

# **Farm Mechanization & Conservation Agriculture for Sustainable Intensification**



## **Review and Planning Meeting**



**Cresta Lodge in Harare, Zimbabwe: 19th to 23rd March 2018**

## List of acronyms

2WT:	Two-wheel tractor
ACIAR:	Australian Centre for International Agricultural Research
AIFSC:	Australian International Food Security Centre
CA:	Conservation agriculture
CGIAR:	Consultative Group on International Agricultural Research
CIMMYT:	International Maize & Wheat Improvement Center
EIAR:	Ethiopian Institute of Agricultural Research
FACASI:	Farm Mechanization and Conservation Agriculture for Sustainable Intensification
FAO:	Food and Agricultural Organization of the United Nations
IAE:	Institute of Agricultural Engineering +
M&E:	Monitoring and Evaluation
MoANR:	Ministry of Agriculture and Natural Resources
SIMLESA:	Sustainable intensification of maize-legume cropping systems for food security in eastern and southern Africa
SRA:	Small Research and development Activity
SSA:	Sub-Saharan Africa
HT:	Hello Tractor

# **1. Background of the project**

## **1.1. History of the project until this workshop**

- 20<sup>th</sup> of December 2011:* First discussions between ACIAR and CIMMYT on the possibility to develop a project proposal looking at mechanizing CA in SIMLESA.
- 4<sup>th</sup> of January 2012:* *Selection of Frédéric Baudron as the focal point to develop a concept note on small mechanization and conservation agriculture in Eastern and Southern Africa.*
- 15<sup>th</sup> of January 2012:* *First draft of a concept note titled “Mechanization to Leverage sustainable Intensification in Sub Saharan Africa (MELISA)”.*
- 19<sup>th</sup> of February 2012:* *Submission of a “Small Research and development Activity” (SRA) proposal to ACIAR to finance a research design workshop for the finalization of a Phase 1 proposal (pre-proposal) to be submitted to ACIAR.*
- 5<sup>th</sup> of March 2012:* *SRA titled “Research Design for MELISA” granted by ACIAR*
- 10<sup>th</sup> to 13<sup>th</sup> of April 2012:* *Research design workshop in Addis Ababa, Ethiopia.*
- 14<sup>th</sup> of June 2012:* *Submission of a Phase 1 proposal (pre-proposal) titled “Mechanization to Leverage sustainable Intensification in Sub Saharan Africa (MELISA)” to ACIAR.*
- 20<sup>th</sup> of June 2012:* *Reception of the comments from the In-House Review and invitation to submit a Phase 2 proposal (full proposal).*
- 6<sup>th</sup> of November 2012:* *Submission of a Phase 2 proposal renamed “Farm Mechanization & Conservation Agriculture for Sustainable Intensification”.*
- 7<sup>th</sup> of December 2012:* *Reception of the comments from a first external reviewer on the Phase 2 proposal.*
- 12<sup>th</sup> of December 2012:* *Reception of the comments from a second external reviewer on the Phase 2 proposal.*
- 17<sup>th</sup> of December 2012:* *Submission of a revised Phase 2 (second version).*

- 20<sup>th</sup> of December 2012: Small group meeting at ACIAR discussing the Phase 2 proposal and requesting for adjustments.*
- 29<sup>th</sup> of January 2013: Submission of a revised Phase 2 (third version).*
- 28<sup>th</sup> of February 2013: Submission of the final version of the Phase 2 proposal (fourth version) following ACIAR comments on the previous one.*
- 18<sup>th</sup> of March 2013: Project accepted by ACIAR, letter of agreement signed by ACIAR and sent to CIMMYT.*
- 25<sup>th</sup> of March 2013: Letter of agreement signed by CIMMYT.*
- 25<sup>th</sup> to 30<sup>th</sup> of March 2013: Planning event for Kenya and Tanzania in Arusha, Tanzania.*
- 3<sup>rd</sup> to 8<sup>th</sup> of February 2014: Planning event for Ethiopia and Zimbabwe in Harare, Zimbabwe.*
- 11<sup>th</sup> to 14<sup>th</sup> of March 2014: Review of first year implementation and Planning for the 2nd Year of the FACASI Project (Kenya and Tanzania), 11th to 14th March, 2014*
- 9<sup>th</sup> to 14<sup>th</sup> of February 2015: Review of the first two years of implementation and planning for the 3<sup>rd</sup> year of the FACASI Project (Ethiopia, Kenya, Tanzania, Zimbabwe), and mid-term review, 9<sup>th</sup> to 14<sup>th</sup> of February 2015.*
- 17<sup>th</sup> to 20<sup>th</sup> of February 2016: Review of the first three years of implementation and planning for the 4<sup>th</sup> year of the FACASI Project (Ethiopia, Kenya, Tanzania, Zimbabwe)*
- 31<sup>st</sup> Jan to the 3<sup>rd</sup> of Feb 2017: Review of the first phase of implementation, exist strategy for Kenya and Tanzania and closing of phase 1. Planning for phase 2 of the project for Ethiopia and Zimbabwe*

## **2. Day 1: introduction, phase 1 presentations**

### **2.1. Participant Self-introduction by country and objectives**

### **2.2. Highlights from FACASI 1 and presentation of FACASI 2 (F. Baudron)**

Main messages from part one (highlights from Phase 1):

