012). Multi-objective optimization and design of farming systems. *Agricultural Systems*, 110, pp.63-77.

Biography

Hongkun Oh worked for the international relief and development NGO, World Vision, as a senior program officer and a field project manager based in Ghana, Rwanda, and Uganda. He completed his master's degree on agroecology in the Wageningen University with a particular focus on food security of small-scale farmers in developing countries. Currently, he is based in the Netherlands and running his own consultancy firm, Agriconsulting Grow, as a consultant on agriculture and development.