Opus™ Kangundo Crop Cut Executive Report

Digitalising the Kenyan Agriculture Insurance Programme
to Enhance Scale, Effectiveness, and Affordability

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Executive Summary

Agricultural sustainability is the top priority in the developing world, where more than 500 million smallholder farms responsible for over 80% of food production face existential challenges. The pre-eminent focus of research institutions, development agencies, governments, and agribusinesses is the development of novel products and services to achieve last-mile sustainability. However, it is the lack of coordination with local stakeholders, extremely disconnected marketplaces for agriculture services, and additional delivery barriers that impede progress - not a lack of sustainable agricultural practices.

In March 2023, Green Enterprise Group Ltd (GEG) conducted a trial of its agriculture extension tool, Opus™, in Kangundo sub-county, Machakos County, Kenya. The results of this trial and the resulting methodology are enclosed in this report, which presents problem and solutions in layman's terms to a general audience.

Using Opus™, the Green Enterprise team collaborated with the project manager of the Kangundo Crop Cut - also the director of all operations pertaining to crops in the sub-county - to partially digitalise the extension process. Doing so notably reduced project overhead, increased transparency and oversight over the individual Crop Cuts undertaken as part of the activity, and automatically delivered formatted, digitised data at the activity's end.

By extending the use of Opus™ to the country's national Agriculture Insurance Programme and to agriculture extension -

the process of delivering agricultural services to farmers - we can help address food security, youth employment, gender equality, and environmental sustainability by modernising agriculture in Kenya.

The first section of this report introduces the Crop Cut approach and discusses its shortcomings. The second section lays out the four simple steps used by GEG to digitalise the process - UAI and form delivery, project set-up, service delivery, and project review. The third and final section explores the potential benefits and use cases that are currently under development.

Table of Contents

Section 1. The Standard Crop Cut Approach

The Crop Cut method is a widely used technique for assessing the yield of crops in agricultural insurance programs. In Kenya, the Kenyan Agriculture Insurance Programme (KAIP) uses the Crop Cut method to determine the yield of insured crops.

The KAIP is a government-run program that provides crop insurance to smallholder farmers in Kenya. The program uses a combination of satellite imagery, weather data, and the Crop Cut method to determine crop yields and assess crop losses. This helps farmers to mitigate the financial risks associated with crop failures and weather-related disasters, and to improve their livelihoods and food security.

Under the Crop Cut method, a representative sample of the insured crop is selected, and the crop is harvested, threshed, and weighed to determine its yield. This yield is then compared to the expected yield based on historical data and other factors to determine the extent of any crop loss due to insured perils such as drought, floods, pests, and diseases.

Management of the Crop Cut occurs at a sub-county level. The agent overseeing Crops in the sub-county is the project manager. They are provided with a list of UAIs (Unit Areas of Insurance) with GPS locations tagged on google maps links and with a data collection form. They divide the individual Cuts into bite-sized tasks and assign them to agents.

These agents use their notebooks to take farmer information while completing the Cut and then transcribe that information onto printed sheets. The project manager reviews these sheets, adds any missing information (such as the moisture content of crop samples taken back to the office), and delivers them. They also oversee payment, quality assurance, and project management for everyone in the field.


(Image) A Kangundo Sub County Ward officer collects Crop Cut information from UAI_32. Pictured here is the manual data collection approach: which entails one agent reading questions off a printed copy of the data collection form and transcribing this information into a notebook. The data collected is then carefully copied into the form in the office, so that it can be legible for the project manager (March 3rd, 2023).

However, the Crop Cut - like other comparable agricultural projects - is expensive and time-consuming for agents and the Government. The current Crop Cut procedure is manual, paper-based, and relies on relationships of direct oversight and trust. Digitisation - the automation of select tasks using technology - shows incredible potential to reclaim resources such as time and money and deliver huge additional benefits such as youth employment.

Section 2. The Crop Cut on Opus™

Green Enterprise presents Opus™, an agriculture extension tool which provides end-to-end digitisation of development projects conducted by organisations and governments. It is composed of a project management platform and a mobile app.
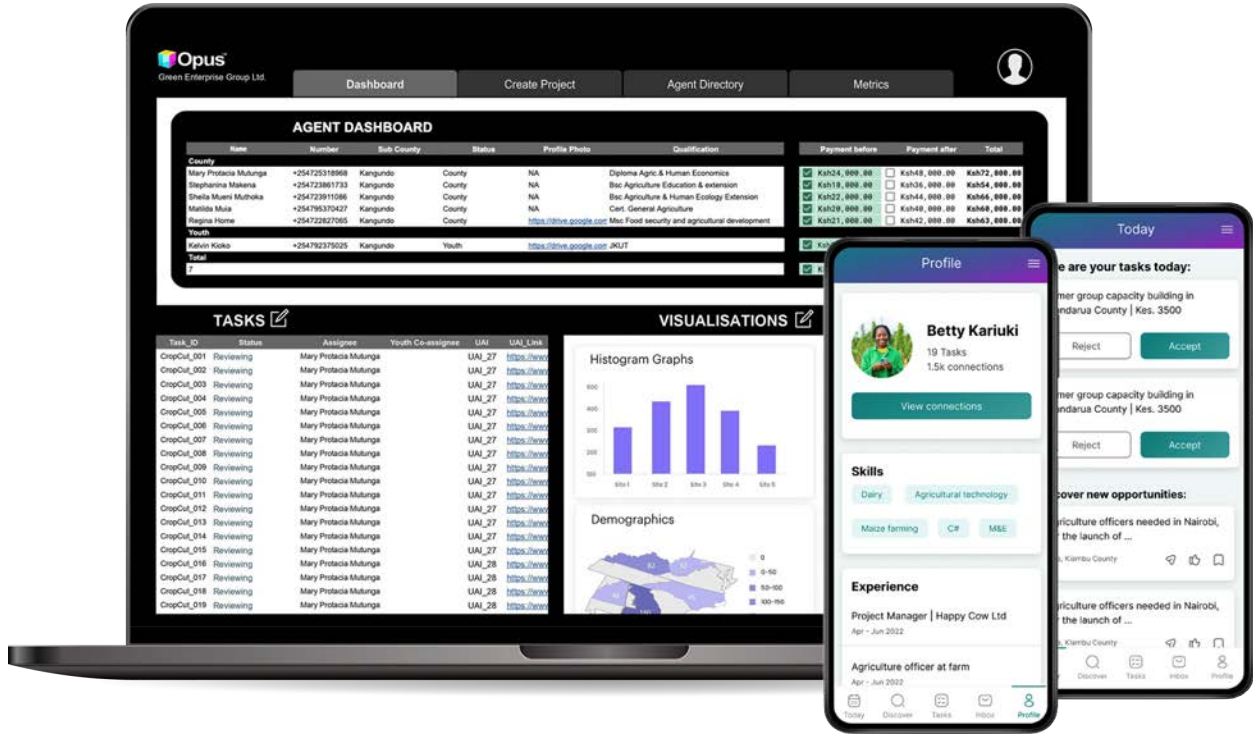
To understand how Opus™ could be used to digitise the Crop Cut, we ran a small trial of the model in March 2023 with the Kangundo Sub County office in Machakos County, Kenya. This trial spanned the two weeks of the annual Crop Cut taking place in the sub-county and engaged 5 enumerators and 350 farmers. In total, 105 locations were visited and 315,000.00 Ksh were paid to enumerators.