- Labour / farm power is increasingly becoming one of the most limiting factors of smallholder farming in Africa
- Land preparation is one of the most critical operation, and one of the most power intensive
- Direct seeding allows for quick crop establishment and makes the use of small engines possible
- Why two-wheel tractor in Africa? Small and fragmented farms/fields. Small engines are common in rural Africa, appropriate for the skill-level of local mechanics
- The FACASI approach involves locally available two-wheel tractors and direct seeders, service providers and trainers.
- FACASI results demonstrate this is a time-saving technology for maize establishment, with a modest fuel consumption (below 6 L per ha)
- In the case of wheat (and other small grains) it is also yield increasing
- It is not profitable for farmers to individually own machines, but a model involving service provision is profitable. Service provision is not new for smallholder in ESA: most of them hire labour, draft power and or tractor already.
- The profitability of service provision increases with the number of services offered (planting, transporting, shelling, etc), which guarantee that the use rate is maximized.
- Mechanization service provision is profitable, both for service providers and their clients
- There is evidence (e.g., from Zimbabwe) that mechanizing CA increases its adoption
- The profitability of mechanization services may be increased through technological innovations (local manufacturing of cheaper attachments, second generation engineering to increase the performance of attachments, etc) and institutional innovations (innovative business models, better targeting, policy improvement, access to finance, booking services, etc)
- There are other small mechanization options than 2WTs which can significantly reduce drudgery and form the basis of a profitable service provision business (e.g., single cob shellers)

Main messages from part two (summary of the variation):

- Aim of the variation: (1) to resolve second generation technological challenges emerging during early adoption, (2) to study the profitability of and business case for investment in service provision and other business models, (3) to understand early adoption resulting from the first phase, and (4) to assess the value of training and information sharing
- Why Ethiopia and Zimbabwe only?
- Welcoming new steering committee members

## **Questions/Answers and Comments**

**Q. Jehiel:** Have you done any work with 65 to 75hp tractors with conservation agriculture techniques?

**A. Frédéric:** Larger mechanization with CA piloted with FAO and others but not to scale. As a research organization, we are focusing on below 25hp. The cost aspect and the type of soil are some of the reasons for adoptions for 2WT.

**Comment from Jehiel:** There's a gap for 4WT owners in terms of getting information on CA and it would be good to get them filtered information on the Hello Tractor platform. The market has a great interest in 4WTs so it is important to provide information on technology for 4WTs so that we can respond to the market.

**Q. George M.** There is a need for discussion on policy implementation. We can't scale out without adoption and we cannot do adoption without policy implementation. What is happening in that space? Regarding business model, it is a good idea to provide a refreshment on the accomplishments on phase 1. Also, when organizing National Advisory meetings, it would be good to include the countries that are no longer in phase 2 (Kenya and Tanzania) so that we can update each other.

**A.** A lot of change has happened and Birstat's presentation will address that. Also, Ephrem and Dorcas will also do a refreshment on phase 1 accomplishments. Unfortunately, we don't have the funding to include the previous partners but we would be happy to do so if this were to change. Perhaps a suggestion can be made to ACIAR so that we could include them in our future plans. Also, the next phase of FACASI could be a part of the SIMLESA project.

**Q. Richard.** What has taken place on seeder evaluation and agronomic performance on seeding technologies?

**A. Frédéric:** A synthesis comparing the business models across the four countries was done by David Kahan and it is available for review. Regarding the technologies, we have some output from John Blackwell and there's a publication with Bisrat (on wheat) that is in the works and will be available in the next month.

**Q. Euan** Is there a concern that farmers will dis-adopt mechanization?

**A. Frédéric** – sometimes the private sectors take a shortcut and there's some issues with quality that dis-incentives adoption.

**A. Raymond:** The adoption of certain low-quality equipment may suffer but overall CA technology still demonstrates the benefit and people generally look for other brands rather than abandon the technology

**A. Bisrat** – My presentation has case studies that will address this question so it's best to go through that first

**A. Richard:** Mature markets can differentiate between products but in immature markets, a tractor is just a tractor so it's important to try and maintain quality assurance

### **2.3. Official opening by Rabson Gumbo, Director of Mechanization in MoA**

#### **Questions/Answers and Comments**

**Q. Ben Econet:** What happened to the testing center for equipment?

**A. Rabson:** It used to be mandatory for equipment produced in the country or purchased from abroad to go through rigorous testing but there seems to be less of a requirement, however there is again some positive development such as requiring a quality fitness certificate before providing a loan for example but more can and will be done.

**Q. Christian:** I agree when you say that we have a listening minister but what would you suggest is the best way to get him engaged and listen to what we're doing. Is it through a field day or meeting?

**A. Rabson:** Field days are the best for this purpose. The minister is a farmer (a good one) and likes being in the field himself.

**Q. Alice:** What data has an impact at policy level (increase in production, foreign investment, youth involvement) and what indicators should we look at?

**A. Rabson:** Involving the local industry is my recommendation. There are many fast-moving information that are not clearly defined so defining that is necessary as well as delivering what the farmers want.

## **2.4. FACASI experience and situation of small mech in Ethiopia (Bisrat Getnet)**

Main message:

- FACASI demonstrated that small mechanization is a pathway to sustainable intensification
- Raising policy related issues to small mechanization has been one of the key outcome of the FACASI project.
- FACASI enabled a partnership with the private sector and between countries in the region
- No other project tried to address the issues in a complete manner from technology evaluation, to investigating of policy issues, looking at commercialization and sharing knowledge
- Knowledge sharing has been a critical activity from FACASI, and created interactions with the global small mechanization community (e.g., University of Firenze).
- The number of service providers has increased tremendously since 2013
- FACASI Ethiopia attracted additional donors (e.g., GIZ)
- Success stories for wheat, teff, maize and bean
- Training remains key

### **Questions/Answers and Comments**

**Q. George:** Great presentation indicating where we are from first phase. Have you replicated Selam Awassa type of training?

