Mechanization experience: Implementation of the PPP Pilot in Lower-Mangoky Irrigation Scheme Atsimo Andrefana Region, Toliara Province, Madagascar

Workshop/Training in Tsukuba, Japan
**GENERAL INFORMATION ON THE RICE SECTOR AND MECHANIZATION STATUS IN MADAGASCAR**

- **General information**: Rice area: 1.4 million ha, representing 60% of total cultivated land. *Average annual rice production*: 3.5 million ton (paddy). About 2 million households practice irrigated rice. *Rice consumption*: 118 kg à 138 kg/pers/year

- **Mechanization status of rice farmers in 2000 (UPDR survey)**

<table>
<thead>
<tr>
<th>Type of Machinery/equipment</th>
<th>%</th>
<th>Type of Machinery/equipment</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor with accessories</td>
<td>0,2</td>
<td>Rotary hoe / weeders</td>
<td>14,4</td>
</tr>
<tr>
<td>Tiller with accessories</td>
<td>0,1</td>
<td>Sprayer</td>
<td>3,5</td>
</tr>
<tr>
<td>Push Cart</td>
<td>26,4</td>
<td>Angady / shovel / hoe</td>
<td>97,3</td>
</tr>
<tr>
<td>Cattle Plow</td>
<td>33,0</td>
<td>Sickle / Mchette</td>
<td>92,0</td>
</tr>
<tr>
<td>Harrow</td>
<td>28,8</td>
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Data on the Bas-Mangoky Scheme

- Production Target for PRBM: Total Production: 60,000t (paddy) in 10,000ha at the end of the project; Yield: 6 t/ha
- Project Period (2 phases): 2009 - 2021
- Water Supply = 10m³/s; Number of Users: 8,000 in 23 WUA; Main Canal in self-supporting management structure
- Implementation of policy of the Ministry of Agriculture, via PPP, 2 objectives:
  - Improved producers’ access to inputs
  - Enhanced Mechanization
PPP Pilot for agricultural mechanization in Bas-Mangoky (2012-2014) – Pilot phase

DESCRIPTION OF GOOD PRACTICE
Memorandum of Understanding and Demarcation of Responsibilities

Government through the PRBM Project:

✓ Rehabilitation of the irrigation infrastructure and the access road within Bas-Mangoky scheme
✓ Organization of WUAs into a federation
✓ Facilitation of linkage building among three actors: Micro-Finance Institutions (MFI) - Producers - Private Agricultural Machinery Suppliers
✓ Accompanying producers in the negotiation on the tri-party agreement
✓ Supervision on the fulfillment of the PPP agreement
Memorandum of Understanding and Demarcation of Responsibilities

Volamahasoa Micro-Finance Institution (Private MFI working in the West South Region):

- Awareness creation and training on credit,
- Provision of campaign credit and on agricultural equipment and materials (interest rate : 3-5%)
- Communication and organization of logistics with MATERAUTO
- Group purchase of equipment from MATERAUTO: power tillers and small Milling machine
Producers’ Association:

- Users Organization. Tentative organization of the motorized agricultural machinery users among themselves
- Demand survey for motorized agricultural machinery
- Negotiation with Materauto and the Volamahasoa MFI on the terms of acquisition and after-sales service
Memorandum of Understanding and Demarcation of Responsibilities

Private Agricultural Machinery Supplier: MATERAUTO

- Sales of a range of products and provision of after-sales services according to producers’ choice
- Supply and delivery of power tillers in Morombe City (HQ of PRBM), and to producers
- Training of local technicians on repair of power tillers
- Establishment of a spare parts supply system for the group purchase by association of agricultural machinery users

CARD
COALITION for AFRICAN RICE DEVELOPMENT
Operational Mechanism of PPP pilot (2012-2014)

Operational Mechanism of PPP arrangement during 2 years:

1. ➔ Aggregation of spare parts demand/needs by the office of the Association of Agricultural Machinery Users
2. ➔ Sending purchase orders to Materauto
3. ➔ Reception of the pro-forma invoice by the office
4. ➔ Payment to Materauto (through Western union)
5. ➔ Materauto delivers spare parts through reliable local taxis
POSITIVE RESULTS OF PPP PILOT (2012-2014)

- Acquisition of 19 power tillers and huskers by interested individual farmers
- Creation of a local mechanization service providers for plowing and harrowing on rice fields
- Improved rice yield from 3.5t/ha to 5.1t/ha (with other concurrent actions such as the dissemination of improved technologies such as quality seeds)
- Increased rice production: increased cultivated area with the additional production of 38,015 tons compared to the production in 2007
NEGATIVE RESULTS OF PPP PILOT (2012-2014): Problem N°1: Poor Quality of power tillers

- Frequent breakdown and changes of key parts ➔ Increasing needs (in number) of spare parts for repair ➔ Negotiation on “deferred payment” by some members for spare parts (Proceeded by the chairman of the Association of Agricultural Machinery Users)

