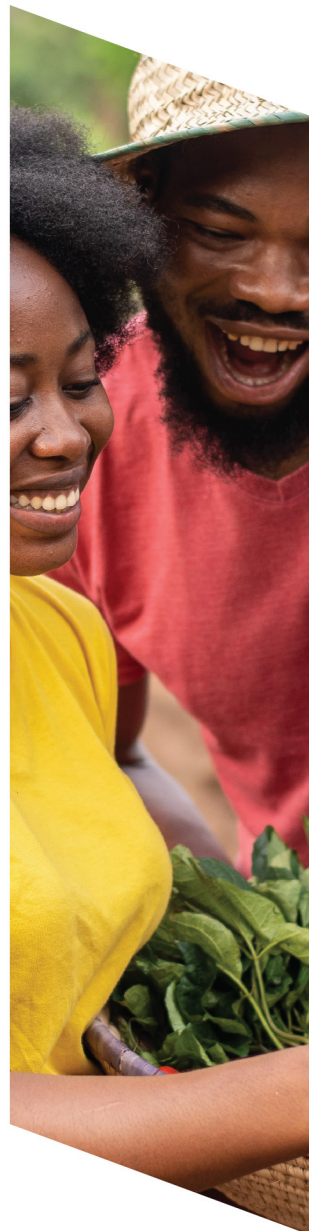
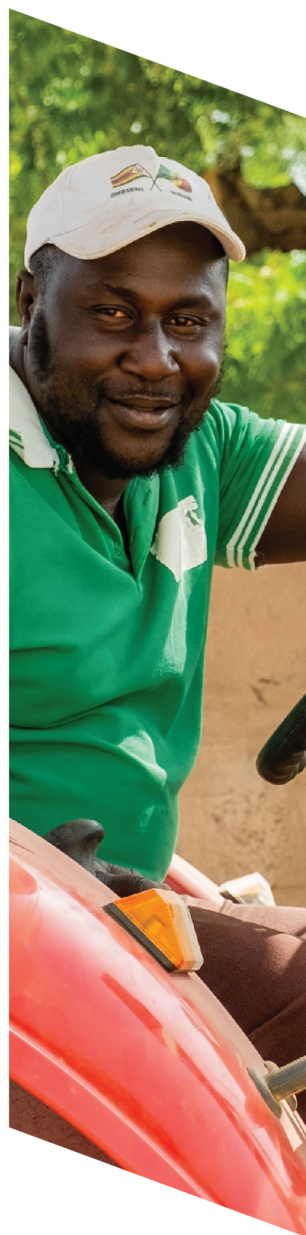


# TRACTORIZATION FOR AFRICA

Innovative Capital For Agri-Mechanization  
& Youth Employment.



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# List of Acronyms and Abbreviations

PAYG	Pay-as-you-go
SROI	Social return on investment
T4A	Tractor for Africa

# Executive Summary

Africa has the lowest yield per hectare and the lowest tractor saturation in the world. Smallholder farmers in Africa are the most affected, disadvantaged, marginalized and getting the lowest return on their effort across the value chain driving them further below the poverty line. Of the tractors available in Africa, most smallholder farmers lack access to them. Smallholder farmers cannot evidently afford tractors (to buy or lease) neither can they access tractor rental services in its traditional form/model.

Currently, smallholder farmers are losing money, time and yield because of manual labor and due to lack of mechanization (fifty percent (50%) of Africa's yield gap can be attributed to the lack of tractors). For instance, in Nigeria according to Journal of human ecology (2022), only 28% of small holder farmers use tractor for their farm operations which is largely due to non-availability of tractors, financing and challenges related to the underdeveloped ecosystem. In addition, agriculture in Africa is labor-intensive making it unattractive for young people. This is leading to a huge youth migration from the farm to the cities.

While the challenges persist, there are social enterprises in Africa addressing these challenges by leveraging technological innovation and mechanization to support smallholder farmers in their farming operations to

improve farm productivity. Hello Tractor, a critical mechanization solution provider in Africa is an agricultural technology company that connects tractor owners to smallholder farmers in need of tractor services through the flexible Pay As You Go financing model that identifies local potential tractor owners who can meet criteria for tractor financing and supports them to improve the management of their businesses. Hello Tractor has leveraged catalytic funding from Heifer's Agriculture, Youth and Technology (AYuTe) Initiative. The AYuTe Africa Initiative is an annual competition that awards cash grants to promising young agritech innovators and firms across the continent — professionals who are using technology to reimagine farming and food production in Africa. The competition is a catalyst for growth, combining grant with business development initiatives to translate the energy and ideas of young African innovators into meaningful impact for African farmers.



Heifer International and Hello Tractor co-designed a tractorization for Africa program leveraging catalytic funding from Heifer. Heifer International provided \$4.5 million in grant financing to pilot the model in three countries (Nigeria, Kenya and Uganda) which further unlocked commercial capital of about \$7M for increased tractor penetration and ecosystem development. With this support from Heifer International in the tractorization program for Africa, Hello tractor was able to significantly expedite its service to smallholder farmers by growing the amount of equipment available in the market, financing the unbanked and promoting conservation agriculture practices. By creating equitable access to tractor services, Heifer International through Hello Tractor enables smallholder farmers to earn more and grow more, improving livelihoods and food security for their families and communities.

Findings from the assessment study revealed that as of December 2022, 104 tractors have been purchased and handed over to 104 beneficiary tractor owners across Nigeria, Kenya and Uganda through the Tractorization Project Pay As You Go model. The initiative has also provided service to 21,048 smallholder farmers in need of mechanization services and created opportunities in terms of direct jobs for over 312 youth to earn an income serving as booking agents and tractor operators. Furthermore, the initiative have created 784 indirect jobs across target communities in the 3 countries where the project is being piloted. Smallholder farmers reported that the Tractorization project contributed to their overall progress and in some cases, demand was not sufficiently met.

Hello Tractor, the project implementing partner of this project pilot phase has effectively fulfilled its objective of enhancing farmers' income by facilitating increased acreage through improved access to tractors. This accomplishment demonstrates the project's efficiency, relevance, and effectiveness, resulting in an impressive 227% boost in farmers' income. The intervention also showed a positive Social Return on Investment and above 90% loan repayment rate. The project is expected to scale up to other African countries and reaching more smallholder farmers.