## Step 1.   (Government) Provision of UAIs and Data Collection Form

To begin the Crop Cut, colleagues at the Ministry assembled a list of UAIs (Unit Area of Insurance) and created a data collection form. These were then passed on to the local project manager who oversaw the crop cut.
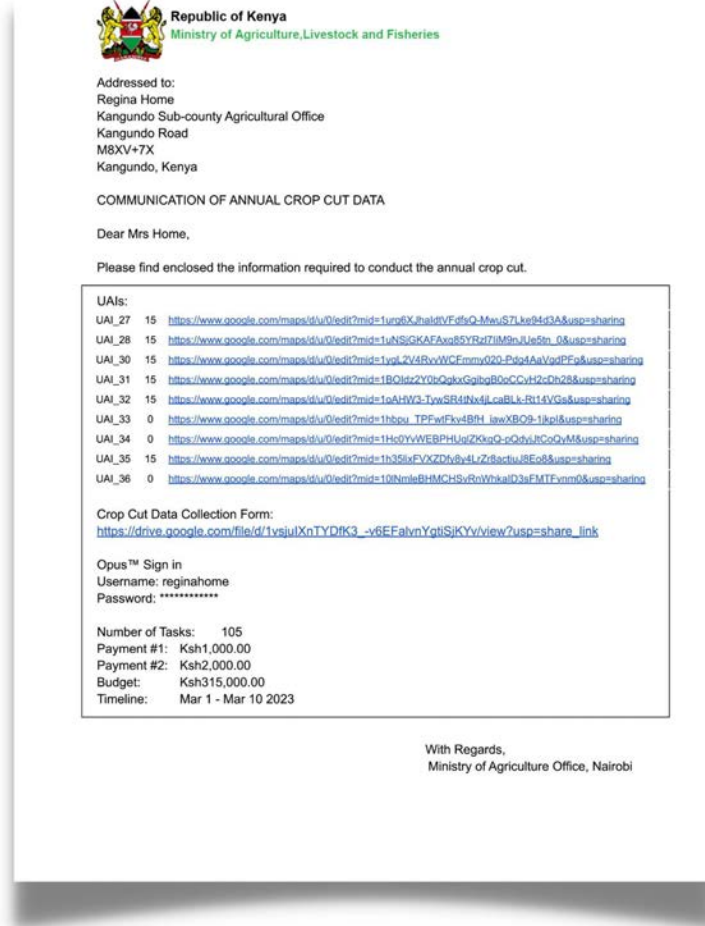
(Image) A mockup of a message communicating the UAIs and Data Collection form to the project manager - Kangundo Kenya.

Step 1.1.   Digitising the Data collection form

The data collection form was a PDF for the agents to print and fill out manually. To begin the digitisation process for our trial, we turned it into a digital form on the data collection app *Kobo Collect*. Kobo works offline and can be used in the field.
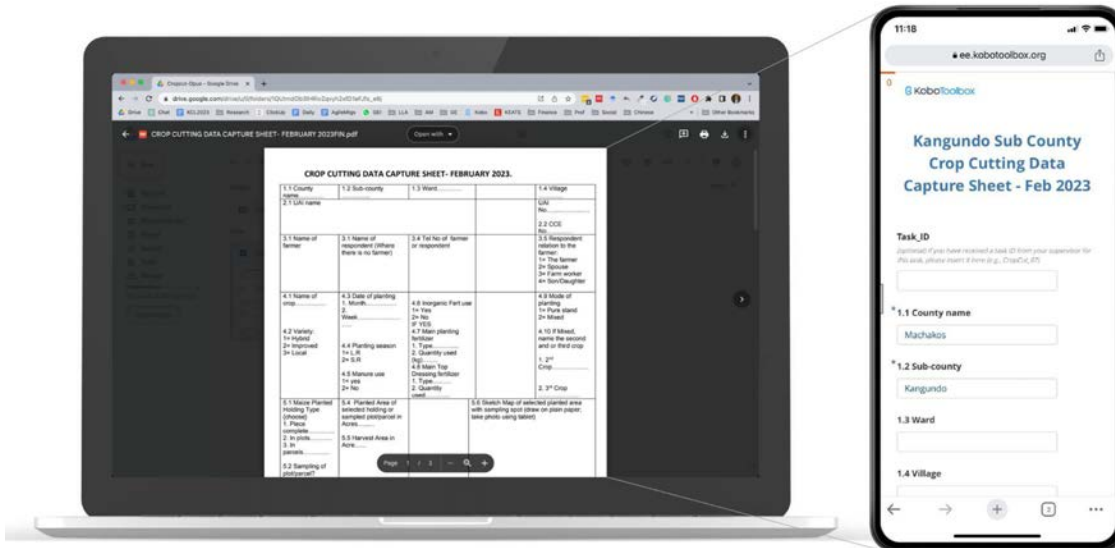
The form is live and can be accessed at this link: https://ee.kobotoolbox.org/x/4kU5QLzF.

Step 2.   (Project Manager) Project Set-Up

Once the form was created and the UAIs and project details were passed on to the project manager, this individual selected the agents to complete the Cut and assigned the appropriate number of tasks to these agents. This process was digitalised using Opus™.

Step 2.1.   Dashboard completion

To begin preparing the project, the project manager inputted information from their supervisor into the Opus™ "dashboard" page. This information included the project information, a link to the data collection form, information about the number of Crop Cuts to complete and their individual budgets. Finally, it included a repository of the UAI locations to be visited by enumerators and locations for them to select points to navigate to. Opus™ uses this data to autofill tasks for the rest of the project - creating detailed task instructions for agents to use to complete their Crop Cuts - and to manage payroll.
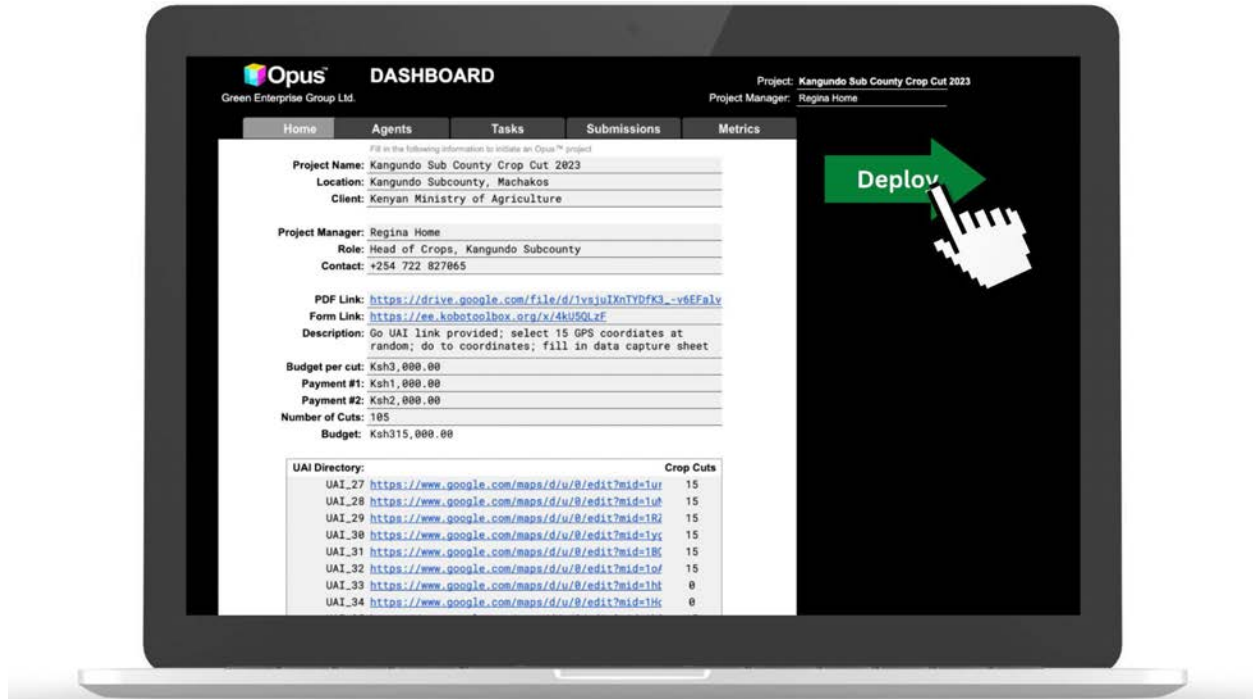
Step 2.2. Agent Selection

