MAINSTREAMING AGRICULTURAL INNOVATIONS:
The experience of PICS bags in West and Central Africa

July 2012
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Why is cowpea so important in Africa?

- Cowpea is a major cash crop for millions of smallholder farmers across Africa
- Despite low yields, African farmers produce more than 90% of global production (FAOSTAT)
- Of the 5.54 millions tons produced globally (2010), more than four-fifths is harvested by smallholder farmers in West Africa
- In the 1990s, more than 300,000 MT were traded annually within the NCG* 
- During 2000-10, regional production grew roughly 70% (FAOSTAT)
Why is cowpea so important in Africa?

• Rich in protein and amino acids, cowpea beans are an important part of household nutrition, particularly in areas where meat is scarce

• Per capita consumption ranges from 1.5-18 kg/year (Langyintuo et al., 2003)

• Cowpea leaves are a valuable fodder

• Highly resilient in dry, hot conditions, cowpea may offer solution for farmers adapting to climate change
Importance of cowpea in West & Central Africa

Understanding the challenge

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Mapping the PICS landscape – case study summaries
What is the problem? – smallholder farmers suffer substantial post-harvest (and income) losses to due to pest infestation

- African smallholders lose an estimated one quarter of their crop to pests during post-harvest storage
- US$300 million in losses (IITA)
- With few storage options and to limit risk, most farmers sell at harvest
- Low prices at harvest = loss of income
What is the problem? – many conventional storage methods rely on pesticide treatments containing aluminum phosphide

- Phostoxin and other pesticides are highly effective in killing insects and curbing storage losses. But…
  - they are costly to average smallholder (up to 3 Phostoxin tablets required for 100kg cowpea = 300 FCFA)
  - …and highly toxic when ingested
  - Misuse of chemicals poses serious health risks (“killer beans”)
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PICS technology offers a safe, low-cost, low-tech storage solution designed for smallholder cowpea farmers

- Developed by Purdue University and African researchers in mid-80s
- **non-chemical**, hermetically sealed, 3-ply plastic bag
- Locally manufactured, locally procured
- …and **affordable** to farmers ($2-3 per 100kg bag on average)
Designed for small-scale cowpea farmers, PICS technology offers a safe, low cost, simple storage solution

**VALUE PROPOSITION**

- enables long-term, on-farm storage with minimal loss
- higher farmer ROI via seasonal price variability

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**Potential for significant impact on farmer livelihoods...**
The challenge – how to unlock the potential gains from PICS technology by getting PICS bags into the hands of smallholders across West and Central Africa?

**BUT…, impact** depends on the **ability** of farmers to **access** the technology, and…

**access** depends on timely and spatial **availability, and affordability**

So, how to develop effective, reliable and sustainable delivery systems that can deliver the technology:

- ☑ to the right places
- ☑ at the right times
- ☑ in the right quantities
- ☑ at the right price
The PICS project was designed to facilitate the development, promotion AND dissemination to farmers of hermetic storage bags.

Project mandate > 4 pillars:

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2. **disseminate information** on non-chemical cowpea storage methods

3. **demonstrate** the most **effective** cowpea storage methods

4. **Develop commercially-driven supply chains** for PICS bags

Since 2007, the project has been pioneering investments in the development of commercially-driven, factory-to-farm distribution systems in 10 markets across West and Central Africa.
The challenge – how to get the PICS technology into the hands of smallholders across West and Central Africa?

- High risks and low ROI perceptions inhibit private sector investments in upstream R&D
- R&D in innovative tools and farm management techniques largely publicly-funded (e.g., government, donors, philanthropy)
- Public sector extension systems for technology dissemination can be effective in changing farmer behavior and stimulating demand but fall short of guaranteeing accessibility
- Commercialization pathways are needed to ensure availability and affordability
- High risks, high marketing costs, weak business climate, uncertain policy environment, etc. curb private sector investments in commercialization of agricultural innovations
The challenge – how can the private sector in Africa be better mobilized to deliver agricultural technologies more effectively, more cheaply, and more sustainably?

1. What factors discourage private sector investments in commercialization of agricultural technologies?

2. What incentives are needed to encourage buy in and galvanize supply chain investments?

3. What inefficiencies exist that might be addressed via market, legal or regulatory remedies?

4. What is the public sector’s (i.e., government, donors, research institutes, NGOs) role?

5. Where are possible entry points for enhanced public-private collaboration in innovation delivery (production and commercialization)?