**Fig. 1**  
**Efficiency of tractorization by beneficiaries**



## 1.1 Goal & Objectives of the Assessment:

The overall objective of the assessment was to evaluate the activities implemented in the first 2 years (pilot phase) of the Heifer tractorization program towards achieving the expected outcomes and to make recommendations on further replication, scaling up or continuation of the project.

The study looked closely at the following specific objectives:

- Assessed the relevance of the program in terms of the priorities, objectives, implementation plan and beneficiaries' (smallholder farmers and youth) needs as defined by the program (usefulness, alignment)
- Assessed the results and progress of the project in terms of effectiveness (achieved outcomes versus planned outcomes) and the efficiency of implementation (output achieved against inputs and budgets used)
- Assessed the feasibility and sustainability in terms of design, scope, implementation, partnerships, management and steering of the project.
- Identified evidence of programming strengths, weaknesses, emerging opportunities and lessons learned.



# Methodology and Approach

The impact assessment was conducted in selected countries, states, regions and communities where Hello Tractor is supporting smallholder farmers on the Tractorization program. The study area reflects the overall characteristics of the population.

Organisation	Country	State/Region/County	Study community
Hello Tractor	Nigeria	Nassarawa state	Awe, Nassarawa Toto
	Kenya	Kisumu County	Rahuor, Ahero

## 2.2 Population and Sampling Frame

Hello Tractor is a technology-enabled agricultural solutions company that provides access to tractors to smallholder farmers in Africa. The beneficiaries of the tractorization initiative are smallholder farmers in Nigeria, Kenya, and Uganda. As at January 2023, the project had a total direct beneficiary population of 21,520, these include tractor owners, small holder farmers, technicians and tractor drivers.

## 2.3 Sample size

Below is the sample size based on our statistical inference.

The sample size calculation of organizations with more than 10,000 beneficiaries will be estimated at 95% confidence interval and 5% margin of error. For other organisations with lesser number of beneficiaries, convenience sampling of 10% of beneficiaries will be sampled.

There are four levels of beneficiaries, tractor owners, farmers, booking agents and tractor technicians. In total, we have 21,520 beneficiary farmers.

**N=21,520**

$$n = \frac{z^2 * p * (1 - p) / e^2}{[1 + (z^2 * p * (1 - p) / (e^2 * N))]}$$

where: N = 24000 (population size)

p = 0.5 (estimated proportion of population with the characteristic of interest)

E = 0.05 (desired margin of error)

Z = 1.96 (for a 95% confidence level)

n = 377.952

Rounding up to the nearest whole number, we get a required sample size of 378 beneficiaries.

## 2.4 Method of Data Collection

Quantitative and qualitative data were collected using various data collection tools namely, survey questionnaire, beneficiary profiling, focus group discussion, photography, and observations.

### 2.4.1 Primary data collection instruments



#### Surveys

This instrument provided us with a bird's eye view of the benefit/impact of the Heifer's

Tractorization program on smallholder farmers and youths. The small-holder farmer's survey targeted a representative sample out of the total beneficiaries with at least 95% confidence from the feedback. The survey was administered by enumerators in the two project countries (Nigeria and Kenya). Please note that a simple random sampling technique was explored.



### Focus Group Discussions (FGD)

This method of data collection further gave us an in-depth analysis of current opportunities/gaps, efficiency, and effectiveness of project delivery. One focus group discussion was organized for each partner organization where applicable.



### Beneficiary profiling

This tool was used to interview beneficiaries with interesting impact stories. Furthermore, it provided information on how effective and efficient the Heifer's tractorization for Africa implementing partner have been and what form of improvements they look forward to.



### Implementing organization questionnaire (Key Informant Interviews)

This tool was used to understand the state of play of the project, the project outcomes, and shed more light on challenges/opportunities/sustainability of the project.

## 2.4.2 Secondary Data Instrument Desk Review of Resources

This entailed a review of tractorization program documents, literature, and organization reports.

## 2.5 Methodology to evaluate Social Return on Investment (SROI):

- Desktop review (project reports, project financials & project data)
- Project beneficiary Interviews
- Direct observation

Project benefits (mostly intangible) will be evaluated and monetary estimates provided in relation to the outcome indicators and weighted index. Each indicator will have a scorecard of between 1 (low) – 5 (high), with the following weighted index.

- Weight 1 – 0%
- Weight 2 – 25%
- Weight 3 – 50%
- Weight 4 – 75%
- Weight 5 – 100%

For example, in a tractor mechanization project where one of the outcomes is the increase in family savings of smallholder farmers. It is expected that the beneficiary should show evidence of increased income. This indicator should certify that the outcome has been achieved or not achieved.

The project outcome indicator must score a minimum of 50% weighted index. Each weighted index will be assigned a monetary value based on the level of satisfaction for each project outcome, such as not satisfied, averagely satisfied, and very satisfied. Thereafter, the SROI and Net SROI are calculated with the following formula.

$$\text{SROI} = \frac{(\text{Total value of benefits})}{(\text{Total project cost})}$$

$$\text{Net SROI} = \frac{(\text{Total value of benefits} - \text{Total project cost})}{(\text{Total project cost})}$$

## 2.6 Validity and Reliability of Instrument

The data collection instruments were tested and a pilot was conducted before rollout. Survey Monkey (paid version) was used for survey administration. This has been a reliable and affordable tool for our clients, including Heifer.

The FGDs were led in pairs: one field supervisor facilitated the discussion and one enumerator took notes. Where applicable, one FGD was conducted for the implementing organization. The FGDs comprised 8–10 participants on average and the discussions lasted for about 1 hour at a convenient venue which was identified by the community members and the research team. The FGDs were conducted in a relaxed and conducive environment to allow full participation of men, women and youth.

## 2.7 Data quality was ensured by:

- Enumerators were engaged locally.
- Enumerators were adequately trained on the content of the instruments and purpose of the study.
- The instruments were pretested and ensured that all enumerators were familiar with both the terrain and the tools.
- Using technology to collect data
- Supervising the data collection process

## 2.8 Limitations of the Survey

- Lack of baseline data from Hello Tractor
- Developing indicators after projects have started and grants awarded.