With the Dashboard page complete, the Project Manager continued to the "Agent" page, where they listed the agents selected for the Crop Cut and insert relevant information including contact information, location, and qualifications.
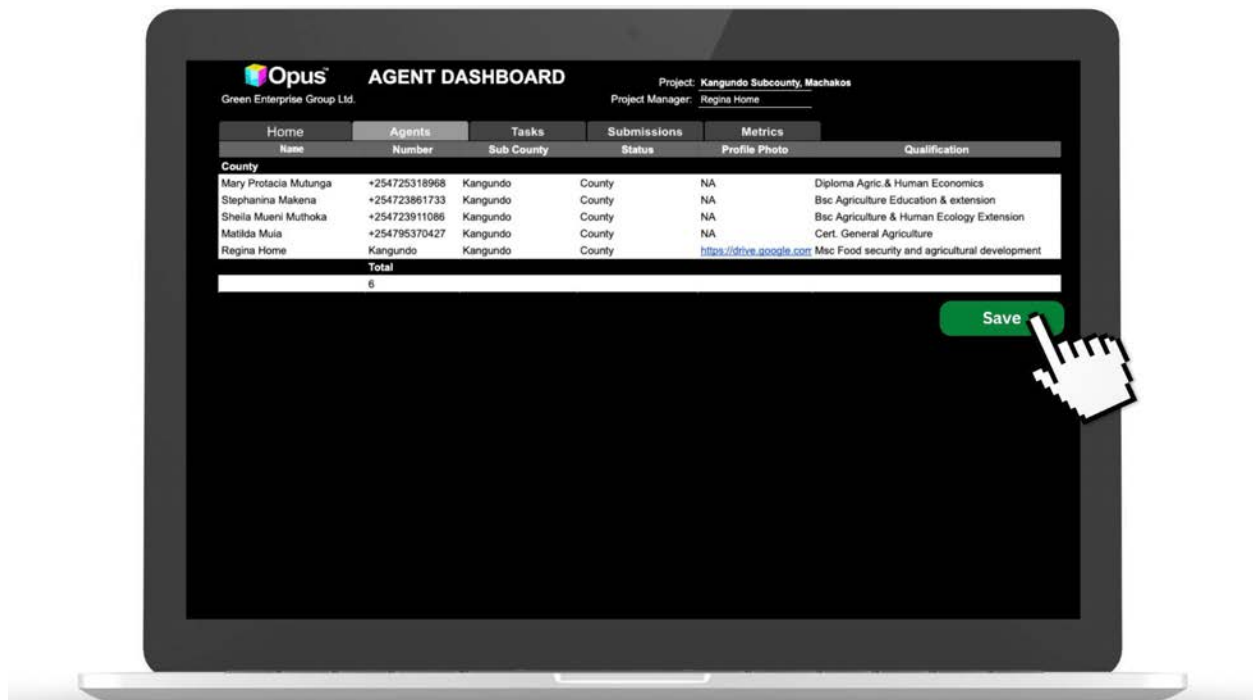
Step 2.3. Task Assignment

With the "Agents" page filled in, the Project Manager navigated to a simple task creation porthole and creates the appropriate number of tasks (105 in this case), assigning each Crop Cut to an enumerator (or agent) and a co-assignee. Each task automatically auto-fills the commission, supervisor, form link, and task instructions, using the information inputted into the dashboard.
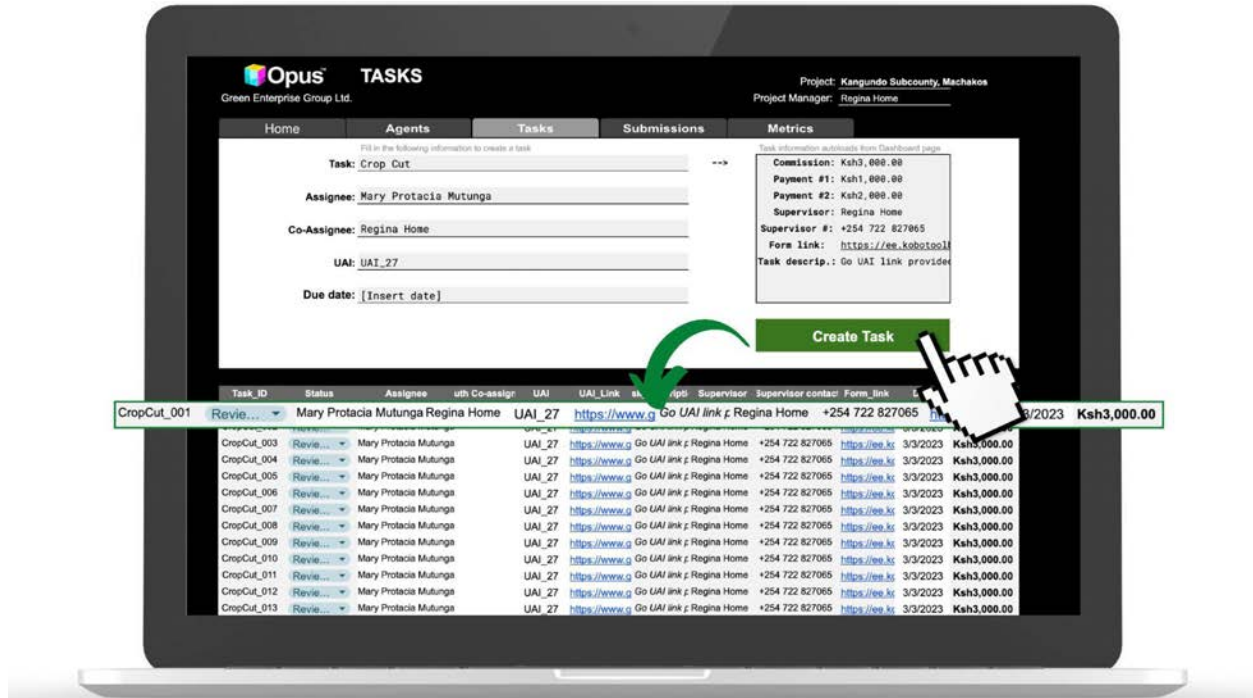

Step 3. Service Delivery & Data Collection (by Enumerators)