**A. Bisrat:** We are partnering with Selam Awassa in FACASI 2 but we're also doing a lot of work with other projects involving maize in other areas such as Bako. In Awassa we're focusing on maize but we're also trying to influence the public sector.

**Comment from Tamiru:** A lot has been learned from FACASI 1 and the ministry has been using a lot of what has been done which has boosted our confidence. At this point we want to scale up what has

been done and to that end we want to know if you can give us what has been done with the planters so far, so we can demonstrate and we can also give you one of the ten planters we're planning to order so it can be used in the research site. In regards to quality, in our financing scheme Metec is not included due not only to the quality but also the poor support.

**Q. Special** How do you address overloading through the design (shear bolt)

**A. Bisrat:** We consider the farmer's preferences and we have had cases where they prefer the one with lower capacity vs. another one so we always consider the desires of our users in our engineering.

## **2.5. FACASI experience and situation of small mech in Zimbabwe (Raymond Nazare)**

Main message:

- On-station and on-farm trials were useful for investigating planter performance, give pointers as to the best bets and be a platform for participatory evaluation with farmers
- FACASI sZimbabwe took part in the crafting of two policy frameworks: the National policy on Agricultural Mechanisation and Irrigation, and the Climate Smart Agriculture Framework for Zimbabwe
- The following are critical points for FACASI2:
  - Create selling points for small scale mech based conservation agriculture services supplied by private sector based supply actors to farmers.
  - Farmers with capacity to pay for services ultimately drive demand for the supply chain.
  - Create conditions (a business case) to motivate private money to invest in agricultural mechanisation service provision
  - Generate sufficient interest in a critical mass of manufacturers/importers to invest in supplying the relevant hardware to SP's

### **Questions/Answers and Comments**

**Comment Frédéric:** How long do you think FACASI should go on and what would be a good time for exiting? This will be a good discussion for later on in the week.

**Q. Christian:** you presented a range of seeders, shellers, planters. Do you have a ranking or prioritization for the different equipment

**A. Raymond:** Small farmers can only afford machines that gives them the best performance for their money so it's difficult to make recommendations as it's subjective.

**Q. Jehiel:** Was there any consideration around density of demand between 4WT and 2WT? When we make comparison between oxen, 2WT and 4WT we have to decouple the practice. It is important to not just associate CA with 2WT and do an apple to apple comparison as there seems to be a bit of a bias towards 2WTs in this case.

**A. Raymond** Yes there is a bias in promoting 2WT for obvious reasons but we did a comparison of conventional, 2WT and 4WT so we did cover that.

**A. Frédéric** Entry point cost is smaller with 2WT vs. 4WT so it's also a selling point.

## 2.6. Agribank (Wadzanai Kanyuchi)

Main message:

- Agribank is a stable government owned institution that has been in place since 1924. It gives financial advisory services and help farmers run their operation as a business. Agribank offers the following services: (1) help smallholder farmers increase yield and return, (2) offers seasonal accounts with no monthly charges that are low cost to maintain, and (3) women and youth empowerment facilities.
- Currently there is a shortage of cash in Zimbabwe so it makes sense for these farmers to deposit their money in the bank. Only a minimum of 2 USD is required and there's no charge to keep the account open but a minimal charge that occurs during swiping (relative to how much they're charging)

### Questions/Answers and Comments

**Q. Jehiel** Does Agribank finance tractors?

**A. Wadzanai:** We finance anything that has to do with agriculture but nothing in place specifically for tractors. This means if someone comes in, we'll look at their case and serve their needs.

**Q. Walter** What can we use as collateral, can the asset itself such as a tractor be used as collateral

**A. Wadzanai:** this is explored on a case by case basis, so we determine what sort of collateral or see what type of security an applicant can offer before deciding.

**Q. Michael M** – do you have data on what type of farmers gets a loan (men, women etc)?

**A. Wadzanai:** We have the profile of the people we loan to but in terms of statistics it's not something we have readily available but can certainly arranged if/when desired.

**Q. Jaji** – How can we go about importing equipment from abroad?

**A. Wadzanai:** We apply on behalf of the client to the reserve bank and you will be put on the waiting list.

## 2.7. Training in FACASI 2 (Patricia Nyoni / Bisrat Getenet)

Main message from the Zimbabwe presentation:

- Key objectives of the trainings provided by the Institute for Agricultural Engineering: (1) to enhance understanding of Conservation Agriculture and gaps to be filled by mechanization, (2)

to impart knowledge on 2WT operational management, (3) to impart knowledge and skills in business management of 2WT and related services, and (4) to provide hands-on experience on usage of 2WT and various attachments

- 10 trainings are scheduled at the institute from September 2017 up to 2020 (2 have already been conducted).

Main message from the Ethiopia presentation:

- Training highlights
- 28 service providers have been trained between August and September 2017 in Melkassa
- In addition, 17 service providers have been trained in their respective regions
- 176 farmers and mech stakeholders have been reached through field days

### **Questions/Answers and Comments**

**Q. Michael M.** Is there a way of assessing the training and the value of it?

**A. Frédéric.** This is an on-going training which is considered like a mentoring throughout the different seasons but we don't do an assessment on what works and what doesn't.