## 2.9 Assessment Phases

The assessment was structured into phases as highlighted below:

### 2.9.1 Project Inception and Preparatory Phase

Desk reviews were conducted to document existing work and obtain the needed background for the full implementation of the research. This is key and important to the overall success of the research. Consultations were organized with the client to build consensus on our understanding of the assignment, survey instruments, support required such as administrative approvals, sampling methodology, selection of respondents, work plan, timelines and deliverables.

### 2.9.2 Preparation of Study Tools and Validations

We developed draft study tools and instruments based on the above to streamline the research protocol for smallholder farmers selected with the approval of the project lead. A pilot of the research was conducted to pre-test the data collection tools in the field for validation to ensure standardization of tools before data

collection began. Kasher's field supervisors and selected team members recorded and documented the findings of the pilot which was then used to modify data collection tools as required. Validation and pre-tests were done in partnership with M & E departments at Heifer.

### **2.9.3 Execution Phase: Field Team Deployment and Data Collection**

Data collection for this study was for a total of 15 days in the selected areas. Data were collected through face to face interviews, focus group discussions, key informant interviews and prior consent of the respondents were obtained. The trained enumerators conducted the interviews, probed the respondents where necessary and recorded data taking maximum care for data quality. Kasher's field supervisors supervised the entire process, crosschecked completed questionnaires and conduct data cleaning to prepare the responses for analysis.

### **2.9.4 Finalization Phase: Data Analysis and Report Finalization**

Qualitative Data Analysis: In-depth interviews and notes/transcripts were subjected to analysis after translation. A qualitative analysis expert performed qualitative content analysis using a thematic analysis approach.

We worked closely with the client and our project advisors during the preparation of the final report. We participated in rounds of reviews and revisions: an initial review by the client and a second round of consultation with partner stakeholders.

# Hello Tractor (Implementing Partner)

## 3.1 Brief Introduction

Hello Tractor is an agricultural technology company that connects tractor owners to smallholder farmers in need of tractor services and supports tractor owners to improve the management of their businesses.

The Heifer's tractorization for Africa program aims to provide affordable farm mechanization through a digital tractor-sharing model. The overall goal is to support entrepreneurs who will employ tractor operators and booking agents to create direct jobs, give smallholder farmers mechanization access, increase their yield, and provide additional yearly income to the farmers.

The project model is called PAYG (Pay-as-you-go) and it is part of the Heifer International tractorization initiative for Africa. The PAYG tractor financing product was launched on January 14, 2022, in Kisumu, Kenya with six (6) tractors distributed to booking agents who had booked the required demand for clearing farmland of a total of five hundred hectares (500ha) using the Hello Tractor App to qualify for the financing. Between March and September 2022, six (6) additional launches were held in Kenya, Nigeria, and Uganda.





According to the report from Hello Tractor, as at December 2022, the T4A/PAYG program had purchased and successfully handed over 104 tractors across Nigeria, Kenya, and Uganda, surpassing the period's target. They have also provided service to 21,048 smallholder farmers in need of mechanization services and created opportunities for over 250 youth to earn an income serving as booking agents and tractor operators. Furthermore, they have been able to train the project beneficiaries to be able to book through their platform and to properly operate and maintain tractors while in the field.

In addition, they have secured partnerships with 5 manufacturers and dealers to supply tractors,

implements, and after-sales support. The project is currently in an active phase in which it is providing beneficiaries with round-the-clock hands-on support, monitoring data trends, and repayment activities, and incorporating lessons learned into the project's value chain.

As at December 2022, a total of 104 beneficiaries had become tractor owners, and 208 booking agents, 157 tractor operators and 3 tractor technicians have been employed. The beneficiaries are located in Nigeria, Kenya and Uganda. The assessment was conducted among smallholder farmers and tractor owners in Ahero, Rabuor, and Kisumu counties in Kenya, as well as Awe and Nassarawa Toto local government areas in Nassarawa state in Nigeria.

## 3.2 Key Findings

### 3.2.1 Tractor Owners

All the tractor owners surveyed gave positive feedback on the intervention. The majority of them stated that they received their tractors after the planting season ended last year, so they were unable to service many farms. Currently, they haven't been able to service the vast majority of farmers due to the lack of rainfall. However, due to the high demand for tractor services by farmers, they are all optimistic about being able to complete the tractor payment before the end of the five-year period provided by Hello Tractor.

The tractor owners also stated that Hello Tractor provides them with an app that enables them to track their work, activities, and progress. They also provide them with a hub of engineers from which they can request the services of those in close proximity. The main challenges mentioned were the high cost of diesel, lack of rainfall, and security issues in some areas, which limit where they can go to provide services to farmers.

The PAYG model has since proven to be more affordable (rent costs, insurance, technical support, etc.) for smallholder farmers than commercial renting as testified by most of the beneficiaries interviewed.

### 3.2.2 Farmers (Nigeria)

The majority of farmers in Awe local government area in Nassarawa state are rice farmers, while those in Nasarawa Toto are maize and sesame seed farmers. According to the farmers, having access to tractors has enabled them to expand the size of their farms and lands cultivated. They stated that they prefer the use of tractors to manual labour because it saves time and money, pointing out that the estimated cost of labour is twice that of using tractors for land preparation activities.

The farmers further stated that Hello Tractor rental fees are significantly lower than those of other commercial tractors. However, they requested a price reduction so that more farmers could afford to pay for tractor services.

#### Challenges



#### Few tractors available to farmers:

The farmers' main challenge is the long waiting period (of about three to four weeks) before they can access the tractors because there are not enough tractors to service all of the farmers, and when the tractor needs repairs, they have to wait for the technical team to come from Abuja to carry out repairs.

### 3.2.3 Farmers (Kenya)

The majority of farmers in Kisumu County are rice farmers, with a few intercropping maize, sorghum, vegetables, and sugarcane. According to the farmers' feedback, the introduction of Hello Tractor services in their communities has significantly increased their yields and acreage. Most farmers are very optimistic about the transformation that the technology is bringing to the area, and they believe that the service should be expanded to other areas across Kenya, to spur agricultural growth.