### Step 3.1. Registering on Opus™

Once tasks are created they pass on to agents, through our robust custom-developed mobile app.
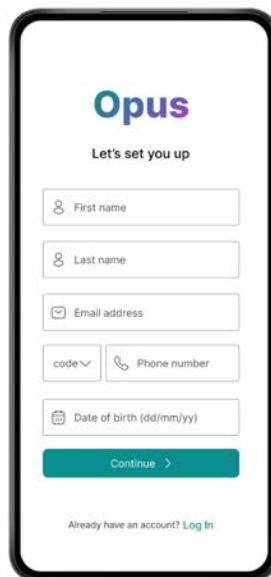
To participate in projects, agents download Opus™ and create an account by going through a simple 5-minute registration process. Their data is encrypted using military-grade (AES-256) end-to-end encryption with a Transport Layer Security (TLS) protocol, enabling client-side field-level encryption of sensitive information before it reaches the cloud.
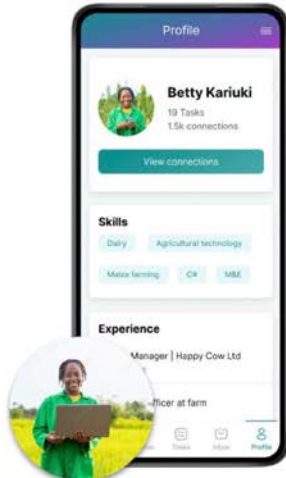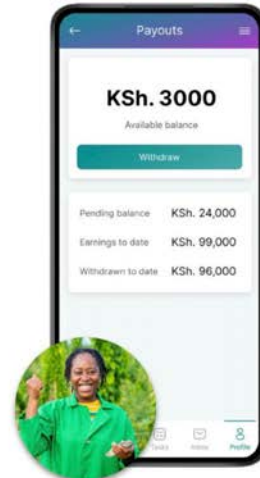
Registration: individuals register, list experiences, and receive training.
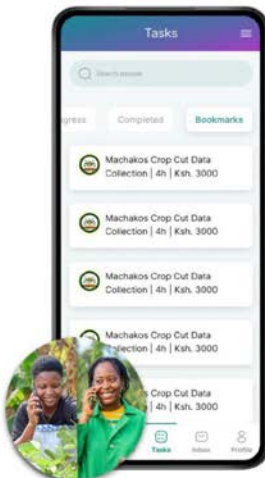
Task-Orders are sent to the phones of qualified individuals.

Delivery: Enumerators visit farms and collect Crop Cut data

Payment: Once Crop Cuts are completed enumerators are paid through their account.

Once individuals have created their accounts and personalised their profiles with relevant professional information, they receive their assigned task orders in a central dashboard on their app. They can use this dashboard to sort and accept tasks, navigate to the task location, submit data, and receive direct M-PESA payments for tasks completed.

Explore

Connect

Track skills

Add experiences
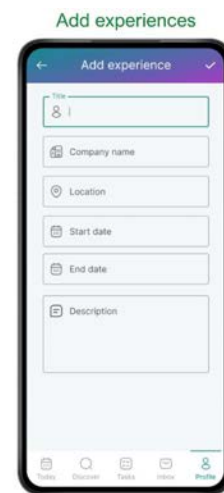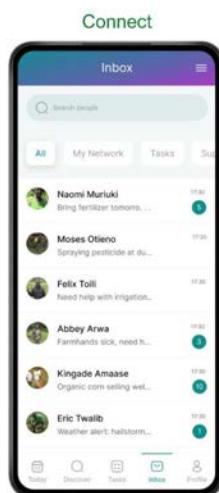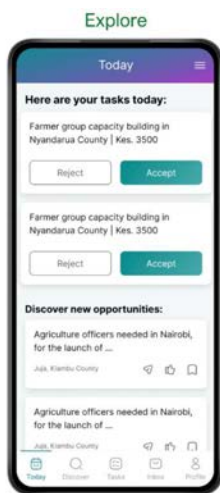
Using Opus™, agents can organise their tasks, find their way to farms, collect data, and receive payment, all without any oversight from their supervisor. Additional features include a built-in

chat section so that agents can communicate with their supervisors and colleagues, as well as a "discovery" section to find other people and jobs.

(Image) Kangundo ward agent Matilda Muia conducts a Crop Cut using Opus™, which integrates with the data collection app *Kobo Collect* via a link on the task page. (March 4th, 2023)

Step 4.   Review (by Project Manager)
Step 4.1.   Reviewing & Completing Data
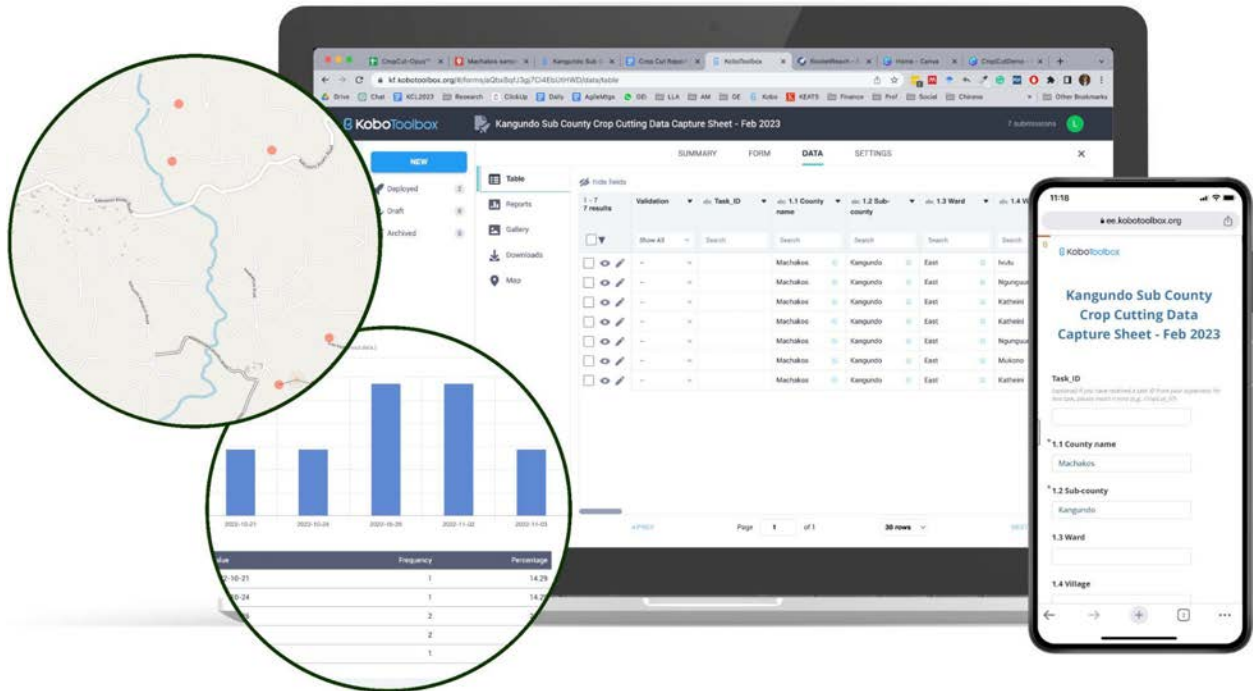
Once Crop Cut data was inputted into Kobo Collect and submitted by enumerators, it showed up in Kobo's data visualisation system - complete with maps views and built-in graphs. This same

dataset was synced with the Opus™ dashboard and could be visualised on the "submissions" page.