**Q. Raymond.** Do we expect all SPs to be trained?

**A. Frédéric.** It is important that every SP should have some type of training but the format doesn't have to be rigid or formal.

**Comment (R. Bell)** On average it probably takes two years before the operator becomes skillful. We believe that with peer learning that could cut down the time to one a year.

## **2.8. CBA and market system analysis in FACASI 2 (Dorcas Matangi / Ephrem Tadesse)**

Main message:

- Presentation of the activities to be conducted during the variation
- Presentation of main findings and key lessons from the first phase
- Overview of agricultural machinery leasing in Ethiopia (new development)

### **Questions/Answers and Comments**

**Q. Raymond:** Does it make economic sense to power a sheller with an expensive 2WT?

**A. Ephrem:** When you consider how much money the SP makes per day/per week you will discover that they can pay for this tractor within one month which makes it viable and they also shouldn't invest in something that they will not use for long periods even if it's cheaper.

**A Frédéric:** Perhaps there's a better way to power a sheller and use the tractor for other things but

this is probably more context specific. It might make sense in one area/country where taxes are high on engines vs. another where it's low.

**Comment Michael M.** This makes a lot of sense from an economic point of view but if you're looking at this from a holistic point of view there's a lot more involved.

**Comment Euan:** in order to consider supply chain vs. value chain approach, it would be good to amend your work accordingly.

**Q. Richard** What's the repayment period for the loan from the Development Bank of Ethiopia?

**A. Ephrem** This is dependent on the life of the machine and the frequency of operations.

**Q. Euan.** A lot of attention is generally paid to risk aversion in Ethiopia why is that?

**A. Ephrem** All farmers seem risk averse everywhere not just in Ethiopia but their risk appetite can be increased through demonstrations.

## 2.9. Behavioral economics in FACASI 2 (Alice Woodhead)

Main message:

- Definition of behavioral economics
- Presentation of the 3Cs and design thinking

### Questions/Answers and Comments

**Q. Michael M:** What do you mean by tools, do you mean policy instruments?

**A. Alice:** Yes, this could mean various things, for example the government has education and raising awareness, tax breaks etc and the private sector would use marketing to explain the benefits of a product.

**Q. Tamiru:** Who sets the standard? Is it the government or private sectors?

**A. Alice:** It can be either and it's open to discussion as it's dependent on the country and the sector (health and safety are generally setup by the government and implemented by either the government or private sector)

## 2.10. Hello tractor: presentation of the company and its role in FACASI 2 (Jehiel Oliver)

Main message:

- The huge opportunity to (1) manage tractor fleets better, (2) minimize tractor downtime, and (3) increase tractor utilization
- HelloTractor's solution: a monitoring device, a tractor owner app, and a booking agent app.
- Customer development targets manufacturers, dealers/suppliers and fleet owners

- Future plan: full digital records of mechanized areas for deeper analysis and planning

### **Questions/Answers and Comments**

**Q. Michael:** The use of SMS can be tricky so how do you deal with that?

**A. Jehiel:** We moved away from SMS as the catchment area was too big so it wasn't the optimal way as it's also detached.

**Q. Michael:** Is it possible to do an application that can estimate the running hours where there's not even an odometer on 2WTs?

**A. Jehiel:** The technology already does it where it counts engine hours where it's running active. We're also looking into developing working activity and measuring the speed at which it is working.

**Q. Rabe** What is your relationship with the manufacturers? Can you do a live demonstration?

**A. Jehiel:** We don't have an agreement to sell data to any manufacturers as it's also against our regulations. In regard to live demonstration, we can send you a device so you can do a testing.

**Q. Alice** How do you address data security in light of the scrutiny of data breach and big data?

**A. Jehiel:** At the current time, we don't do anything specific and we also don't share data. Also, the farmers we work with are not in tune on how data can be used maliciously so it wouldn't make sense to have them sign a privacy agreement

**Q. Lewis M.** Can you monitor the performance of your implements by adding sensors?

**A. Jehiel:** To get down to implement level we need a lot of data and at this time we don't have the bandwidth to accommodate such a feature.

**Q. Ben** How does the payment loop for the service take place (cash etc)?

**A.** In Nigeria we deal in cash, in Kenya we use Mpesa. Also, we have our own booking agents and also other booking agents. These booking agents take commissions. We don't have any plans on taking commissions from the agents we don't own.

### **3. Day 2: Field Day: 2 sites in Makonde**



## 4. Day 3

### 4.1. Recap of previous day (Frédéric Baudron)

**Q George M.** 1) We saw great work by the youth group and we should make sure to communicate this as a success story 2) Gender should be an aspect that we include in this phase of the project.

**A. Frédéric:** Yes, I agree and this is why we're asking everyone to contribute a success story. We would also like to include a good gender research but we don't have a lot of resources allotted for this. We would like for ACIAR to approve some funding for gender.

**Q Koza:** I was impressed with the modifications that the youth group made. In regard to the shellers and planters I feel we shouldn't be stuck on imported material only but should also have locally produced material as an alternative.

**A. Frédéric:** I agree that we should really focus on local supply and though we all know the Fitarelli performs great we need to determine at what stage we will be comfortable in producing our own locally.

**Comments:**

**Tiri Koza:** Training is also important in terms of empowerment and impact

**Walter C:** The sheller is a good story and we increased output by a ton/hour (for one farmer) but the challenge is that the price is too costly. I also believe the policy aspect is something we need to explore.

**Frédéric:** We should write a short success story for the knowledge platform on the success of the shellers and threshers.