#### Challenges

Despite the success attributed to the intervention, the farmers highlighted a few challenges they are experiencing.



#### Few tractors available to farmers:

Similar to farmers in Nigeria, farmers in Kisumu



The use of tractors made land clearing much easier, ultimately leading to a significant increase in farm size from 3 to 6 hectares. Their income skyrocketed from \$1,084 to \$3,251, bringing about a substantial improvement in their financial situation.



County must wait several days before it is their turn for the tractors to cultivate their farms due to the increased number of farmers in the area serviced by Hello Tractor.



#### High tractor rental fee:

In addition to the long waiting period, most farmers in Kenya stated that the cost of hiring the tractors is relatively high, resulting in little or no difference with other private tractor owners and county government tractors. Currently, the cost of hiring tractors is about \$40 per acre and the difference in the cost with other private tractor owners is \$5 or less.



#### Lack of farming training:

The majority of the farmers stated that they lack the necessary skills and knowledge on farming techniques and tractor use, and that simply providing tractors is insufficient to spur the much-needed increase in yields. It should be noted that this is not a component of Hello Tractor's value add, it could however be integrated into future work.

#### Lack of sensitization on Hello Tractor services:

Most of the farmers in Kenya stated that there is little or no sensitization on the services provided by Hello Tractor. Only a few of the farmers were aware that Hello Tractor Hub provides fertilizer and seedlings to farmers.



#### Lack of markets for the farmers' produce:

The majority of the farmers stated that they have difficulty finding markets for their produce and that the available buyers buy the produce at low prices, resulting in losses. It should be noted

that this is not a component of Hello Tractor's value add, it could be integrated into future work.

## 3.3 Analysis

### Overview



The survey was conducted across Nigeria and Kenya with a total of 324 farmers and 26 tractor owners.

### 3.3.1 Nigeria

In Nigeria, an average Hello Tractor customer is a male farmer between 25 to 40 years. This demographic accounted for 60% of respondents interviewed. In line with empirical data, there are more male farmers than female farmers in Nigeria. Regardless of cultural and land ownership limitations, there were many female outliers who are successful farmers, supporting their families and communities.

An inspiring example is Doris Joshua, a 27-year-old female farmer residing in Toto, Nasarawa. The use of tractors made land clearing much easier, ultimately leading to a significant increase in farm size from 3 to 6 hectares. Their income skyrocketed from \$1,084 to \$3,251, bringing about a substantial improvement in their financial situation.

In Doris' own words,



**When we didn't have access to tractors, things were quite challenging. However, once we started utilizing tractors, our income grew exponentially, surpassing our expectations. We can now afford to provide our children with quality education, and we've been able to invest our savings in securing additional land."**

#### Farmer's demographics:

At least 90% of the farmers who were surveyed have been involved in farming activities for 10 to 20 years. Moreover, a significant proportion of the farmers, 74% of them, are household heads who are responsible for supporting a family of 3 to 10 individuals. Their long-standing involvement in agriculture suggests that the farmers are likely to have encountered various challenges and opportunities in the past, which may have shaped their farming practices and decision-making processes. The data also highlights the importance of farming activities in the region, particularly in supporting the livelihoods of households, and their dependence on this sector for income and sustenance.

Farmers are primarily engaged in crop farming as it is the most dominant agricultural value chain in the region. The most commonly cultivated crops were maize, rice, cowpea, sesame, melon and groundnut. This suggests that these crops are the most profitable and viable options for the farmers in the area, and they have a competitive advantage in terms of demand and supply. The farmers have significant expertise and experience in growing these crops, which may have been passed down through generations. The focus on crop farming

also suggests that the region has a favourable climate and soil conditions for growing these crops, which may have led to the specialization in this value chain.

#### Land size under cultivation:



The survey also revealed that before the intervention, the average land size cultivated by the farmers was 4.8 hectares. However, after the intervention, the average land size cultivated increased to 7.4 hectares, indicating a 54% increase. This suggests that the intervention was successful in improving the productivity and efficiency of the farmers, allowing them to expand their cultivation activities and potentially improve their income and livelihoods. The forecast from interacting with farmers is that land size under cultivation will continue to increase partly due to access to tractors.



#### Hectares requested to be serviced:

Based on the survey data provided, Hello Tractor serviced 95% of the total hectares requested to be serviced. On average, each farmer requested 7.2 hectares to be serviced but only 6.81 hectares were serviced. This suggests that Hello tractor is operating at optimum efficiency, as they were able to meet the needs of each farmer to a certain extent. There are several reasons for the shortfall in the number requested

to the numbers actually serviced, this can be traced to the fact that Hello Tractor did not have enough tractors or manpower to service all the requested hectares within the planting season, or that there were logistical challenges in reaching certain farms. Alternatively, some farmers may have requested more hectares than they actually needed or could afford to pay for, which could also contribute to the difference between requested and serviced hectares.

According to the farmers interviewed, there is a shortage of tractors and the waiting time during the planting season is between three to four weeks.

This was reechoed by Shekwolo Abu, who said that “we do not have access to tractors on time. It takes three to four weeks of waiting time during the planting season.”

Overall, while Hello Tractor was able to service a majority of the requested hectares, there are still some areas for improvement in their operations to increase efficiency and ensure that their customers’ needs are met.



#### **Rental cost per hectare:**

Hello Tractor’s current rental cost in Awe and Toto, Nasarawa, is between \$54.31 to \$65.17, while other commercial service providers charge between \$65.17 to \$86.9 for their rental services.

This suggests that Hello Tractor is competitively priced compared to other service providers in the area. It could be a factor in their ability to attract and retain customers who may be looking for more affordable tractor rental options. However, it is important to note that there may be other factors that customers

consider besides price, such as the quality of service, availability of tractors, and ease of use, which may also impact their choice of service provider.



#### **Comparative analysis of tractor and labour cost:**

77% of the farmers surveyed agreed that tractor cost per hectare is more cost-effective than labour cost per hectare. This suggests that the farmers perceive tractor rental as a more efficient and cost-saving option for their farming activities. Manual labour cost per hectare is approximately double the cost of tractor rental, which implies that the use of tractors is significantly more economical than relying on manual labour.