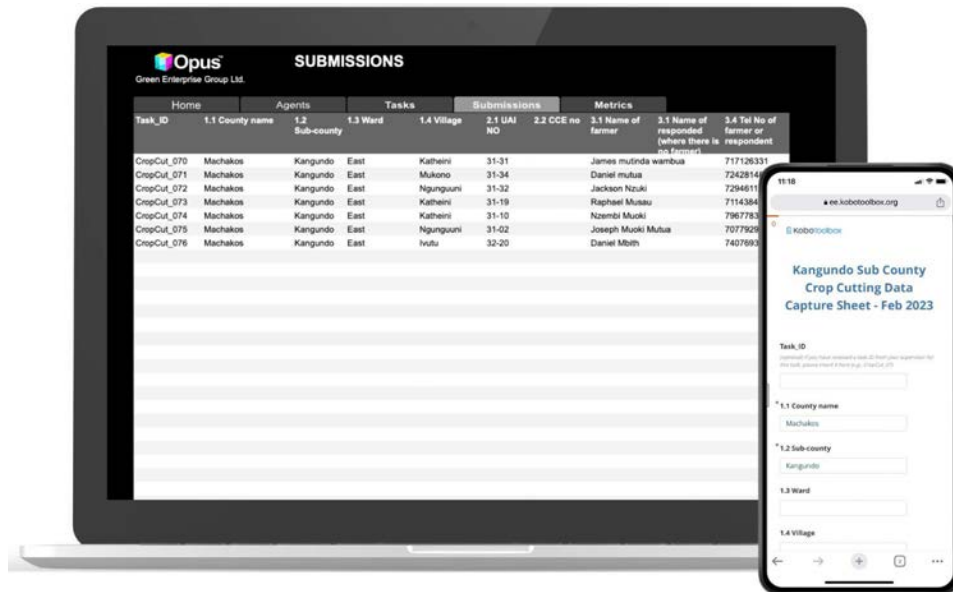The project manager used this page to fill in additional data (e.g., crop moisture content) and generate custom visualisations. Once data was filled in, checked, and formatted, the project manager navigated to the Opus™ metrics page to generate useful, customisable visualisations of project data. In addition to traditional graphs available on Kobo Collect, the metrics page also displayed important data on enumerator performance, including "tasks assigned per agent", and "daily output". These metrics are critical tools to help project managers assess agent performance and improve project management on a granular basis.
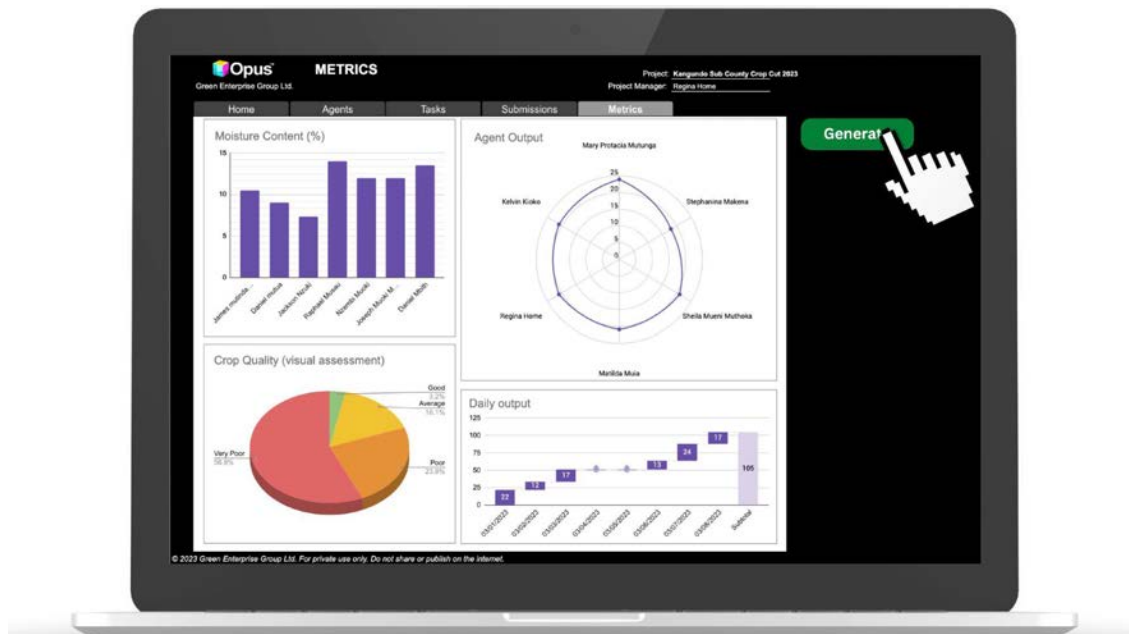
This was the extent to which Opus™ was used in the Kangundo trial, but it could have done even more.

Step 4.2.   Quality Assurance

One of the platform's greatest strengths is making quality assurance more than guesswork. Monitoring service delivery is extremely important to ensure task compliance. However - while traditional top-down oversight can ensure that agents are doing their work well - this approach is subject to bias. It is also not scalable, which significantly constrains the amount of work that each project manager can oversee. For the Crop Cut, Opus™ can be used to randomly select a small number of Crop Cuts to audit.

How this would work is once a project manager has generated their project tasks (105 in this case), they navigate to the "settings" page and activate "Quality Assurance." They then select a percentage of these tasks to audit and the auditing method - in this case, by phone call - and insert an additional short Kobo Collect form. The "audit" button automatically generates additional "Audit" tasks and assigns them to enumerators on the task page.
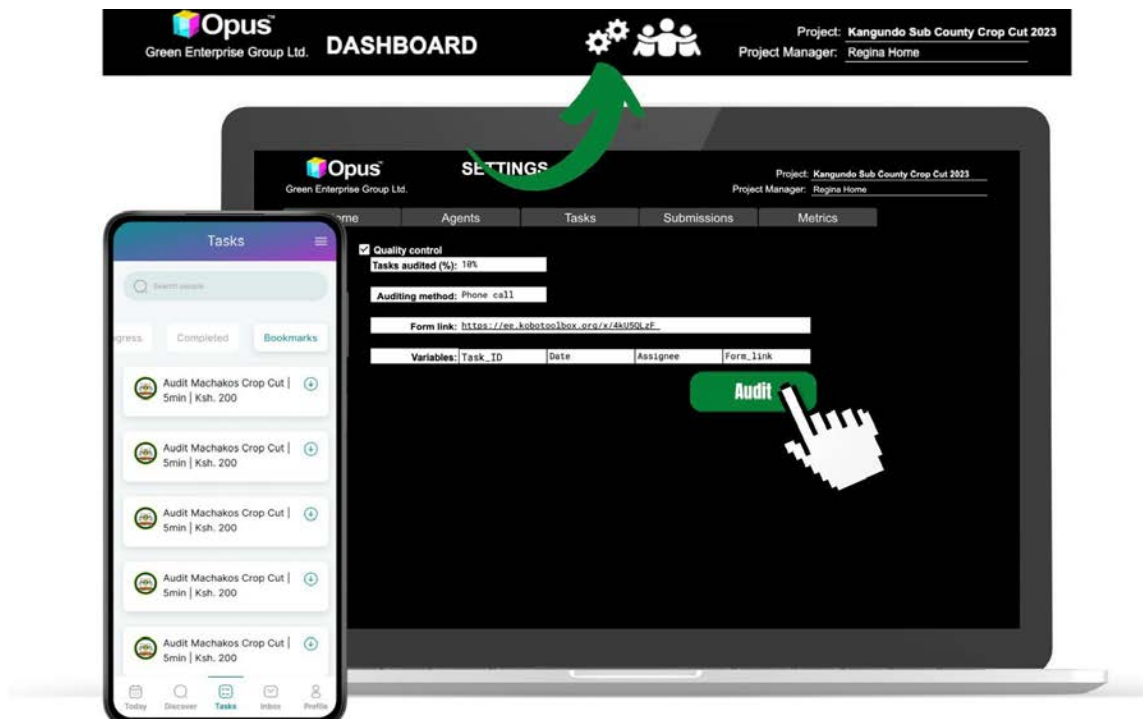
Enumerators who receive the task on their task dashboard merely have to call the farmer on their mobile line, ask a few simple questions about the Crop Cut, and submit a Kobo Collect form. In return for doing this, they receive a small financial incentive. Since this work is so standardised, youth can be commissioned to do it remotely. Using this information, the project manager is able to seamlessly audit the quality of the Crop Cuts and track enumerator performance.