**Euan.** Back 30 years ago when the world bank did studies on mechanization they had emphasized the importance of policies and I am not sure what changes have been made since but it's important to identify what policies are desirable for small holder industry. It is also important to note that business models are going to differ based on the different countries/regions.

## 4.2. Knowledge platform

The group was broken into 3 work groups consisting of Hardware, Business Models and Policy.

- **Hardware** : prototypes, open source designs, training, manufacturing, assembly.
- **Business model** : information on practical applications in the market, best practices.
- **Policy** : banking and government, financing schemes, enabling environments.
- **Success stories** : case studies, marketing materials. Everyone will contribute (everyone will contribute on these)
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### Policy Group

Topic	Responsible	Timeline
Extracting the main messages from the policy brief in phase 1	George Mburathi	2 weeks
A video/CD summarizing versatility, capacity, economic feasibility of small tractors	Tamiru/Koza. Euan to speak to John Dixon 6-9months.	6 months
Youth and gender benefiting from this technology	Tamiru/Koza	9 months - 1 year

### Hardware

### Group

Topic	Responsible	Timeline
Training		
-	Manuals	
- Directory of training centers	Training centers	2 months

Directory of national suppliers of equipment	Bisrat/Raymond	1 month
Distribution of equipment specifications	Raymond/Bisrat	1 month
Distribution of equipment designs	Bisrat/Raymond	6 months
Recommendations for targeting of technologies in communities	Raymond/Bisrat	4 months
Recommendations on promoting safe use of 2WT technologies	Bisrat	2 months

### **Business Model :**

Group will provide case studies that explore the success and failure from the perspective of :

- A. Business models - Syndicate or Cooperative with a purchase equipment and hire, or used exclusively by members.
  - a. Single ownership, exclusive use
  - b. Agent networks
- B. Steering committee – scheduling for utilisation and service
  - a. 1/3 Owner – 2/3 NGO
  - b. Credit with an incentive scheme based on productivity or post-harvest payments
- C. Raising capital models (ownership)
- D. Gender business entrepreneurs - Bertha will be studying 6 female entrepreneurs – case studies that incorporate gender issues with business and capital raising models.

Michael M. is aware of Kenyan case studies in aligned areas that could be provided immediately, and also for FACASI in Zimbabwe.

### **4.3. Second generation engineering planning (Bisrat/Raymond)**

#### **Questions/Answers and Comments**

**Q Richard:** Setup time, how long does it take and what are the options to decrease time?

**A: Raymond** Within 30 minutes you can do your adjustments as there are various ways to do so for depth, transport etc.

**Q Tamiru:** The idea of multi-purpose toolbars is excellent but is there sufficient time to bring these ideas into reality within the next 14 months?

**A. Raymond** We think we can meet these timelines as it's already in the works and we're also using students for a lot of these activities.

**Q. Bisrat:** 1) What are you going to do for lighting so it can be used at night. 2) Diesel engine is more powerful for shelling so what do you think about incorporating those.

**A. Raymond** in regard to lighting we've convinced ATA to change the specs on the tractors they import as it's a problem to get them without and retro-fitting so we now get them with lights. 2) Diesel is more expensive which is why we don't use that.

**Q. Koza:** We need to get our prototypes right when we work with planters are they are very specific and farmers will resort to hand planting if we don't get it right. How do you address that?

**A. Raymond** When we promote CA with these planters, farmers confuse CA with minimum tillage so we have to be careful but we also need to invest in thorough testing

**Comment:**

We need to incorporate feedback from service providers and clients to justify all the engineering work that we're doing and document it well. The private sector also needs to also be involved.

#### **4.4. CBA and market system analysis planning (Dorcas/Ephrem)**

##### **Questions/Answers and Comments**

**Q Bisrat** We can probably add calculations of different costs like depreciations costs, efficiency etc by using materials already developed. What are your thoughts?

**A. Ephrem** We also plan on collecting such information and we have a way of calculating but if there is a method out there that is already developed it will make sense to use that.

**Q Raymond** When you interact with SPs and farmers in the field you come across very basic questions such as when do I buy. Do you have something built in to help answer these types of questions?

**A Ephrem** Yes, we already have calculations that will allow for such decision making

**Q Alice** There's a lot of information but how do you get this out to the mass so they can easily use this information?

**A. Frédéric:** We currently don't have the budget to develop a decision support tool but if there's interest we can develop something simple

**Q Richard:** Does your data include length of time it takes to travel from field to field or is it just in the field as you have to factor the fuel etc.

**A. Dorcas:** No, this is currently just time in the field

**Q Richard.** Do farmers have an accurate idea of the size of the field. Is validation of area necessary?

**A.** At the current time, the farmers tell us the size but we will work on incorporating validation.

**Q. Richard.** What is the big disrupter that is going to drive the shift towards mechanization? Is there a looming labor shortage, imports flooding into the country? What are the big economic disrupters we have to look into?

**A Dorcas:** Climate change is a driver. Drought animal planting period is very short so they need something that can be longer.

**A Ephrem:** Cost is a driver for Ethiopia and when we demonstrate the savings they can make from mechanization they are very interested. Quality of the seed and shortage of labor are also drivers.

**Q. Euan:** Who is going to drive the collaboration, who will take the lead (who has negating power)?

**A. Ephrem:** We address that within the questionnaire.

### Comments

**Alice:** You can develop a half a dozen case studies associated with simple outputs so that others that are not experts can use these data.