- Some farmers don’t make payment for spare parts supplied in advance ➔ Supplier stopped the supply of spare parts ➔ some power tillers get breakdown ➔ Removal of parts from one machine to operate another: phenomenon of “cannibalization” of machines ➔ Decreased number of operational power tillers and milling machines
NEGATIVE RESULTS OF PPP PILOT (2012-2014) : Problem N°1 : Poor Quality of power tillers

- Gradual disruption of the spare parts supply system ➔ Non-payment of spare parts ➔ Destruction of trust between the machinery users association and the supplier MATERAUTO ➔ Discontinuation of the aggregation of needs for group purchase of spare parts
- Decrease in plowing and harrowing ➔ Decrease of rice cultivation area ➔ Reduction of rice production
NEGATIVE RESULTS OF PPP PILOT (2012-2014): Problem N°2: Decrease of water supply and Difficulty in financing due to Socio Political Crisis

- There is a decrease of water supply at the water intake at headwork due to the damaged facility ➔ need financing for rehabilitation
- In the transition of the phases of PRBM, the negotiation was on-going on additional funding for (i) the rehabilitation of the headwork at Bevoay and (ii) the repair of the sediment flush on the main canal.
- Prospect of additional funding was uncertain due to the socio-political crisis that the country was facing.
  ➔ During the transition/negotiation period: supplementary funding was uncertain
  ➔ No investment by farmers – This is the farmers’ risk management until approval of the supplementary funding for stable water supply
Counter measures to enhance mechanization at the PRBM in 2017

Solutions for irrigation problem (low water supply)

- Main water intake in Bevoay and main canal rehabilitated
- Rehabilitation of a main canal dredging system
  ➡ Increase of water supply at the headwork

Changes/ solutions in mechanization

- Acquisition of **better quality machinery**: about 100 power tillers operating in the scheme now, including 7 Kubota and Chinese power tillers: mechanized production + milling + transport of products
- Sufficient quantities of **spare parts available** due to the rapid increase of the numbers of power tillers in the scheme
- Improved capacity in terms of repairing, maintenance of Agric. machines
  ➡ Application of lesson learned from the pilot phase
1. **Factors for successful mechanization**

- Mechanized rice area: 0.5ha -10 ha ➔ Favorable for mechanization
- Strong needs for motorized machinery: producers were interested in the mechanization of rice cropping
- Good design of the PPP mechanism, but the project facilitation is necessary at the beginning, to build strong relationship between the machinery supplier and users
- Provision of after-sales service with the training of local repairers
1. Factors for successful mechanization (continued)
- Producers convinced with the advantages of mechanization, particularly in: (i) increased productivity and (ii) profitability
- Facilitation of PPP by the Project/Government gave confidence to MFI due to its high reputation.
- Responsibility in the management of agricultural machinery was on private individuals
- Efficient spare parts supply system: Aggregation of needs by producers, and low-cost delivery of spare parts by the supplier
- “Mechanization Culture” was introduced and well-anchored in the scheme: Adopted by the producers to a significant degree
2. Factors preventing mechanization

- Poor Quality Machinery (quality of steel which break easily, quality of mechanical system, ...) :

  ➔ Parts quickly deteriorated
  ➔ Increased repair cost, low equipment performance
  ➔ High depreciation cost
  ➔ Frequent machinery failures: delayed field work ➔ Discouraging machinery owners due to frequent purchases of spare parts and frequent repairs
2. Factors preventing mechanization (continued)

- Lack of competition in machienery supply at the beginning of the pilot (with Materauto)
- Long distance between the Association of Agricultural Machinery Users and Supplier (Materauto)
  ➔ Difficulty in spare parts supply, and Risks related to long distance transport. No antenna offices or representation of the supplier existed in the nearest urban town
LESSONS LEARNED AND IMPLICATION FOR SUCCESSFUL MECHANIZATION

- Intermediation in linking producers to agricultural machinery suppliers is sometimes necessary.
- Producers stopped investing in mechanization because of the risk of reduced water supply in the scheme.
- The conditions for a profitable mechanization are necessary: well functional irrigation, decent size of plots for mechanized rice cultivation, profitability with rice.
- It is effective to train repairers within the schemes where machinery is introduced.
LESSONS LEARNED AND IMPLICATION FOR SUCCESSFUL MECHANIZATION

- Need to introduce quality machinery
- Pilot in the introduction of machinery continued for 2 years, and it was sufficient to achieve satisfactory adoption of rice mechanization ➔ Minimum time for the project / adoption process
- Presence of representation / antenna shops of the spare parts supplier near the perimeter is necessary
- Mechanization resumed as soon as Bevoay's main canal was rehabilitated: producers restrict themselves to make agricultural investment in risky circumstances
Actual situation of PRBM project:

- PRBM 1 project is nationally regarded as a success (visit of AfDB president): (i) increase in rice cultivation area and rice production; (ii) autonomy of producers and autonomy in milling and transport services of product within the irrigation scheme.

- Approved a second phase for an expansion of the scheme to 10,000 ha by 2021 with a new main canal at the right bank, to be developed in self-supported concrete structure.
THANKS!