Challenge of Supply Chain Development for Cowpea Technology in Africa

J. Lowenberg-DeBoer, Dieudonné Baributsa, and Heather Fabriès

5th World Cowpea Research Conference
Saly, Senegal
26 September – 1 October, 2010
Objectives

• Review why we need supply chain development for cowpea (and other crops) in Africa.
• Summarize supply chain issues common to much of agriculture in developing countries
• Provide an example of the supply chain development for PICS bags in West and Central Africa
• Discuss supply chain lessons learned in the PICS project
Definitions

**Value chain** — All the steps from production to final use of a product

**Supply chain** — Formally defined as a set of organizations, people, technologies, activities, information and resources involved in moving a product or service from supplier to customer. In practice it is often a subset of the value chain focused on providing an input into the ultimate product. Term sometimes used interchangeably with value chain.
Why do we need better supply chains for cowpea inputs?

• Traditional cowpea production depended on local inputs (i.e. land & labor), but intensified production depends on some purchased inputs (e.g. seed, fertilizer, pesticides, storage materials).

• Growth in population and better living standards require more production.

• Cowpea production is increasing.
Average cowpea production up 43% in selected West African countries. 1990s and 2000s (in 1000s MT)

Data Source: Langyintuo et al., 2003; FAOSTAT
Supply Chain Issues

- The inputs are not present in the farmer’s area
  - insufficient distribution network
- The inputs are not adapted to the African farmer’s requirements
- Products are too expensive/unprofitable
  - costs of manufactured inputs are often very high in Africa
  - farmers lack knowledge of correct input use or follow outdated recommendations
  - misperception of profitability
  - weak output markets so farmers lack economic incentive
Supply Chain Issues

• Farmers are not prepared to pay
  – they have other investment priorities
  – Risks too high - the prices and production are too volatile

• Farmers are not able to pay
  – problem accessing credit
  – there is not enough cash in the economy
    (particular problem for subsistence crops)
Constraints on Ag Input Supply Chain Development in Africa

• High production cost of ag inputs in Africa:
  – Critical size of manufacturing unit is not attained at current demand level
  – Tariffs and non-tariff barriers limit regional trade and market size

• Donor supply of ag inputs:
  – It is difficult for a local ag input industry to compete with free or heavily subsidized inputs from abroad
Constraints on Ag Input Supply Chain Development in Africa

• High input distribution costs, linked to:
  – poor infrastructure
  – lack of supply chain management skills

• Supply chain activities too risky, due in part to:
  – frequent government interventions in the market
  – high season to season variability in demand
  – weak legal structures that makes contracts difficult to enforce and debts uncollectable
Purdue Improved Cowpea Storage (PICS) experience in developing a supply chain for hermetic storage bags
PICS Goals and Expected Impact

• Goal - The overall goal of PICS is that by the end of the project 50% of farm stored cowpea will be in hermetic storage without insecticide.

• Benefits expected for:
  – Directly for 3.4 million cowpea growing households or about 30 million people in those households.
  – Indirectly for millions of cowpea consumers who will have less expensive cowpea late in the marketing year with less danger of misused pesticides.
PICS Has Two Primary Thrusts

• Village Extension activities  ➸ Creating demand
  – Storage demonstrations in all villages where cowpea is grown as a cash crop
  – Message reinforced by radio, TV and other media
  – So far, PICS has been in over 23,000 villages

• Supply chain development  ➸ Creating supply
  – Work with plastics manufacturers to make the right kind of bags – so far worked with five manufacturers in five countries
  – Develop the distribution system for PICS bags to the village level – this has been the bottleneck of the project
Creating Demand for PICS Bags
PICS in 28,000 villages in 10 countries
Approach to Extension/Outreach

Four steps involved in the process:

- Sensitization
- Demonstration
- Follow-up
- Open-the-bag event

Radio offers direct contact with listeners

Going beyond radio - cell phone video teaches farmers how to use PICS bags
Approach to Extension/Outreach

In each village

- Select 5 farmers
- Project pays for the bags
- Farmers volunteer their cowpea (at least 50 kg)
- Farmers agree to store for at least 4 months
Figure 2: Percentages of Cowpea stored with different methods in 2009.