In rare cases where family labour is used, manual labour cost is lower. This implies that the cost of using family labour may be lower than hiring manual labour from outside sources.

The choice between using tractors or manual labour may depend on various factors, such as the availability of family labour, the size of the farm, financial capacity, and the type of crops being cultivated.



#### **Provision of other value-added services:**

Currently in Nigeria, farmers have access only to tractors, while tractor owners have access to additional value-added services such as tractor technicians and spare parts services. Farmers will soon have access to other value-added services with the setting up of a Hub in Toto, Nasarawa, in May 2023.



Farmers identified that renting a tractor has helped improve farming practices and agribusiness.

Figure 2

Nigeria: How renting a tractor improved farming practices/agribusiness



**Challenges identified by farmers:**

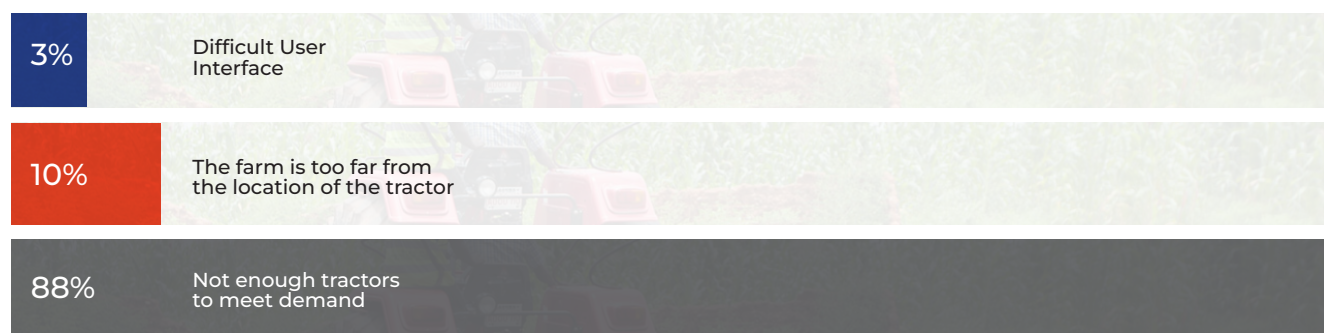
Two key challenges for farmers are inadequate tractors and pricing. Farmers suggested 8 to 20% rental cost reduction to enable them to service more hectares and increase the number of tractors to cut down on waiting time and accessibility.



Others include maintenance downtime, and inaccessibility of their farms due to the fact that farmland is divided by a river.

Figure 3

Challenges in accessing service





### How farmers request for a tractor:

Farmers in the surveyed area have access to multiple channels for booking tractors, including booking agents, farmers' hubs/cooperatives, and direct communication with tractor rental companies. Most of the farmers surveyed prefer to book tractors through booking agents. 7 out of 10 farmers surveyed have used this method, which suggests that it is a popular choice among farmers.

The popularity of booking agents among farmers indicates that these intermediaries play an important role in facilitating access to tractor services in the area.

Figure 4:

Nigeria: How do you book or request a tractor when in need of the service



### 3.3.2 Kenya

The survey results indicate that 51% of respondents in Kenya are female farmers, and most of them farm to feed their families, while men are more predisposed to farming on a larger scale primarily for business. This suggests that women are more likely to engage in subsistence farming while men are more likely to engage in commercial farming. The results also show that 69% of the women surveyed are household heads while 98% of female respondents support between 1–10 people, indicating that women play a critical role in supporting their families.

Furthermore, 33% of the female farmers have more than 5 years of experience in farming, while the rest have less than 5 years of experience. The women farmers have an average farm size of 0.75 hectares, which is relatively smaller compared to male farmers. Conversely, 90% of the men surveyed are household heads while 86% support between 1–10 people, with 10% supporting more than 10 people. 53% of the male farmers have more than 5 years in farming, while the rest have less than 5 years of experience. The male farmers have an average farm size of 1.25 hectares, which is larger than that of women.



The benefit of tractors and Hello Tractor Hub service: The use of tractors has improved agricultural practices for farmers as observed by Zaccheaus Okoth, a 40-year-old rice farmer, who previously relied on manual labour for harvesting and experienced low yields.

The results suggest that gender differences in farming practices in Kenya are driven by socio-economic and cultural factors. Women are more likely to engage in subsistence farming due to limited access to resources and markets, while men are more likely to engage in commercial farming due to their economic and social status. The smaller farm sizes of women also reflect their limited access to land and other resources.

The benefit of tractors and Hello Tractor Hub service: The use of tractors has improved agricultural practices for farmers as observed by **Zaccheaus Okoth**, a 40-year-old rice farmer, who previously relied on manual labour for harvesting and experienced low yields. She says,

“ We used to use our hands in harvesting and we could not harvest well so most of the produce remained in the farm. As of now, harvesting has been made easy.”

Farmers in Kisumu also have access to a suite of services through the Hub. These include subsidized fertilizers, seeds provided by Hello Tractor, and extension services. **Joshua Ochieng**, a 45-year-old rice farmer, notes that

“ Back then, there were no fertilizers but as of now, we have access to quality fertilizers and pesticides.”

Other factors that led to an increase in income: In general, the income of farmers has increased significantly, with male farmers experiencing a 102% increase and female farmers experiencing a 42% increase. However, according to the survey respondents, this increase can be attributed to various factors such as improved access to resources like tractors, fertilizers, herbicides or pesticides, improved seedlings, access to irrigation, and stabilisation of commodity prices by the national cereals and produce board in Kenya.

**Moses Onyango**, a 41-year-old farmer who cultivates rice and maize, believes that farmers could do even better if they had access to better markets. According to Onyango,

“ Farmers can do a lot better if they have access to the market; we produce and sell our rice at a giveaway price.”