## 5. Day 4

### 5.1. Report back: annual plan for Ethiopia (Bisrat)

Activities	Milestones	Due date of milestone	Responsibility
<b>Activity 1.5.1</b> Improvement of wheat speeders	1 improved wheat seeder prototype drawings and testing reports	Dec 2018	EIAR (lead) CIMMYT
1.5.1.1 Sub <b>activity</b> Acquiring inputs	Specifications prepared and inputs purchased (sheet metal, rectangular bar etc.)	April 2018	EIAR
1.5.1.2 Sub <b>activity</b> Acquiring second generation engineering manufacturing seed meters	One 3D printing machine with printing material for 10 seeders purchased	May 2018	CIMMYT (Lead), EIAR
1.5.1.3 Sub <b>activity</b> Manufacturing seeders from conventional rotavator	at least 10 wheat seeders manufactured from conventional rotavator	June 2018	EIAR (lead), Selam Hawassa
<b>Activity 1.5.3</b> Improvement of wheat threshers	1 improved wheat thresher prototype drawings and testing reports	Dec 2018	EIAR (lead) CIMMYT
1.5.3.1 Sub <b>activity</b> Manufacturing multi-crop thresher prototype for wheat and teff with a cleaning system	Manufacturing 1 improved wheat thresher with a cleaning system	Dec 2018	EIAR (lead) CIMMYT, Selam Hawassa
1.5.3.2 Sub <b>activity</b> Conduct evaluation/testing	Test report	Dec 2018/9	EIAR/CIMMYT
<b>Activity 1.5.5</b> Improvement of trailers	1 improved trailer prototype drawings and testing reports	Dec 2018	EIAR (lead) CIMMYT
1.5.5.1 Sub <b>activity</b> Acquiring inputs and make modification to a prototype	Specifications prepared and inputs purchased (horns, reflectors, side view mirrors etc.)	May, 2018	EIAR (lead), Selam Hawassa
<b>Activity 2.3.8</b> Conducting twice yearly training on technical and business development	Technical and business development report	Oct 2017, May 2018, Nov 2018, March 2019	Selam Hawassa (lead)
2.3.8.1 Sub <b>activity</b> Acquiring training aids	One 2WT(20hp), 1 6 rows seeded, 1 pump, 1 trailer, 1 thresher, 1 reaper purchased	April 2018	Selam Hawassa (lead), EIAR, CIMMYT

2.3.8.2 Sub <b>activity</b> Preparation of technical (2WT and seeder operation, calibration) and business training modules and operator manuals (seeders, pump, threshers)	1, 2WT operation and calibration module, 1 business development training modules for 2WT operators prepared	March 2018	Selam Hawassa (lead), CIMMYT EIAR,
2.3.8.3 Sub <b>activity</b> Conducting technical and business training at least 50 men and women trained during each training.	Training report on technical and business development	Oct 2017, May 2018, Nov 2018, March 2019	Selam Hawassa (lead), CIMMYT EIAR,
<b>Activity 2.4.3</b> Socioeconomic analysis of the Mechanization service packages offered by hire service business models	Report on the costs and benefits of small mechanization service packages for rural service providers and users	Feb 2019	CIMMYT, (iDE)
<b>Sub Activity 2.4.3.1</b> Develop CBA and Business model performance study data collection tool	Two data collection finalized and shared for partner iDE	Feb 2018	CIMMYT
<b>Sub Activity 2.4.3.2</b> Test the tool	Both the tool tested with iDE	April 2018	CIMMYT
<b>Sub Activity 2.4.3.3</b> Train data collector	5 data collector/enumerate hired and trained	May, 2018	CIMMYT
<b>Sub Activity 2.4.3.4</b> Collect data	Required information collected at least from 30 service providers	May, 2018	CIMMYT
<b>Sub Activity 2.4.3.5</b> Analyze the data and write a report	Final CBA and BMP study report	Oct, 2018	CIMMYT
<b>Activity 2.4.4</b> Assessment of the performance of business models along the supply chain (local importers, manufacturers, hire services providers)	Report on the incentive structure and supply chain in small mechanization business	Sep, 2018	CIMMYT, iDE
<b>Sub Activity 2.4.4.1</b> Conduct review literature on <ul style="list-style-type: none"> <li>Systemic and structural business enabling environment related incentive and disincentives to upgradions</li> <li>Systemic and structural inceptives or disincentives as Wells as capacity constraints to value chain upgrading on the part of buyers.</li> </ul>	Systemic and structural indicators identified and documented	Feb 2018	CIMMYT
<b>Sub Activity 2.4.4.2</b> Develop Mechanization value chain analysis data collection tool	Data collection finalized and shared for partner iDE	Feb, 2018	CIMMYT
<b>Sub Activity 2.4.4.3</b> Test the tool	Data collection tool tested	April 2018	CIMMYT

<b>Sub Activity 2.4.4.4</b> Train data collector	5 data collector/enumerator hired and trained	May, 2018	CIMMYT
<b>Sub Activity 2.4.4.5</b> Collect data	Required information collected at least from 30 actors along the value chain	May, 2018	CIMMYT, iDE
<b>Sub Activity 2.4.4.6</b> Analyze the data and write a report	Final report of performance of business models (along the supply chain) will be submitted and shared for stakeholder.	Sep, 2018	CIMMYT
<b>Sub Activity 2.4.4.7</b> Update the report at the end of the project	At the end of the project the value chain will be assessed again and updated	Feb, 2019	CIMMYT, iDE
<b>Activity 4.2.6</b> Annual advisory and scaling meeting (organizing yearly)	Minutes of the meeting	Nov 2017, Nov 2019	EIAR (lead) CIMMYT
<b>Activity 4.2.7</b> Conduct yearly field days	Field day reports	Oct 2018, Oct, 2019	EIAR (lead) CIMMYT