- **Burkina Faso**
  - Other Hermetic: 22%
  - Double bag: 25%
  - Triple bag: 30%
  - Traditional: 18%
  - Insecticide: 6%

- **Niger DT**
  - Other Hermetic: 29%
  - Double bag: 38%
  - Triple bag: 25%
  - Traditional: 6%
  - Insecticide: 2%

- **Niger MZT**
  - Other Hermetic: 18%
  - Double bag: 45%
  - Triple bag: 7%
  - Traditional: 29%
  - Insecticide: 1%
Approach to Sack Supply Chain

- Media efforts with Radio and TV
  - PICS consultant

Manufacturers → Distributors/wholesalers → Semi-wholesalers → Vendors → Retailers and roaming vendors

Work with local manufacturers and entrepreneurs
Manufacturing and Distribution of PICS Sacks in West and Central Africa

Current market for a manufacturer

Potential future market

Past market
PICS Sacks Ordered by the Project and Other Organizations

- PICS has helped distributors order 390,000 sacks
- Businesses and government agencies ordered 858,000 sacks
- The largest single order was 800,000 sacks by the Niger Food Security Agency

![Bar chart showing sack orders by PICS and Others in 2007, 2008, and 2009.]

- PICS ordered 40 thousand sacks in 2007.
- Others ordered 200 thousand sacks in 2008.
- PICS ordered 405 thousand sacks in 2008.
- Others ordered 150 thousand sacks in 2009.
- PICS ordered 453 thousand sacks in 2009.
• About 146,000 PICS sacks have been used in village demonstrations.
• Businesses associated with the project have sold about 203,000 sacks
• Others have sold about 819,000 sacks
PICS technology is profitable

Table 1. PICS Storage Margin Examples from Mali. Price is in FCFA and in parenthesis are prices in US dollar ($1 = 500 FCFA)

<table>
<thead>
<tr>
<th>Cowpea Region</th>
<th>Price at closing the bags Oct- Dec 2009</th>
<th>Price at open the bag Mar- Apr 2010</th>
<th>Margin per 100kg using PICS* bags for 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segou</td>
<td>175 F/kg (0.35)</td>
<td>365 F/kg (0.73)</td>
<td>19 000 F (38)</td>
</tr>
<tr>
<td>Mopti</td>
<td>100 F/kg (0.20)</td>
<td>225 F/kg (0.45)</td>
<td>12 500 F (25)</td>
</tr>
<tr>
<td>Sikasso</td>
<td>150 F/kg (0.30)</td>
<td>350 F/kg (0.70)</td>
<td>20 000 F (40)</td>
</tr>
<tr>
<td>Koulikoro / Kayes</td>
<td>200 F/kg (0.40)</td>
<td>330 F/kg (0.66)</td>
<td>13 000 F (26)</td>
</tr>
</tbody>
</table>

In Mali, the retail price of the PICS bag is around 1150 FCFA ($2.30)
- PICS bags can be reused for more than one year
- Cowpea could be store for one year
- Cowpea can be consumed directly
- Effective even with quantities less than the size of the bag
- Cowpea stored for sale -
Businessman storing cowpea in PICS bags.
Maradi, Niger
February 2010

- Cowpea stored for household need -
A woman farmer storing cowpea in PICS bag.
Magaria, Niger
June 2007
Opportunities

- In general, outreach activities have gone very well with various partners.
- Farmers have adopted the PICS technology very quickly.
  - Effective and easy to use.
  - Price relatively low compared to alternative (drums, etc.).
- Farmers use PICS bags to store other commodities.
- PICS bag demand creates business opportunities for:
  - PICS manufacturers.
  - PICS sacks vendors.
  - Local entrepreneurs interested in cowpea storage.
- PICS technology is helping farmers to improve food security and increase their incomes.