Table 1: Beneficiaries' yield data

Yield (kg)	Maize	Rice	Groundnut	Bean	Melon	Millet	Tomatoes
Before intervention (kg)	62,745	513,183	24,800	9,360	109,730	2,600	4,050
After intervention (kg)	118,040	711,635	35,550	13,470	155,790	3,300	4,410
Percentage increase (%)	88%	39%	43%	44%	42%	27%	9%

### 3.3.3 Challenges Identified by Farmers

The primary challenges reported by farmers include insufficient tractor availability, as indicated by 9 out of 10 farmers, and pricing concerns, as mentioned by 5 out of 10 farmers.

Moreover, the assessment has revealed additional challenges specific to the sample population in Kisumu and Ahero. These challenges predominantly arise from climate change, pest infestations, and diseases. Farmers highlighted the need for increased support to combat these issues. Additionally, inadequate access to capital was identified as a barrier to utilizing tractor services effectively, with some farmers requesting for the flexibility of paying tractor rental costs after the harvest.

“The use of tractors is good however, we need to have water pumps. This is the main challenge we have around more so for small-scale farmers,” Leah Akoth – a 27-year-old rice farmer.

The assessment has also underscored the significance of environmental factors. Sherine Omondi, a 40-year-old maize farmer, emphasized the heavy reliance on rainfall for farming activities, rendering farmers vulnerable to losses during periods of insufficient rainfall. Furthermore, Anthony Onyugi, a 45-year-old farmer cultivating maize, rice, and tomatoes, highlighted the detrimental impact of birds that often consume a substantial portion of the crops, leading to significant yield losses.

**Table 2: Comparison between Nigeria and Kenya beneficiaries**

Yield (kg)	Maize	Rice	Groundnut	Bean
	Female	Male	Female	Male
<b>Total respondents</b>	85 farmers (51%)	84 farmers (49%)	44 farmers (28%)	111 farmers (72%)
<b>Location surveyed</b>	Kisumu; Rabuor, Nyando and Ahero		Toto and Awe, Nasarawa	
<b>Household heads</b>	59% are household head	76% are household head	80% are household heads	95% are household heads
<b>Average hectare per farmer</b>	0.75 hectare	1.25 hectare	5.4 hectares	8.2 hectares
<b>Income in 2021 (before intervention)</b>	\$825	\$892	\$424	\$2,594
<b>The average income in 2022 (after intervention)</b>	\$1,166	\$1,802	\$2,035	\$6,183
<b>Percentage increase in income</b>	41%	102%	380%	138%
<b>Mobile phone ownership</b>	Basic phone-72% Smartphone-40% None-4%	Basic phone-58% Smartphone-57%	Basic phone-79% Smartphone-16% None-7%	Basic phone-76% Smartphone-25% None-3%



<b>Farming experience</b>	33% have more than 5years of experience	53% have more than 5years of experience	82% have more than 5years of experience	94% have more than 5years of experience
<b>Predominant crops</b>	Rice (87%) and Maize (38%)		Maize (74%) and Rice (41%)	
<b>Comparative analysis of tractor and labour cost</b>	9 out of 10 farmers surveyed agreed that tractor cost per hectare is more cost-effective than labour cost per hectare.		8 out of 10 farmers surveyed agreed that tractor cost per hectare is more cost-effective than labour cost per hectare.	
<b>Method of booking tractors</b>	9 out of 10 farmers book tractors through booking agents		7 out of 10 farmers book tractors through booking agents	
<b>Hectares requested to be serviced</b>	9 out of 10 farmers book tractors through booking agents		7 out of 10 farmers book tractors through booking agents	
<b>How financing impacted the tractor owner's ability to purchase a tractor</b>	5 out of 10 tractor owners would never have been able to purchase a tractor		9 out of 10 tractor owners would never have been able to purchase a tractor	
<b>Average rental cost compared with other commercial rentals</b>	Hello, Tractor's current rental cost in (Kisumu-Kenya) is between \$87.5 to \$100 per hectare while other commercial service providers charge between \$150 to \$175 for their rental services.		Hello Tractor's current rental cost in Awe and Toto, Nasarawa, is between \$54.31 to \$65.17 per hectare, while other commercial service providers charge between \$65.17 to \$86.9 for their rental services	
<b>Challenges</b>	Two key challenges faced by farmers are inadequate tractors (9 out of 10 farmers) and pricing (5 out of 10 farmers).		Two key challenges faced by farmers are inadequate tractors (9 out of 10 farmers) and pricing (4 out of 10 farmers)	

Overall,

- 87% of the farmers surveyed believed that renting tractors is a more cost-effective option compared to manual labour involving the use of workers or animals.
  - 76% of the farmers reported a decrease in their labour costs since they began renting tractors. This indicates that utilising tractors has helped them save on labour expenses.
  - A significant number of farmers, 76% of the respondents, have been able to expand their farm operations since they started renting tractors. This suggests that access to tractors has facilitated the growth and scalability of their farming activities.
  - The primary challenge faced by 88% of the surveyed farmers is the inadequate availability of tractors. This shortage hinders their ability to access and utilise tractors effectively.
  - In terms of rental prices, 46% of the farmers expressed a desire for a reduction in rental fees.
  - Data showed that 59% of the farmers surveyed were able to make bookings independently without any assistance, utilising their phones directly. On the other hand, 31% of the farmers required some assistance while booking, whereas 11% experienced issues and could not book tractors at all.
  - Tractor owners serviced an average of 92.9 hectares monthly during the planting season. However, their service volume decreases during the off-peak season, suggesting a correlation between tractor usage and seasonal agricultural activities.
  - The surveyed tractor owners have an average monthly income of \$4,610. This indicates that tractor ownership is a lucrative venture, as these owners are earning a substantial income from their services.
- Furthermore, 88% of tractor owners surveyed currently employ one to two tractor drivers and at least 70% support between 1 to 10 people.
- 58% of tractor owners are working with 1 to 2 booking agents, 27% work with 3–4 booking agents and 15% work with more than 5 booking agents.
  - The repayment of tractor financing in Nigeria, Kenya, and Uganda has been exceptional with a 90% repayment rate.
  - The availability of tractor financing has had a significant impact on tractor owners. 73% of tractor owners stated that they would never have been able to purchase a tractor without financing options. This demonstrates the critical role that financing plays in enabling tractor ownership, empowering a substantial portion of tractor owners who would otherwise not have the means to make such a purchase.