6. What are the key risks (i.e., production, market, enabling environment) that discourage investments by manufacturers, wholesalers and other vendors?

7. What are appropriate strategies and arrangements for risk-sharing and/or improved risk management?
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What is PICS?

**Purpose of the PICS supply chain study**

What have we learned?

Mapping the PICS landscape – case study summaries
The following presents summary findings from a study designed to document and learn from the PICS experience in developing supply chains for PICS technology in West and Central Africa.

**PURPOSE OF STUDY:** To better understand the challenges and opportunities for commercial mainstreaming of PICS storage bags (and future agricultural innovations)

**KEY OBJECTIVES:**
1. Describe the current status of the overall supply chain in each country
2. Identify constraints (i.e., financial, structural, social) that hamper the development of the supply chain
3. Identify and evaluate strategies used by the project, its partners and supply chain actors (e.g., manufacturers, vendors) in expanding the distribution system and in increasing bag sales

**METHODOLOGY:**
1. Review of project documentation and existing literature
2. Adoption of case study approach
3. Development of analytical tools (SC organizational maps, vendor network maps, project timelines, SC cost structure, customized interview guides)
4. Broad-based stakeholder consultations
5. Development of country case studies and cross-country analysis
The purpose of the study was to document and analyze the PICS supply chain development experience and gain insights into the following questions:

- What is the **current status** of the supply chain in each PICS country?

- What are some of the **key constraints** that impede the development of vendor networks at various levels of the supply chain?

- What are **key factors** that drive decision-making among actors to invest in the supply chain?

- How **effective** have **strategies** been to date in **expanding distribution** channels and **increasing** bag sales?

- What are possible **investments** to **reduce costs** and **enhance efficiencies** in the PICS supply chain?

- What are the **key risks** and critical **success factors** for the supply chain’s **growth** and **sustainability**?
Several assumptions were developed based on a review of project documentation and available literature

- PICS technology offers a strong value proposition and responds well to smallholders’ needs
- Training/promotional activities have been critical in stimulating demand for PICS bags
- At $2-3 per bag retail, PICS bags are accessible to the average smallholder farmer
- Lack of availability of PICS bags among rural farming households impedes adoption
- Distribution networks are based largely on informal business relationships and trust-based social capital
- Poor access to credit represents a significant SC growth constraint
- Agro dealer networks represent optimal delivery channels to reach rural smallholders
- Underdeveloped financial/insurance markets, weak contract law enforcement mechanisms, poorly developed road networks, *inter alia*, raise transaction and marketing costs, making it costly for vendors to do business and discouraging investments
The PICS experience is expansive, spanning 5 years and 10 markets across West and Central Africa

- Progressive project rollout across region
- Startup in 2007 in Niger and Burkina Faso
- Expansion into Nigeria (2008); Mali, Benin and Togo (2009); Ghana, Senegal, Cameroon and Chad (2010)
- Experiences have varied from one market to the next
- Strategies and project interventions have evolved over time

Step-wise project expansion allowed for an ever-growing knowledge base of best practice as supply chain development strategies were continuously refined based on earlier successes and obstacles encountered.
In analyzing and comparing the PICS experience across the 10 countries, we hope to gain insights into the following questions:

1. What were the **major challenges** faced by the project and its partners in developing commercially-driven supply chains for PICS bags?

2. What **interventions** helped to **overcome** these **challenges** and **encourage** commercial **investments** in PICS marketing?

3. What **investments** are **needed** to support the future **growth and sustainability** of PICS supply chains?
Importance of cowpea in West & Central Africa

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## Highlights - PICS in Numbers*

<table>
<thead>
<tr>
<th>Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>10</td>
<td># of PICS countries where PICS bags are marketed</td>
</tr>
<tr>
<td>6</td>
<td># of PICS bag manufacturers</td>
</tr>
<tr>
<td>2,483,500</td>
<td>total # of PICS bags produced since 2007</td>
</tr>
<tr>
<td>$3,674,850</td>
<td>gross revenues generated by PICS bag manufacturers</td>
</tr>
<tr>
<td>$1,635,550</td>
<td>gross margins captured by PICS bag vendors</td>
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<tr>
<td>1,000+</td>
<td># of PICS vendors involved in PICS bag distribution</td>
</tr>
<tr>
<td>$1.5 million</td>
<td>value of credit extended by manufacturers to PICS bag buyers</td>
</tr>
<tr>
<td>$6.8 million</td>
<td>project investments in training and promotional activities</td>
</tr>
<tr>
<td>$427,400</td>
<td>project investment in developing PICS distribution channels</td>
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</tbody>
</table>