Step 4.3. **Approving Agent Payments**

The project manager handles the disbursements of the payment to the agents undertaking the Crop Cut. This money is used as an incentive and also to cover facilitation expenses such as transportation and food. Opus™ makes processing payroll extremely easy. All the project manager needs to do is navigate to the "agent dashboard" once tasks have been completed. The dashboard contains a payroll section which automatically sums up the amount owed to agents. The project manager processes these payments digitally by clicking the "process" button. This automatically adds the amount listed to the agents' Opus™ accounts.
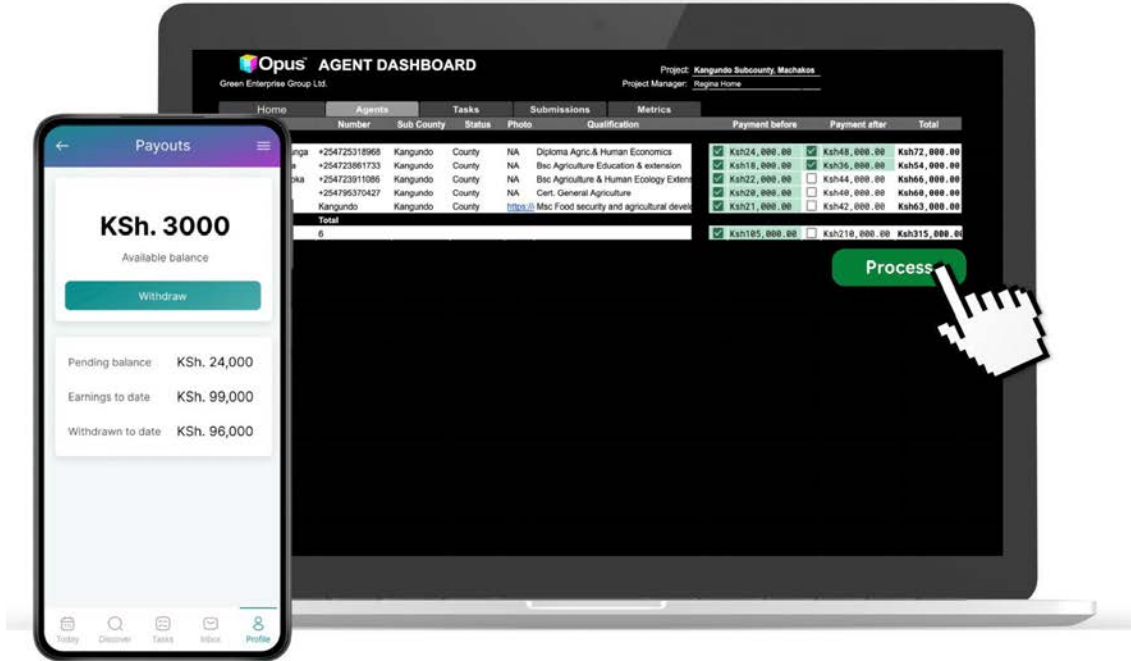
Whenever agents wish, they can withdraw this money via an instant M-PESA or bank transfer from their mobile phones.

Section 3. Additional Benefits of Opus™

The digitisation process may be straightforward, but it introduces a world of possibilities for organisations and governments. Below we list a few:

I. Youth Follow-Along (YFA)

Youth unemployment is a massive and growing problem in Kenya. While millions of youth are accredited in agricultural practices, small-scale farming is seen as hard, unrewarding work and generally spurned. Opus™ makes it possible for the government to engage youth in agriculture en mass. This is why we are coining the YFA (Youth Follow-Along) concept - an activity where qualified you choose to assist agents on a task-by-task basis to deliver agriculture extension services.

Because Opus™ is a publicly available app on the Google Play store, anyone can download it and create an account, listing their location, skills, and experience. Once youth have registered, they will appear on the "YouthFollowAlong" page, which can be accessed from the dashboard.
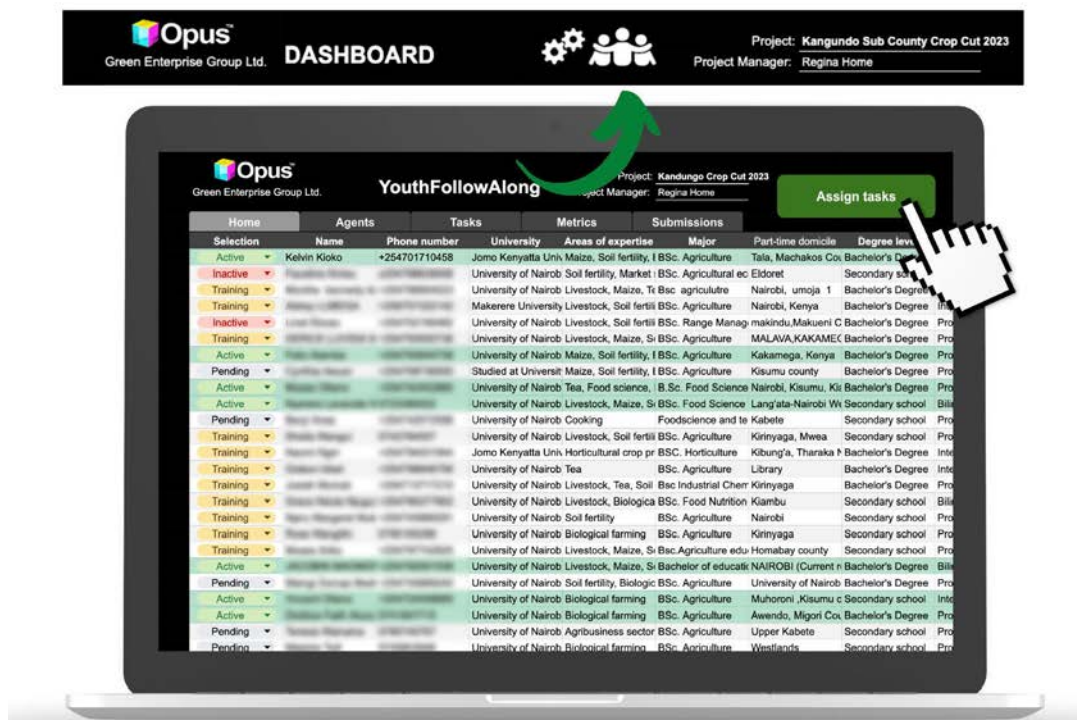
The project manager vets the youth, marks them as "Active" and can then assign them as co-assignees on the tasks page. When a youth Opus™ agent is selected as a co-assignee, they receive a task invitation on their Opus account, chat with their paired enumerator via the "chat" page on their app, and accompany the enumerator to complete a Crop Cut in the field. The tasks that youth complete make up a live portfolio of projects visible on the youths' Opus™ profile page.
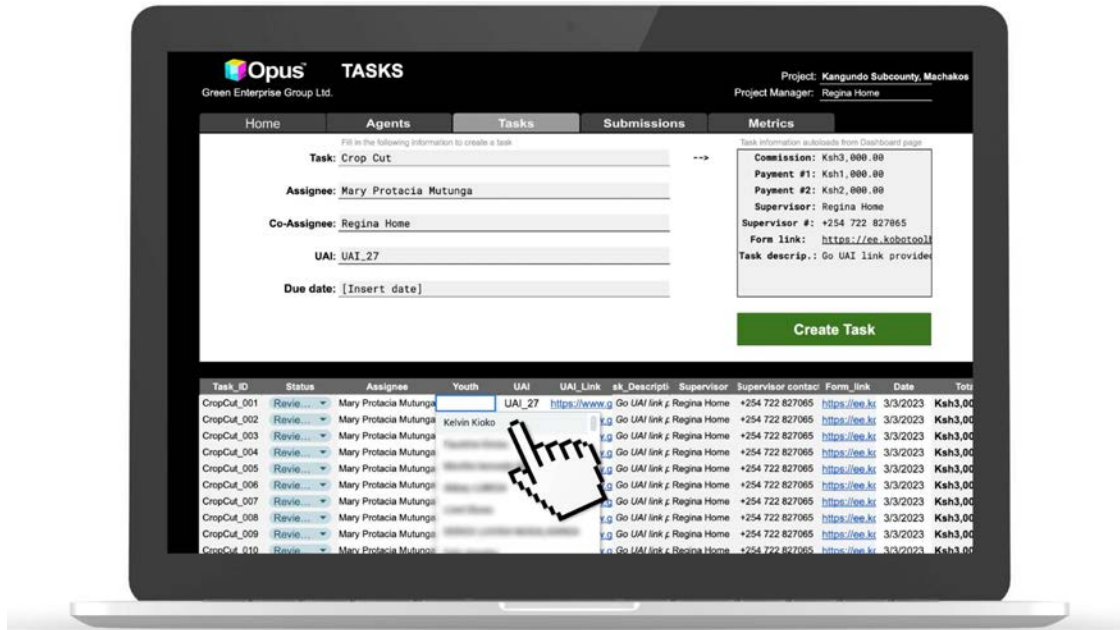
This approach was validated during our trial. What's more, we have registered over 250 youth from universities around Kenya and pre-registered an additional 98,760 of them through TVETs. By giving every unemployed youth in Kenya the chance to access hands-on experience and help agents deliver agricultural services to farmers, we look forward to bringing a generation of young Kenyans into agriculture.