Figure 5: Comparison between tractor and labour costs per hectare, which is more cost-effective?

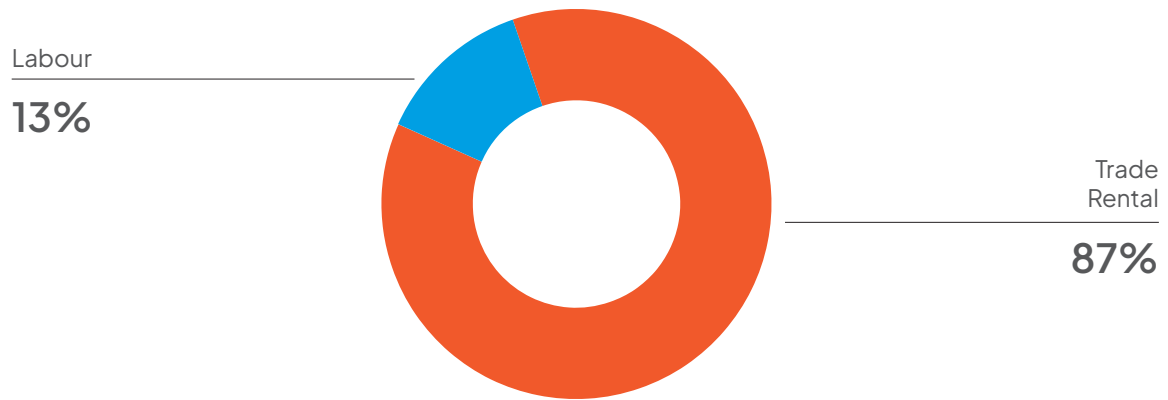
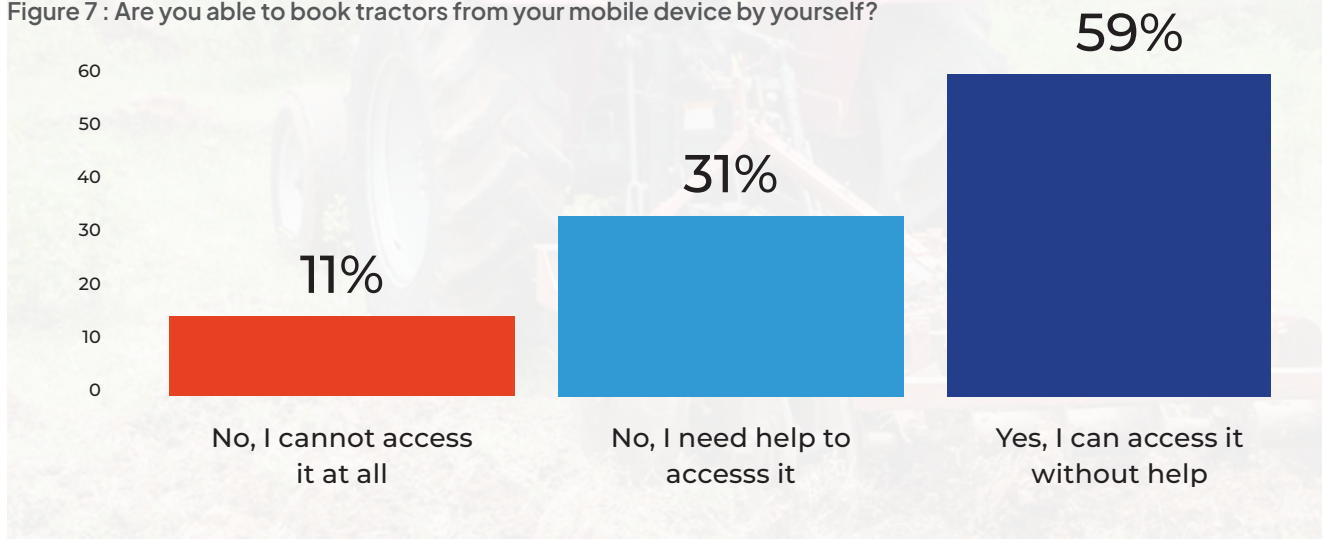


Figure 6 :How renting a tractor improved farming practices/agribusiness



Figure 7 : Are you able to book tractors from your mobile device by yourself?





### 3.3.4 Recommendations

#### **Increasing the number of tractor owners:**

The demand for tractor services exceeds the number of tractors available to serve farmers. As a result, by increasing the number of tractors, farmers will not have to wait as long to access this service, allowing planting and other farming activities to be completed on time.

#### **Introducing the use of USSD code:**

The farmers believe that introducing USSD code will allow farmers who use basic phones

to easily access booking services rather than relying solely on booking agents. This will also make the tractor service accessible to farmers in areas where booking agents are unable to reach.

#### **Introducing credit/loan services:**

The farmers suggested that loans and credit services be made available at the hub. The majority of them stated that this will allow them to increase the number of acres cultivated each season and then they can pay after harvest because most of them do not have enough

money to pay for the tractor services during land preparation.

The farmers also suggested that Hello Tractor expand their services to meet some of their farming needs. Some of the recommended services are listed below:

1. Availability of extension officers to provide necessary information to the farmers.
2. Availability of quality fertilizers and seedlings at subsidized prices to the farmers.
3. Availability of combined harvesters: According to the farmers, the tractors provided by Hello Tractor are mainly used to cultivate and rotavate. They suggested that adding combined harvesters would help speed up the entire farming process.
4. Availability of pricing information and soliciting of markets: Most of the farmers suggested that Hello Tractor helps them solicit for markets and provides them with information on the best prices for their produce.

### 3.4 Social Return on Investment (SROI) Hello Tractor

#### 3.4.1 Overview

One of the key objective of this study is to evaluate the social value of Heifer's investment in Hello tractors T4A and AYuTe projects. Both projects provide financing for tractor ownership and access to tractors for smallholder farmers in Nigeria, Kenya and Uganda.