## 5.2. Report back: annual plan for Activities 2.5.1 and 2.5.2

	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
<b>Activity 2.5.1</b>																
a set of successful and unsuccessful service providers and users of the machinery will be purposively sampled and in-depth case research done																
Student identified and proposal defined																
Survey refined																
Participants identified																
Field survey in Zim and Ethiopia N=60 * 4 sites																
Analyse																
Draft report on the relationship among structural factors and cognitive drivers of mechanisation																
Desktop research and policy analysis of FACASI II research to date																
Present findings and policy brief to CIMMYT & get feedback																
Student thesis completed																
Finalise Activity 2.5.1 report																
<b>Activity 2.5.2</b>																
Study functions of and loops in social networks as regards how they limit referrals and influence																
Draft report an inclusive tool set to facilitate the definition and analysis of gender issues in the mechanization frame of reference.																
Final Activity 2.5.2 report																
Final milestone report																

## 5.3. Report back: annual plan for Zimbabwe (Raymond)

Activities	Milestones	Due date of milestone	Responsibility
<b>Development of the star wheel planter including metering devices</b>	Test report	May 2018	Raymond
<b>Development of mounting mechanisms for starwheel onto a wheeled toolbar</b>	Test report	September 2018	Raymond
<b>Development of a tool bar based boom sprayer</b>	Test report	June 2018	Raymond
<b>Transfer of shear type shelling technology from Ethiopia to Zimplot</b>	Acknowledgement of receipt of drawings from Zimplot	May 2018	Raymond

<b>Combine operations e.g. planting and spraying</b>	Demonstration of technology and test report	August 2018	Raymond
<b>Development of electronic warning kits for planters</b>	Test report of performance of kits	June 2018	Raymond
<b>Manufacturers of ride on planters incorporate a second seat for operators assistant</b>	Pictures of planters with second seat circulated	May 2018	Raymond/Grownnet
<b>Development of training manuals for shelling businesses</b>	Training manual copy	April 2018	Patricia, Kefas, Dorcas
<b>Training of service providers on business and operations</b>	Training reports	May 2018	Patricia, Kefas, Dorcas
<b>Refresher course on the job training</b>	Report	June 2018	Patricia, Kefas, Dorcas
<b>Develop a training manual on repair and maintenance of tractors</b>	Training manual copy	May 2018	Patricia, Kefas
<b>Identify mechanics for training</b>	List of mechanics	April 2018	Chingozha, Jaji, Dzvengwe, Oliver
<b>Training of mechanics</b>	Training report	June 2018	Patricia, Kefas, Robert and Peter
<b>Develop a story on SPs for knowledge platform</b>	Story	April 2018	Dorcas
<b>Liase with Farmshop for 2WT importations</b>	Report	April 2018	Mudawarima,Dorcas, Jaji, Dzvengwe
<b>Innovation platform meetings for SPs</b>	Reports	Quarterly	Jaji, Chingozha,Dzvengwe
Socioeconomic analysis of the Mechanization service packages offered by hire service business models	Report on the costs and benefits of small mechanization service packages for rural service providers and users	On-going until Feb 2019	Dorcas (UZ)
Develop CBA and Business model performance study data collection tool		Done	Dorcas
Test the tool		April 2018	Dorcas
Train data collector		May, 2018	Dorcas
Collect data		May, 2018	Dorcas
Assessment of the performance of business models along the supply chain (local importers, manufacturers, hire services providers)	Report on the incentive structure and supply chain in small mechanization business	September 2018	Dorcas (UZ)
Review literature identify possible indications of <ul style="list-style-type: none"> <li>• Systemic and structural business enabling environment related incentive and disincentives to upgrading</li> <li>• Systemic and structural incentives or disincentives as well as capacity constraints to value chain upgrading on the part of buyers.</li> </ul>		Done	Dorcas
Develop Mechanization value chain analysis data collection tool	Value chain data collection tool	Done	Dorcas
Test the tool		April 2018	Dorcas
Train data collector		May, 2018	Dorcas

Collect data		May, 2018	Dorcas (UZ)
Analyze the data and write a report		September 2018	Dorcas
Update the report at the end of the project		February 2019	Dorcas (UZ)

## 5.4. Remarks from Project Steering Committee

### Tiri Koza on behalf of the steering committee

The 2<sup>nd</sup> phase of the project had a challenge transitioning from phase 1 to phase 2 and the planning did not start until 40% into the project which has shortened the implementation time.

### Emerging gaps

- Supply chain for planters
- Demand creation for the planters not so critical for sheller
- Quality standard is still not where it should be at this point as there are still some tweaks being made
- Incentive could be lacking as cost of equipment seems to be an issue for farmer
- Financing is a key issue as there doesn't seem to be a good mechanism in place
- Peer learning for SPs as well as mentoring on top of formal training should be made available

**Impact on Policy** - Project had input in developing policy of mechanization and we are hopeful that it will continue to shape policy outcome

**Stakeholder involvement**– women, extension workers, youth, financing partners and those that are promoting climate smart initiatives, farmers union should be involved

**Linkage to similar projects:** Incorporating small mechanization in SIMLESA 3

A draft paper on the issues that are emerging from the project and the way forward has been developed and will be shared with the team.

