



Interactive validation of an agent-based model in the time of COVID-19

Habtamu D. Yismaw¹ (h.demilewyismaw@uni-hohenheim.de), Christian Troost¹, Thomas Berger¹

¹Land Use Economics in the Tropics and Subtropics, University of Hohenheim

Background

- the study developed an agent-based model (ABM) using MPMAS to examine the effect of smallholder farmers' investment in agroforestry to adapt to extreme climate and price variability in Ethiopia

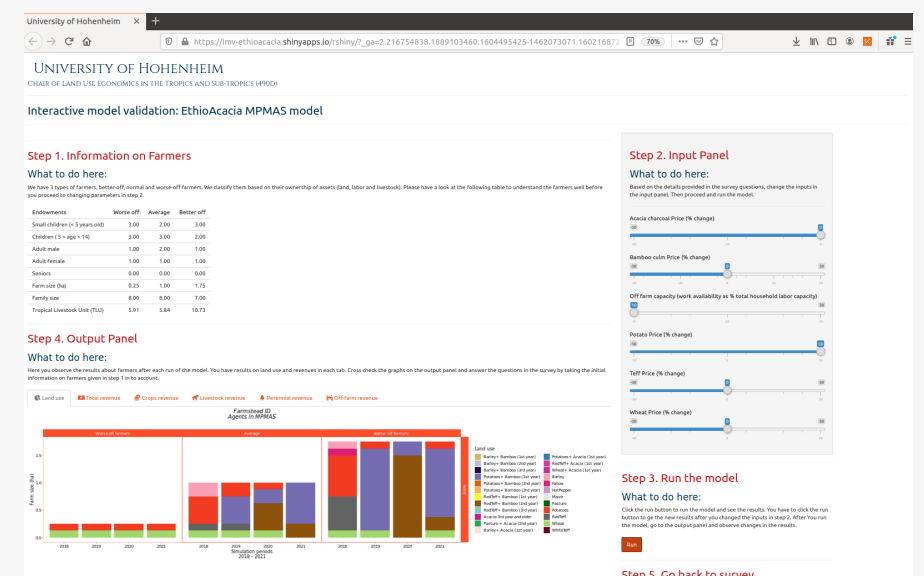
Methodology

How did we do that?

- experts were selected based on relevance of their expertise to the objective of the model and their experience working in the area
- two interactive web applications were developed using R Shiny



User interface

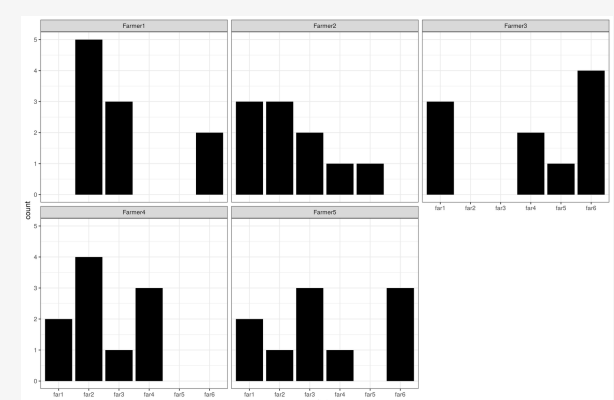


- apps were designed as a web page, could be opened using any device, simulations were run in advance and results were uploaded to the server
- session was guided by the researcher through a video call
- operates with minimal bandwidth requirements suitable for the poor internet connectivity in Ethiopia

Conclusions

- the interactive session has been successful and provided valuable insights to improve the modeling process.

Turing test results



- in this way, the interactive model validation was undertaken while keeping all participants safe from COVID-19

Acknowledgement

- Food Security Center, University of Hohenheim, Stuttgart, Germany provided financial support to facilitate the interactive sessions

ABM: Modeling process

Data Collection

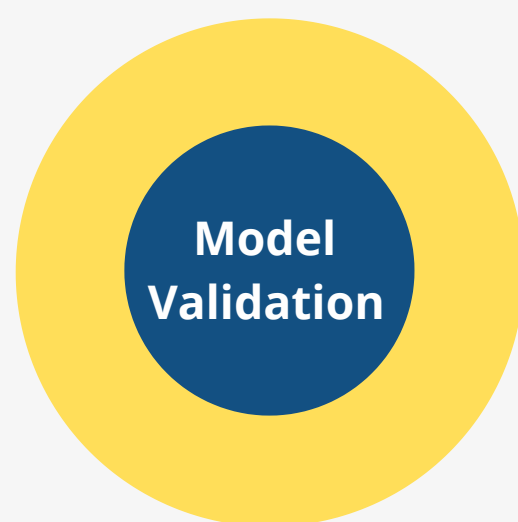
Model Construction

Model Testing

Model Validation

Simulation Experiments

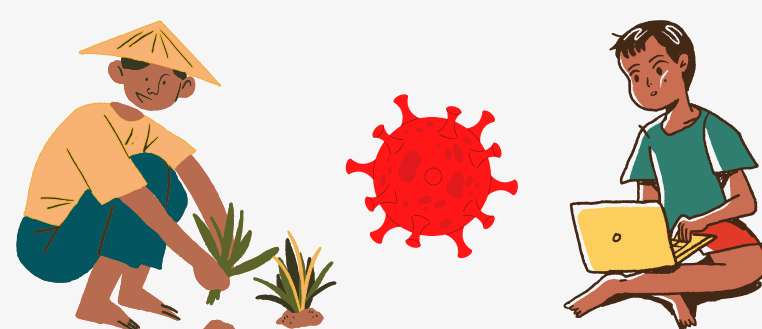
Output Analysis



- to validate the model, first, simulated agent production decisions were compared with cross-sectional survey data collected in the study area in 2018 - prone to overfitting
- to complement the results obtained using survey-based validation, a participatory model validation method was designed to be conducted in the field with farmers who had participated in the survey

Challenge

- however, it was not possible to administer farmer-to-model interactive validation due to the COVID-19 pandemic without inflicting exposure to contagion



Solution

- an alternative online participatory platform was designed to validate the model with agricultural experts instead of farmers