The social return on investment component of the study is focused on measuring the tangible and intangible value (financial) of the projects' impact using clearly defined outcome indicators. The overarching objectives for SROI evaluation are:

- Establish the SROI of projects to beneficiaries (direct & indirect) and the community. For example, "A \$1 investment in providing farmers with access to tractors has generated an SROI of \$2.4; this translates to an increase in farmers' income and an improvement in health and economic outcomes."
- Recommendations for the extended long-term impact of social investment. For example, "an investment in a tractor mechanization project in Nigeria, Kenya and Uganda gives a 140% net SROI, through a sustained increase in farmers' income, health and economic outcomes, development of self-esteem and an opportunity to contribute to the immediate economy (community/state)."

**Table 3: Project benefits**

Indicators	Success rate   No of beneficiaries	Monetary	Groundnut
Increase in family savings	76%   16,355	\$480	\$7,850,400
Healthy living habits	76%   98,124	\$10	\$981,240
Increase in productive hours because of good health	76%   16,355	%10	\$163,550
Increase in school enrolment	64,560 (at least 3 children enrolled in each family)	\$20	\$1,291,200
New business opened	104	\$100	\$10,400
Increased self-esteem	21,520	\$10	\$215,200
Capacity development for tractor operators	157	\$100	\$15,700
		Total value of benefits	\$10,527,690

\*Success rate: 76% of farmers surveyed have been able to expand their farm operations and consequently increased income.

**Table 4**  
Direct and Indirect beneficiaries as at January 2023

	Direct beneficiaries	Indirect beneficiaries
Farmers serviced	21,048	126,288
Tractor owners	104	624
Booking agents	208	1,248
Tractor operators	157	942
Tractor technician	3	9
<b>Total</b>	<b>21,520</b>	<b>129,111</b>
<b>Total direct+indirect beneficiaries</b>	<b>150,631</b>	

\*\* assumption: each direct beneficiary supports at least 5 to 6 people. This is supported by the survey data.

Table 5: SROI table

	Values
Project Cost	\$4,400,000
Benefits (in numbers)	10,527,690
SROI	2.4
Net SROI	1.4
Net SROI (%)	140%

- The SROI ratio of 2.4 indicates that the project was able to generate \$2.4 of social value for every dollar invested in providing tractors to smallholder farmers. This means that the project was highly efficient in creating social impact and yielded a significant return in terms of social value.
- The Net SROI value of 1.4 indicates that the project produced a positive return on investment. It means that the social value generated was 1.4 times greater than the resources initially invested. This outcome suggests that the project was not only successful in achieving its intended social goals but also exceeded expectations by delivering additional value to society.
- Overall, these values paint a positive picture of the project's benefits. The SROI ratio of 2.4 demonstrates the project's ability to leverage resources effectively and create substantial social value. This is significant given that the project benefits are just unravelling and the project has just crossed the one-year mark. This indicates a promising potential for even greater social value creation as the project continues to progress and expand its reach.
- Financial return on investment: The loan repayment rate represents the financial return on investment. This indicates how successful the financing initiative has been in terms of recouping the funds invested. The 90% repayment rate as indicated in the table below suggests that the project is financially viable and sustainable, ensuring the availability of funds for future tractor financing.

This is also an indicator of the project's success in achieving its social goals. When tractor owners are able to repay their loans, it implies that they are generating sufficient income from servicing smallholder farmers.

Table 6  
PAYG repayment report

PAYG Cumulative Repayment Report													
Country	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	Overall Cumulative
Kenya	130%	130%	96%	102%	99%	85%	85%	94%	103%	63%	89%	89%	<b>97%</b>
Nigeria	114%	114%	102%	124%	99%	110%	114%	15%	57%	86%	96%	94%	<b>94%</b>
Uganda			100%	94%	100%	71%	37%	49%	61%	55%	64%	64%	<b>70%</b>
Average	122%	122%	99%	107%	99%	89%	79%	53%	74%	68%	83%	82%	<b>90%</b>

### 3.5 Quotes from Beneficiaries

“Access to tractors and inputs has contributed to my increase in income. Before when using cows, the process was tedious and slow as it can take one or two weeks to cultivate my farm but with a tractor, I can do the job within a day.”

Jane Atieno, a female farmer in Rabuor Kenya.

“Hello Tractor provides a sophisticated mobile app which allows me to track my tractors’ location, carry out routine maintenance, know the number of hectares done and also know the amount of fuel consumed which has helped my business a lot and helps it to run smoothly.”

Samson Enesi, Abuja, a civil servant and a tractor owner.

“Being a female in the agric field, there are some discriminations from male farmers but consistency has helped me, and being a booking agent earlier has helped me. The female farmers trust me more and prefer to work with me and some male farmers prefer to work with me because they think I’m more empathetic.”

Blessing Agu –Abuja, a female farmer and tractor owner.



“It has improved my business as I have been able to improve the acreage I do every year. From the profits, I am able to improve my productivity to buy quality farm inputs for my farm. I am able to keep my family in a stable financial position.”

Samsung Opiyo, Muhoroni, Kisumu, Kenya, a farmer and tractor owner.

“I have been looking at mechanisation for a long time but building capital was a problem. If I can get more on the same terms, I'll get up to 50 tractors because the opportunities are enormous. We get about 5 calls every week and we haven't even been able to satisfy our customers. So the demand is high, even though it's a seasonal business, you can succeed at it with proper planning.”

Munza Ambima, serviced up to 625 hectares to date. (He services Nassarawa, Abuja, Kogi, Delta and Taraba)



## Conclusion and Recommendation

Heifer International through Hello Tractor, the project implementing partner has effectively fulfilled its objective of enhancing farmers' income by facilitating increased acreage through improved access to tractors. This accomplishment demonstrates the project's efficiency, relevance, and effectiveness, resulting in an impressive 227% boost in farmers' income. The intervention also showed a positive Social Return on Investment and a 90% loan repayment rate. In addition, all the tractor owners and farmers surveyed gave positive feedback on the intervention.

The projects directly solve significant challenges facing smallholder farmers. The implementing partner has also clearly identified the 'pressure points' for the smallholder farmers and developed low-cost solutions to address these issues. The overarching challenge is how the project ensure the sustainability of their offerings after the grant cycle.