To make the YFA experience rewarding and safe for youth, we have placed stringent limits on the activities that youth will be able to engage in while on placement. We also plan to audit *all* YFA experiences while the feature is being tested - using our built-in task auditing feature. In addition, we have created rules for agent pairing to ensure a safe experience for female YFA participants. For example, female participants under the age of 25 cannot be paired with a male field agent.

II.   On-Demand Farmer E-Services Portal

This concept is an advanced application of the Crop Cut Concept outlined in Section 2 and trialled in Machakos. The Crop Cut activity is one example of the top-down engagement of farmers by the Government. But agriculture extension is now demand-driven and the general trend is towards privatisation and decentralisation. In addition, private sector engagement is growing with support from County Governments.

With Opus™, organisations will be able to create and populate E-Services Portals that farmers and intermediaries can use to order tasks from their phones. In this way, agriculture extension can become demand-driven and task-based.
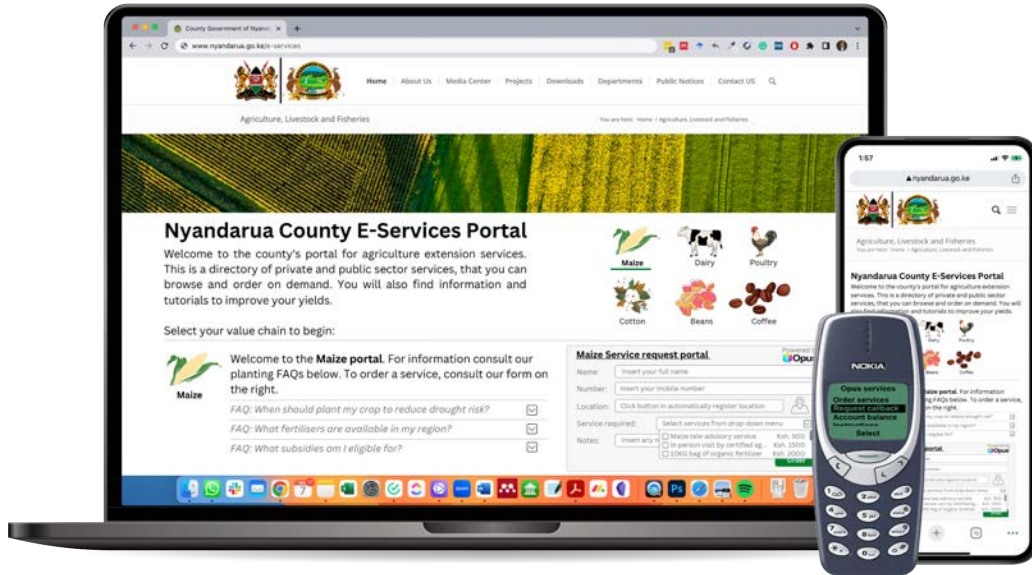
The E-Service Portal approach is outlined in the following chart:
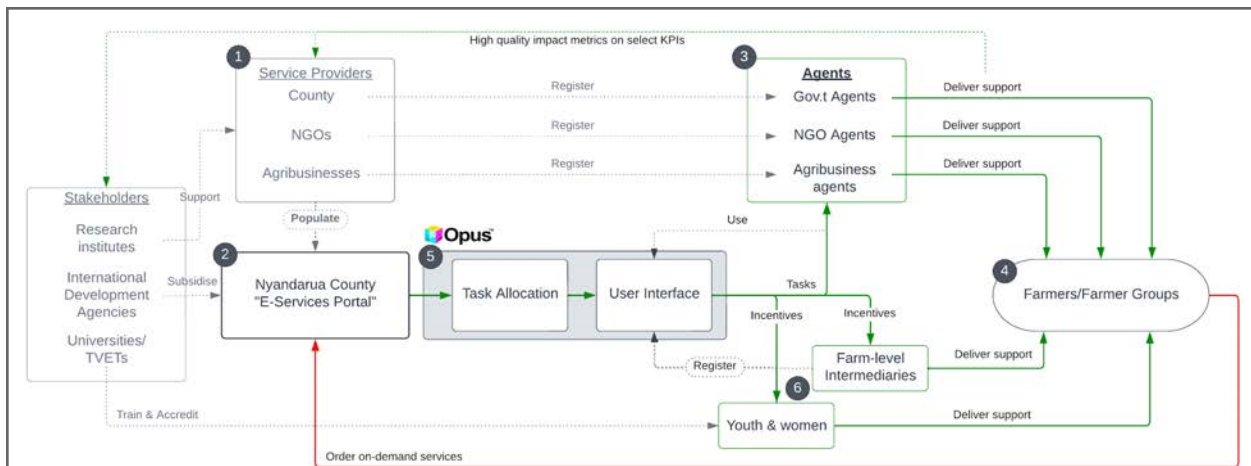
1.   Service providers

Service providers include county governments, NGOs, and agribusinesses. They are all actively engaged in delivering agricultural tools, information, and production methods to smallholder farmers.

2.   "E-Services Portal"

The County Government can create an "E-Service Portal" with agricultural information and support, which can be populated by research institutes and service providers. The portal will be categorised into value chains and easily navigable for farmers or farmer groups. The portal will be integrated into the county government website and maintained by the county and its partners. For farmers who require additional support beyond the listed information, the portal will have integrated forms to order on-demand services such as phone advisory sessions, in-person visits, or delivery of service products. Opus™ will provide technology to make services on-demand by connecting every service request with an agent or qualified individual.

The "E-Service" portal can be likened to a government-operated e-commerce store for on-demand agriculture extension services. Each service or product listed will have a standardised approach for qualified agents to follow. Farmers can input their data and order services on the portal. For county governments and partners who want to deliver services to specific farmers, they can type in the farmer's name, location, or address on a dedicated portal. They can then select the service they want to be delivered to the farmer and customise details such as due date, cost, and delivery deadline. Once tasks are ordered, they are assigned to agents who can accept the commission and carry them out as instructed.

3. Agents

Service providers register their agents on Opus™ to complete services. Agents can customise their accounts, insert their skills and experience, and upload accreditations that enable them to deliver services. When services are ordered through Opus, the task allocation framework uses this information, including proximity to farmers, to select the best individuals to deliver any given task and assign them automatically.

4. Farmers/Farmer Groups

Farmers can access information and support by navigating the government's E-Service portal on their smartphones. They provide their names, location, service required, and additional notes to direct tasks to them. The data is encrypted using military-grade (AES-256) end-to-end encryption with a Transport Layer Security (TLS) protocol, enabling client-side field-level encryption of sensitive information before it reaches the cloud. Once agents are assigned tasks, they deliver them to the farmers.