*Numbers are conservative estimates*
Analysis of bags sales to date suggest a nascent but rapidly growing market for PICS technology in the region, despite a XX% drop in cowpea output in 2011-12.
Analysis of bags sales to date suggest a nascent but rapidly growing market for PICS technology among the region’s smallholder cowpea farmers

- **Growing demand** suggests that PICS technology responds effectively to smallholders’ needs, offering them a compelling value proposition.

- Commercial sales of PICS bags reached nearly 280,000 units in 2010-11, up from 4,500 units just 2 years earlier.

- **Poor** 2011 cowpea harvest (27% lower in Burkina vs. 2010) dampened demand for PICS bags in 2011-12, but sales are expected to rebound and expand in the years ahead.

- Kano-based bag manufacturer Lela Agro anticipates commercial sales of more than 300,000 bags in Nigeria alone for the coming season.

- Sizeable project and public sector investments in promotional and training activities during initial product launch phase were key to creating/stimulating demand.

- Direct public sector procurement of PICS technology and project demo bags have been instrumental in “priming” the market; 170,000 units anticipated for 2012-13 season in BF alone.

- Strong scope now exists to support and strengthen capacity of PICS vendors and the SC overall to respond effectively and profitably to rapidly growing market.
PICS technology also offers manufacturers and vendors a compelling business opportunity to expand their product base and increase sales

Key incentives among manufacturers and vendors to invest in marketing PICS technology include:

1. Complements existing product lines with minimal uptake costs
2. Aids in attracting new customers, facilitates upselling, and helps build existing customer satisfaction and loyalty
3. Creates new, supplementary revenue stream
4. Helps fill seasonal gap (October-Dec) when demand for other products (e.g., seeds, fertilizers) is lowest
BUT... manufacturers/vendors face myriad risks with limited tools to manage them effectively, discouraging participation and investments in the PICS supply chain.

Generally, risk types can be categorized as:

- **Production risks**
  (e.g., variable rainfall, pest/diseases)

- **Market risks**
  (e.g., counterparty risks, price volatility, exchange rate volatility, theft/property damage)

- **Enabling Environment risks**
  (e.g., weak legal framework, inconsistent sector/tax/trade policy, underdeveloped communication/transport infrastructure)

While not unique to PICS, **risk events** (e.g., poor rainfall, debt default, product theft or damage, logistics breakdown) can result in significant **financial losses** to individual SC actors and **shocks** to the SC more broadly.

With few options available, SC actors limit their exposure by **minimizing** their **level of activity** and **level of investment** in any one activity (i.e., via diversification).
Beyond risk factors, analysis of the PICS experience highlights a number of constraints that hamper PICS supply chain growth, and possible solutions:

<table>
<thead>
<tr>
<th>CONSTRAINT</th>
<th>OPPORTUNITY</th>
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<tbody>
<tr>
<td>Weak vendor capacity to forecast demand raises risks and results in costly “dead” stock or unmet demand</td>
<td>Facilitating more robust information flow among vendors across SC for more timely and efficient procurement</td>
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<tr>
<td>High risk perceptions for new product with untested demand discourages vendor participation in PICS production/marketing</td>
<td>Sharing risk and encouraging investments via promotional activities/training, demo bag purchase and “moral guarantee”</td>
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<td>Niche product (i.e., on-farm storage) with narrow market applications (i.e., seasonal, single crop) inhibit mass market appeal/uptake</td>
<td>Expediting research into product development (e.g., new crops, new market segments) to expand demand base</td>
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<td>Upstream vendors (e.g., grain traders) with business/revenue models poorly adapted/oriented (i.e., output) to PICS marketing</td>
<td>Encouraging participation among vendor networks marketing complementary products/services (e.g., inputs) to farmers</td>
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<td>Weak regulatory environments and growing competition from cheaper, lesser quality alternatives threatens market’s uptake</td>
<td>Embedding quality control systems across the supply chain via product branding and vendor/farmer sensitization</td>
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<tr>
<td>High borrowing costs and slow stock turnover rates discourage investments in PICS inventory and marketing activities</td>
<td>Facilitating access to favorable financing mechanisms to help reduce inventory management costs &amp; related risks</td>
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More than most anywhere else on earth, rainfall in West and Central Africa is subject to high and growing levels of variability

