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In cooperation with



Data collection at Jimma, February 2022.  
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# COFFEE INNOVATION

Coffee Disease Early Detection Using  
Artificial Intelligence

# OVERVIEW: DEBO ENGINEERING (ETHIOPIA)

## CHALLENGE

Farmers have difficulty identifying coffee diseases because of different symptoms in different coffee varieties, microclimates and other combinations of problems. Even expert agronomists need to be familiar with the local plant physiology in order to correctly diagnose and treat them. Through working closely with the pilot coffee farmer group, additional gaps in coffee farmer access to information were identified. Debo is continuing to develop features and functionality for the app to bridge other gaps.

## INNOVATION

### BUNA APP – APP TO DIAGNOSE COFFEE DISEASES

Debo Buna App revolutionizes the coffee farming industry with its innovative technology designed to diagnose coffee diseases swiftly and accurately. By harnessing the power of Artificial Intelligence (AI), the app analyzes vast data sets and detects patterns within photos of coffee leaves, branches and roots, enabling farmers to identify diseases with precision. This not only prevents misdiagnosis and excessive use of medication but also facilitates early detection, empowering farmers to take proactive measures to mitigate damage and effectively manage plant care.

## COMPANY DESCRIPTION

Debo Engineering is an emerging technology-based agritech startup company that provides end-to-end farming and processing automation services specializing in the coffee industry. It was founded in Jimma, Ethiopia, in 2019.

## KEY COMPANY STATS

### NUMBER OF PRODUCER PARTNERS

One farmer group (approx. 45 farmers)

### NUMBER OF STAFF

Five (plus ten women hired for additional app development and training)

## COST

### COSTS

Annual subscription fee paid by farmers

### EFFECTS ON REVENUE AND YIELD

Effects on revenue and yield were difficult to determine given the short timeframe.

Farmers reported that they were able to limit damage to their coffee trees from disease from the first use of the app.

## PREPARATION

### TIMELINE

Nine months to develop the technology, five months to collect data and train the AI model, five months to procure and deploy devices

### MATERIALS AND EQUIPMENT

- Smartphone, tablet or computer
- Internet access
- Coffee union support (optional)

### STAFFING REQUIREMENTS

Each farmer can manage data input

## LESSONS LEARNED

### CHALLENGES

- COVID-19 distancing practices and travel restrictions posed challenges, particularly to using farmer interviews to inform the tool design and features.
- Collecting data from farmers involved traveling over long distances which was time consuming and resource-intensive.
- At the end of the project timeline, the development of the app was completed, but some additional work and impact measurement had not yet taken place.

### TAKEAWAYS

- The success of the app opened up a whole new perspective for Debo Engineering on how technology might be able to help coffee farmers.
- Debo has leveraged their user feedback to identify other features that could help farmers increase revenue and improve access to market (e.g. adding coffee tourism, washing, grading, tasting using e-tongue and export facilitation).
- Debo would like to visit more coffee growing regions outside of Ethiopia to better understand the context of global coffee production and to develop tools with broader applicability.

# RESULTS: DEBO ENGINEERING (ETHIOPIA)

As a result of deploying the Debo Buna App:



## THOUSANDS OF IMAGES OF COFFEE PLANTS

collected across Jimma, Harar and Sidama to train the AI.



## FIVE LOCAL LANGUAGES

supported by the app (and more can be easily added).



## 45 FARMERS:

Mobile phones, a laptop, and training on the app and features were provided to help farmers have better access to detailed coffee disease analysis.



## DEBO ENGINEERING IS ADDING TRAINING

to bridge skill gaps and address farmer needs to maximize value (e.g. coffee exporting).

“

The commercial benefits have been substantial, as we have seen a reduction in production costs due to optimized resource allocation and a higher market price for our disease-free coffee beans.

”

## IMPLEMENTATION: DEBO ENGINEERING (ETHIOPIA)



Training for farmers on how they can use the application. © Debo Engineering

### STEP

1

Collect background data from the area to train AI (one month).

### STEP

2

Register and add farmers and train them to use the app.

### STEP

3

Collect and upload other data (coffee tourism etc.) to connect farmers to other revenue streams.

“

By harnessing the power of artificial intelligence, we have significantly improved the efficiency and accuracy of disease detection in our coffee plantations.

”

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**MISSION:** The Fund's objective is to increase the profitability of smallholder coffee farmers, and foster greater, more equitable value distribution along the supply chain through promoting innovative farming systems, transparent and inclusive business models, and access to new markets.

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