5. Opus™

Once data enters Opus™, it is packaged into "task orders" and run through our task allocation framework. The app features a back-end task allocation interface and a front-end user interface. Task orders are input into the platform through an "E-Service Portal" (or by service providers rolling out coordinated projects). The task interface is a gig-work platform allowing agents to deliver services to farmers on a targeted, on-demand, and per-project basis. When agents are assigned or recommended for tasks, they follow a set of clearcut, simple instructions to in-field delivery to farmers.

6. Ancillary support

Because Opus™ is a publicly available platform, anyone with a smartphone can register, this includes farm-level intermediaries that already work with farmers and disadvantaged groups such as youth and women.

6.1 Farm-level intermediaries
Farm-level intermediaries are individuals who regularly work with farmers on an informal basis and are trusted by them. They could be invaluable support staff to agents delivering a service to farmers, helping increase service effectiveness, decrease costs, and solve service providers' *mobility problems* by sourcing individuals from rural areas who are minutes away from the farmers who need to be serviced.

6.2 Youth and women
Opus™ can be a useful tool to engage youth and women in the agricultural sector. The platform can encourage them to register and create tasks they can complete, such as monitoring, product delivery, and training session coordination. These tasks can be

assigned to local youth and women who face challenges in accessing credit or opportunities for a stable livelihood. Consistent engagement through Opus™ can create numerous high-quality hands-on employment and skill development opportunities for these undersupported demographics.

To facilitate the entry of youth into this labour market, universities and TVETs can be involved as training and accreditation partners. Opus™ can be integrated into the post-graduation project-based training and integration program to provide a comprehensive solution for youth and women's inclusion in the agricultural sector.

III. Revolutionising Accountability For Project Cash Flow

Few of the funds allocated to agriculture extension actually go to farmers. This is because the management and oversight of current extension systems are so top-heavy that much of the allocated budget gets consumed just by setting up, running, and monitoring projects. More funds yet are required to do lengthy quality insurance, which requires project managers going to speak with farmers.
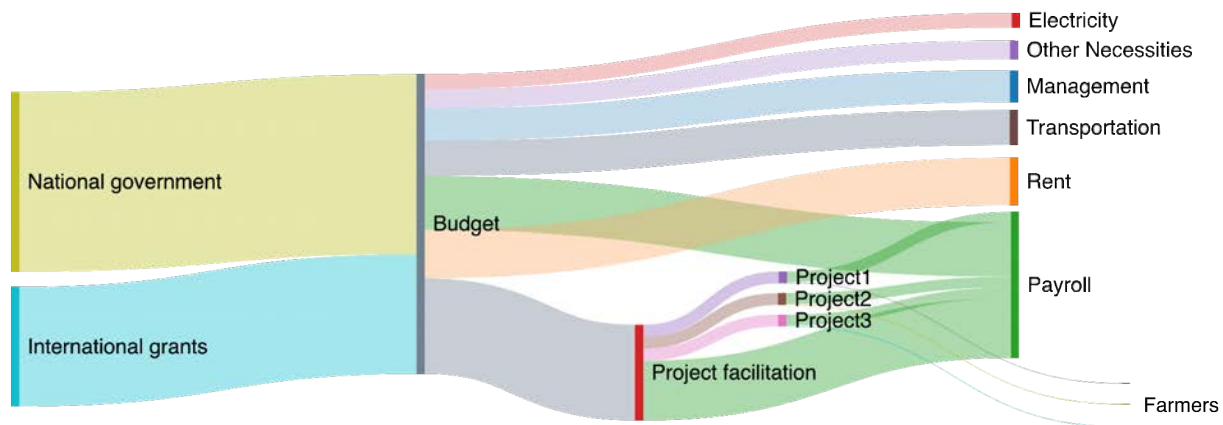
Opus™ is set up to help allocate as much of their budget as possible to actually servicing farmers. Of the funds that are spent paying staff to deliver services, every cent is tracked all the way to the ground, earmarked for specific environmental and social impact, and automatically audited.
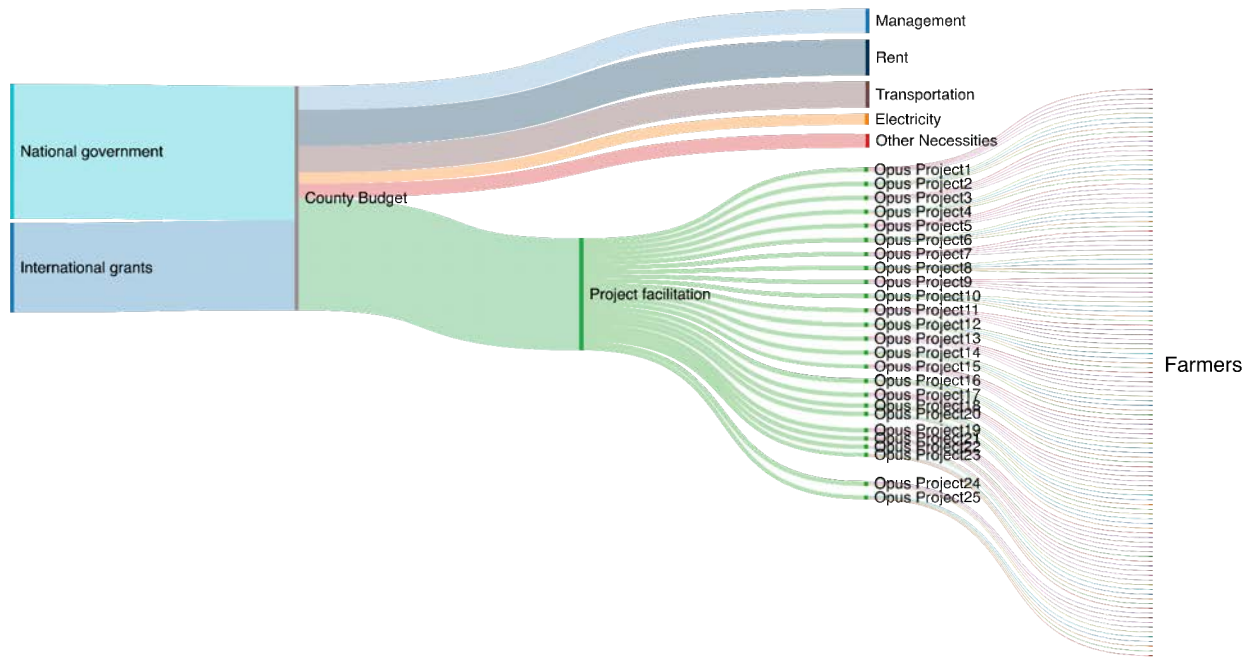
This watertight approach to project funding and financing can encourage millions of dollars in external financial investment from financial institutions and development agencies.

IV. Revolutionising Gender Equality

Opus™ is able to address four key barriers that prevent women from entering the agriculture sector in Kenya. These include location, time flexibility, job safety, and discrimination.

1) Location: using our platform, women can perform jobs from their villages, and do not need to commute to cities to secure work;
2) Time Flexibility: women who are caretakers for children or the elderly can still find flexible gigs that fit into their schedule;
3) Job Safety: by transforming informal gigs into official tasks, we can screen job opportunities and track gender safety on the ground, guaranteeing every woman safe and uplifting work.
4) No Discrimination: our software is designed to eliminate gender bias, making it possible for qualified women to get the same jobs as similarly qualified men.

Additionally, using targeting employment by directing task orders to qualified women living near farms, Opus™ can transform gender equality in the agriculture sector.