Volume of annual cowpea production depends on myriad factors including planted acreage, yields, and… rainfall

SOURCE: FAOSTAT, 2012
Demand for PICS technology is highly correlated to the level of cowpea production and can vary considerably from one season, one locale to the next.

The Challenge
Market demand for PICS bags is directly tied to cowpea production and the availability of surplus cowpea. Rainfall is chief among factors that determine annual output. Erratic rainfall patterns make it difficult for PICS bag manufacturers and vendors to effectively forecast output and manage their inventory effectively. Moreover, marketing PICS bags is a highly seasonal activity where timing is everything. Lacking good information, facing a high level of uncertainty, and looking to minimize their risks, manufacturers produce on invoice; vendors procure at or near harvest time. They also seek to limit volumes per order. This practice contributes, as it did during 2010-11, to delayed delivery and debilitating ruptures in supply of PICS bags during peak demand periods in many countries. The following year, poor and uneven rainfall dampened demand for PICS bags across the Sahel region, leading to costly unsold stock. Resulting inefficiencies in the supply chain represent a significant drag on growth. To address this challenge, the project in 2009 started facilitating yearly vendor meetings to identify challenges and strengthen procurement processes. At least one manufacturer (Lela Agro) and wholesaler (GIC-DEMRI/Cameroon) has begun carrying inventory to speed up delivery.

The Opportunity
Putting more and better (and more timely) information into the hands of manufacturers, wholesalers, and other vendors and facilitating enhanced communication and flow of information across the SC can strengthen vendors’ decision-making, improve inventory management, reduce marketing inefficiencies, and increase bag sales.

1. Build on to date investments by exploring avenues to institutionalize yearly vendor meetings and secure the role of the PICS business consultant under the direction of manufacturers and/or national distributors.

2. Identify/develop information sharing mechanisms in partnership with national extension agencies through which localized estimates of farmer plantings and yields are made accessible to PICS vendors.

3. Leverage existing GIS rainfall monitoring/forecasting resources (e.g., AGRHYMET-Niger, ACMAD, Rainwatch/NOAA) and facilitate vendors’ access (e.g., via mobile phone) to needed information.
Prohibitive costs of institutional credit, limited turnover and low margins constrain investments in PICS marketing

Gross Margin vs. Interest Rate (6 months)

ASSUMPTIONS:
• loan amount of 50,000 FCFA
• 6-month linear repayment
• Initial procurement of 45 bags (at 1100 FCFA/bag)
• 1X turnover

At 100 FCFA margin, 9% or below “breakeven” point
Prohibitive costs of institutional credit, limited turnover and low margins constrain investments in PICS marketing

Gross Margin vs. Interest Rate (2x, 6 months)

ASSUMPTIONS:

- loan amount of 50,000 FCFA
- 6-month linear repayment
- Initial procurement of 45 bags (at 1100 FCFA/bag)
- 2X turnovers during loan period

At 100 FCFA margin, 16% or below “breakeven” point
Prohibitive costs of institutional credit, limited turnover and low margins dampen investments in PICS marketing

The Challenge
Poorly developed financial markets are an oft-cited barrier to growth in Africa. Yet, among PICS vendors, lack of access to formal credit is not in itself a constraint. Vendors typically have banking relationships and many are able to meet collateral requirements. However, few are willing to leverage bank credit to finance their inventory. High borrowing costs are mostly to blame. Distrust and lack of understanding of loan requirements among vendors further discourages borrowing. However, the strong seasonality and low margins characterizing PICS marketing is what makes borrowing prohibitive. Uncertain demand and slow turnover further raises associated risks. During 2009-10, project efforts to link vendors in the Tillabery and Dosso regions of Niger to local micro-credit institutions attracted only a handful of participants. Generally, manufacturers and vendors prefer to rely on their own resources or use informal credit to finance their production, procurement, inventory, and marketing activities. Given the high opportunity costs of capital in Africa and high risk business environment, spot manufacturing and procurement are the norm. This contributes to delayed distribution and delivery of PICS bags to points of sale, ruptures in supply, and unmet demand.