Overall: Improvement of the value chain with consumers accessing healthy cowpea.
Challenges

The development of the supply chain, especially the distribution system has been the bottleneck of the project. Problems include:

• **PICS technology is a new product - Distributors are reluctant to invest because:**
  - Difficult to estimate the demand for PICS bags
  - Farmers are also reluctant to purchase the sack during the first year

• **Vendors have very limited capital – Like the farmers, PICS sack retailers and vendors are often poor people**

• **Legal system not well developed in most of West and Central Africa, consequently:**
  - Contracts are not easily enforceable
  - Business is based on trust and relationships.
  - Difficult to develop and expand distribution networks because wholesalers are reluctant to provide inventory credit to retailers

• **Farmers complain about the distance to the point of sale**
Challenges

• Despite all these challenges the PICS supply chain is transitioning from project activity to a private business:
  – Moved from consignment to 20% down payment
  – In 2010 all distributors are ordering PICS bags with no project funds involved
  – Some distributors are adapting models that have worked well on other products (e.g. cell phones) to improve PICS bag sales
  – Allow distributors to set the price of sacks during the second year – First year is building the market.
Lessons Learned

Supply Chain

Demand Development:

• It is possible to reach millions of people in Africa with improved technology

• NGOs can be very good technology transfer partners in the intervention areas, but they don’t usually cover the whole cowpea zone.

• National extension services have be great technology transfer partners for PICS and they have broad geographic coverage
Lessons Learned
Supply Chain

Manufacturing level:

• Local manufacturing is best if it can be cost effective – avoids transport and customs charges, shortens delivery times which is important for in season orders

• Balance local manufacturing with the economies of scale – can critical scale be achieved in one country?

• Better to work with an entrepreneurial manufacturer who wants to expand business
Lessons Learned Distribution

- Because of weak legal systems, distribution systems in Africa depend on personal relationships.
- Because each person in the system can only maintain a limited number of these relationships multiple layers are required.
- This is in contrast to the trend toward “flat” distribution systems in North America and Europe, which are based on strong legal and communications systems.
Lessons Learned
Distribution

• Better to work with literate wholesalers – they are more likely to take formal commitments seriously

• Ag input vendors need year around sales – storage inputs fill an important seasonal gap by giving them a product at harvest time.

• Risk and credit linked. Wholesalers unwilling to provide bags on credit to rural retailers because of concern about being repaid, not necessarily lack of capital.
Lessons Learned Media

• For storage direct communication to farmers is essential – message often distorted after three or four layers of farmer to farmer transmission.

• Demonstrations are a great way to reach farmers – most effective if they participate.

• Radio a way to reinforce the message, but need “commercial messages” that mention specific vendors and prices. Many NGOs reluctant to be involved in commercial of messages.

• Cell phone video has great potential for visual communication about inputs.
Three Points to Remember

1) Supply chain key for most improved cowpea technology – little gain to teach farmers about a technology for which they can not obtain the inputs.

2) Prerequisite for a sustainable supply chain is:
   1) Technology profitable for farmers
   2) Input packaged to fit the potential buyers
   3) Farmers are informed about the technology

3) Developing a distribution system anywhere requires trust – even more so when legal system is weak
PICS Project Partners

– Bill and Melinda Gates Foundation
– International Center for Tropical Agriculture (IITA)
– World Vision International
– National Institute for Environmental and Ag. Research of Burkina Faso (INERA)
– National Ag. Research Inst. of Niger (INRAN)
– Local and International NGOs
– National extension services
– Farmers and Farmers Based Organizations (FBO)
– Private sector (Manufacturers, entrepreneurs, etc.)
Thank You for your attention!

Jess Lowenberg-DeBoer
Purdue University
Email: lowenbej@purdue.edu
Web: www.ag.purdue.edu/ipia/pics