

EasyHarvest – ICT-enabled geolocation and optimized scheduling for combine harvesters

Background

Procuring timely, appropriate, adequate and efficient farming equipment for the needs of rice farmers is difficult. Scheduling for combine harvesters, in particular, is a challenge; in the status quo, a farmer calls for combine service that comes on a first come, first serve basis. Poor communication, poor matching of field conditions with machines and poor scheduling lead to high costs, low productivity, high environmental footprint, low operational efficiency and high crop losses. For instance, it is estimated that an optimized scheduling target can potentially reduce postharvest loss by 3% and harvesting costs by 10%, resulting in a savings of approximately USD 1 million per year for a 40,000 users targeted. The Seed Grant sought to develop a system to address these existing constraints to provide better access and availability to machinery services.



What was done

EasyHarvest is a web-based tool in the pilot stage of development. It provides a smart link between farmers and combine harvester service providers. It is designed to optimize the scheduling of combine harvester services by matching the actual needs of farmers and the availability of the contractors' machines. *EasyHarvest* uses algorithms for predicting farm conditions, anticipated harvesting times, and available infrastructure based on available data in a cloud-based platform, and it becomes "smarter" as more data are used in its algorithms.

It has the following key components:

- User interface and database structure for farmers and contract service providers
- Model algorithm for optimizing the schedule of operations
- Integration with current IRRI ICT platforms (e.g., *Rice Crop Manager*) via two-way sharing of data

EasyHarvest combines its users' most common tasks with the scheduling of harvest machinery, with each stakeholder, such as farmers, service providers, and farm managers, having access to different user interfaces.



1. Farmers: ability to share information about their field and estimated harvesting date, receiving information on available machines, and booking the services that match their needs.
2. Service providers: the ability to share information about their combine harvesters and harvesting schedules on a real-time geo-located map, which also helps them keep track of their assets in the field.
3. Farm managers: the ability to see a proposed optimal schedule for each field available and optimize management accordingly.



Partners

For the Seed Grant, we worked closely with the Seed Grant Program, Ziegler Experiment Station, *Rice Crop Manager* Team and the Postharvest and Mechanization Team.



Results and Lessons Learned

Using the Seed Grant fund, we were able to create a cloud-based platform and optimized scheduling system that is currently functional and running.

Next Steps

Following the Seed Grant funding period, we have developed a concept for the next generation or *EasyHarvest^{Pro}*. This platform will broaden the tool's application to include the following:

- Optimized scheduling and operations of the combine harvester, laser-leveling machines, transplanters, straw balers, and more
- Smart (image processing-based) fertilizer and pesticide application
- Smart (drying and storage, modeling and remote sensing based) postharvest management

We hope to create a more robust decision support tool to promote best practices into the rice farming value chain for sustainable rice production.