The Opportunity
Encouraging manufacturers and large wholesalers to secure and maintain timely inventory of PICS bags would help reduce costly delays and improve availability of PICS bags across the supply chain.

① Facilitate the development and set up via local banks and micro-credit institutions of customized inventory financing mechanisms at affordable rates/terms for manufacturers and wholesalers.

② Explore the use of inventory credit programs to help address resource constraints among farmers and encourage PICS storage

③ Facilitate linkages between participating farmer groups and local PICS bag distributors
Uptake by cowpea traders has been limited due in part to the high up-front costs of PICS technology vs. conventional chemical methods of storage.

**ASSUMPTIONS:**

- 10 tons of cowpea
- 9-month storage period
- PICS – 100 bags at 1100 FCFA/bag
- Chemical Methods – 3 tablets (36 FCFA each); 1 woven bag (300 FCFA); 2 low density liners (100 FCFA each)
- 3 more tablets (36 FCFA each) for 2\textsuperscript{nd} treatment at 6 months

**Initial cost of PICS - 80% higher**
Yet, when considering the costs of storage technology relative to overhead costs, the difference is negligible.
The Challenge
PICS bags represent a niche product. PICS technology was designed for a specific application (i.e., on-farm cowpea storage) to meet the needs of a specific target market (i.e., smallholder farmers). Evidence suggests that PICS bags are indeed highly effective in limiting post-harvest losses and are relatively affordable to the average farmer. Consequently, demand is growing and uptake among farmers to date has been noteworthy. However, its success obscures several weaknesses. While numbering in the millions, individual smallholder farmers have limited resources and purchasing potential. As a niche product, PICS bags offer limited commercial, mass market appeal and sales in terms of volumes to date have been relatively modest. Potential scope exists to tap more fully into other market segments to increase the volume of sales. Cowpea traders, in particular, represent a potentially important high volume segment but uptake as yet has been limited due in large part to perceived high access costs.

The Opportunity
Expanding the size/scope of the PICS market by targeting other segments such as grain traders would contribute to higher volume sales, encouraging new investments in the supply chain and the commercial mainstreaming of PICS technology into the marketplace. To increase demand and the volume of bags sold:

1. Accelerate ongoing research into the use of PICS technology for other crops and expedite launch of related farmer training and marketing activities.
2. Enhance the level of training for traders to better sensitize them to the economic and social (e.g., health risks) benefits of investing in PICS technology.
3. Launch broad sensitization on the health risks of chemical-based storage methods to incite interest of PICS technology as a viable alternative among large volume cowpea buyers (e.g., school/military feeding programs, food banks, food security agencies, NGOs) and the cowpea traders from whom they source.
4. Encourage the practice of bulk procurement among farmers to help them access more competitive volume pricing.

Uptake by cowpea traders has been limited due to the high up-front costs of PICS technology vs. conventional chemical storage methods.
Weak contract law and enforcement institutions/mechanisms discourage professionalization, credit sales, and expansion of distribution channels

The Challenge
Liquidity is critical to a well functioning supply chain. In West Africa, weak public institutions for contract law and enforcement contribute to the high level of informality that dominates the business climate. The inability of vendors to depend on legally binding contracts to protect their business interests and manage counterparty risks is a handicap that discourages investments and, more specifically, the use of credit-based sales. While trust-based credit sales are commonplace within well-established vendor networks, the vast majority of PICS transactions are affected on a cash and carry basis. This greatly constricts the free movement of PICS bags across the supply chain and the availability of bags when and where they are needed.

The Opportunity
Leveraging and nurturing trust-based capital existing within established vendor networks to encourage credit sales and the flow of credit from better capitalized upstream manufacturers/vendors to cash strapped downstream semi-wholesalers and retailers can help overcome capital constraints.