### Additional comments from steering committee

**Richard Bell** In regard to the project and progress, we don't have any issues and/or concerns. We are very pleased with the efforts from the team and overall we think you've done a great job!

**Euan Fleming** You have a very aggressive plan and you will have a very busy year coming up. Looking forward to seeing your progress.

**George Mburathi** In spite of the delays and issues the countries experienced, I would like to commend the project leader on a job well done. In the coming year, I would like to see additional partners joining the project such as FAO.

### Link to all annexes

[https://www.dropbox.com/sh/qdoemclp8qjly5/AAB71K9gNYbDeqlhfg\\_VjtMOa?dl=0](https://www.dropbox.com/sh/qdoemclp8qjly5/AAB71K9gNYbDeqlhfg_VjtMOa?dl=0)

## Appendix 1: program

**Day 0: Monday 19<sup>th</sup> of March 2018; Arrival of participants**

**Day 1: Tuesday 20<sup>th</sup> of March 2018**

8h30 - 9h00	Registration	All
9h00 - 9h15	Word of welcome	Raymond Nazare
9h15 - 9h30	Official opening	Rabson Gumbo, Director of Mechanization in MoA
9h30 - 9h50	Participant self-introduction	All
9h50 - 10h30	Highlights from FACASI 1 and presentation of FACASI 2	Frédéric Baudron
10h30 - 11h00	Coffee break	
11h00 - 11h45	FACASI experience and situation of small mech in Ethiopia	Bisrat Getenet
11h45 - 12h30	FACASI experience and situation of small mech in Zimbabwe	Raymond Nazare
12h30 - 14h00	Lunch	
14h00 - 14h30	Second generation engineering in FACASI 2	Frédéric Baudron
14h30 - 15h00	Training in FACASI 2	Patricia Nyoni / Bisrat Getenet
15h00 - 15h30	CBA and market system analysis in FACASI 2	Dorcas Matangi / Ephrem Tadesse
15h30 - 16h00	Coffee break	
16h00 - 16h30	Behavioral economics in FACASI 2	Alice Woodhead
16h30 - 17h00	Hello tractor: presentation of the company and its role in FACASI 2	Jehiel Oliver
17h00 - 17h30	Closing of Day 1	All

**Day 2: Wednesday 21<sup>st</sup> of March 2018**

Field day (departure at 7h30 and return by 17h00)

Cocktail (from 18h00 onward)

**Day 3 – Thursday 22<sup>nd</sup> of March 2018**

8h30 - 9h00	Registration	All
9h00 - 9h30	Recap of previous day	All
9h30 - 10h30	Knowledge platform	Jehiel Oliver / Rahel Assefa
10h30 - 11h00	Coffee break	
11h00 - 12h30	Second generation engineering planning (continued)	Raymond Nazare / Bisrat Getenet
12h30 - 14h00	Lunch	
14h00- 15h30	CBA and market system analysis planning	Dorcas Matangi / Ephrem Tadesse
15h30 - 16h00	Coffee break	
16h00 - 17h00	Behavioral economics (planning)	Alice Woodhead / Michael Misiko
17h00 - 17h30	Closing of Day 3	All

**Day 4 – Friday 23<sup>rd</sup> March 2018**

8h30 - 9h00	Registration	All
9h00 - 9h30	Recap of previous day	All
9h30 - 10h00	Report back: annual plan for Zimbabwe	Raymond Nazare
10h00 - 10h30	Report back: annual plan for Ethiopia	Bisrat Getenet
10h30 - 11h00	Coffee break	
11h00 - 12h00	Remarks from Project Steering Committee	PSC
12h00 12h30	Closing	Tiri Koza

## **Appendix 2: list of participants**

<b>No.</b>	<b>Name</b>	<b>Institution</b>
1	Raymond Nazare	University of Zimbabwe
2	Special Musoni	University of Zimbabwe
3	Dorcas Matangi	Consultant
4	Billy Mukamuri	University of Zimbabwe
5	Walter Chigwada	Zimplow /Mealie brand
6	Tiri Koza	Ministry of Lands and Rural Resettlement
7	Sepo Marongwe	Ministry of Lands and Rural Resettlement
8	Tedy Dzvangwe	Ministry of Lands and Rural Resettlement
9	Lewis Mataba	Grownet
10	Jaji Francis	Agritex Makonde
11	Misheck Chingozha	Mechanisation Department Makonde
12	Mike Munyati	Institute of Agriculture Engineering
13	Patricia Gunda	Institute of Agriculture Engineering
14	Kefas Murira	Institute of Agriculture Engineering
15	John Wilde	Farmshop
16	Rabson Gumbo	Ministry of Agriculture
17	Ben Nyakanda	Econet
18	Frédéric Baudron	CIMMYT
19	Rahel Assefa	CIMMYT
20	Ephrem Tadesse	CIMMYT
22	Micheal Misiko	CIMMYT
23	Richard Bell	Murdoch University
24	Jehiel Oliver	Hello Tractor
25	Alice Woodhead	University of Southern Queensland
26	Euan Fleming	University of New England (UNE)
27	Tamiru Woldemariam	Ministry of Agriculture and Natural Resources (MoANR)
28	Bisrat Getnet	Ethiopian Institute Agricultural Research (EIAR)
29	Rabé Yahaya	CIMMYT
30	Walter Mupangwa	CIMMYT
31	Rose Faju	CIMMYT
32	George Mburathi	ACIAR Rep