1. Channel PICS distribution, where possible, through legacy and complementary vendor networks vs. creating new, parallel distribution channels.
2. Rely on manufacturers to identify wholesalers with whom they have an existing relationship and who already market their products.
3. Provide training on for existing and prospective vendors on PICS technology and to strengthen inventory management, book-keeping, and marketing skills.
The Challenge
Making the right choice when it comes to vendors is critical. Yet, the evidence suggests that making the right choice is more of an art than a science. Among important assets the project looked for during vendor selection were a well developed existing distribution network and liquid assets. While advantageous, these assets are by no means sufficient to guarantee a successful outcome as is evidenced by the PICS experience in Burkina Faso and Benin, in particular. The analysis would further suggest that institutionalizing the use of public extension agents to distribute PICS bags on a consignment basis poses unmanageable risks to vendor suppliers. Also, grain traders (e.g., Benin) and farmer organizations (e.g., Senegal) are ill-equipped and poorly adapted to spearhead upstream PICS distribution. Conversely, agro-dealer networks are particularly well adapted but often suffer from weak marketing capacity and limited working capital. The most critical success factors are that vendor networks be oriented appropriately toward servicing rural markets and that PICS marketing activities be complementary to their existing revenue model.

The Opportunity
Channeling PICS distribution through existing vendor networks with complementary business models and product/service lines oriented toward input and/or rural markets ensures optimal alignment of incentives among participating vendors where PICS bags represent an additional revenue stream with potential to fill seasonal gaps.

1. Conduct full market study to identify potential surplus capacity, major production zones, market and end user preferences and profile potential vendor partners to strengthen initial project planning/implementation.
2. Where feasible, leverage manufacturers’ distribution networks marketing their existing product lines and maximize manufacturer participation in SC development activities.
3. Where possible, identify multiple wholesalers to lead distribution in specific sub-markets and ensure direct sourcing relationships with manufacturers while encouraging bulked procurement.
4. Establish partnerships with agro-dealer associations and strengthen members’ capacity via training on PICS technology, inventory management, and marketing skills development.
5. While eschewing institutional arrangements, facilitate localized vendor linkages with public extension agents looking to leverage their unique proximity to and social position among farmers to market PICS bags on an individual, entrepreneurial basis.
Distribution systems need to reliably deliver bags at the right time, in the right quantities, to the right places, AND at the right price

• In most PICS countries, price fixing schemes were implemented to discourage speculation, keep prices low, and encourage uptake among farmers.

• An analysis of costs and margins at various points in the PICS supply chain suggested that average downstream margins, particularly at the retail level, are relatively limited compared with those at the manufacturing and wholesale levels.

• Given lack of efficiencies of scale, many retailers expressed difficulty in securing sufficient margin to cover their marketing costs and make a profit from the activity.

Fixed pricing programs can discourage investments in downstream marketing
The Challenge
When launching any new product, getting the price right is crucial. To high a price? Buyers may turn their backs. Too low a price? Profit margins can suffer? From the start, the PICS project and its partners wanted to ensure that bags would remain affordable to the average smallholder farmer. They also wanted to discourage price speculation. Keeping prices low would encourage uptake. This rationale led to the implementation of informal yet effectively managed price fixing programs in all PICS markets. While keeping prices in check, fixed pricing also kept a lid on downstream margins, and thus, incentives to invest in PICS marketing. Evidence suggests that this dynamic explains, in part, the lack of growth in retail distribution and the limited availability of PICS bags beyond urban and peri-urban markets.

The Opportunity
Enabling the market’s price discovery mechanisms to set prices at various points of sale based on supply and demand, transportation and marketing costs incurred ensures maximum flexibility in decision-making and more efficient allocation of resources among SC actors across the supply chain.

1. Conduct initial price benchmarking study to help orient project and vendor partner planning but encourage fixed pricing only at the manufacturer level to increase visibility for improved resource management among vendors
2. Encourage vendors via co-financing arrangements to invest in the decentralized use of localized TV and radio advertising to highlight their pricing and storefront locations
3. Encourage competitive pricing among vendors via training in tiered marketing and other differential pricing strategies

Distribution systems need to reliably deliver bags at the right time, in the right quantities, to the right places, AND at the right price
Manufacturers and vendors often reluctant to invest in production/marketing of a new product with uncertain market demand

The Challenge
PICS technology represents an unknown commodity. Manufacturers and vendors perceive PICS bags as a new, highly speculative product for which demand in the marketplace is untested. Perceptions of high risks weigh heavily on their willingness to participate in the supply chain and invest their (often) limited resources. Moreover, their anticipation of low volumes and profit margins in the short- to medium-term further dampens interest. Securing direct investments by manufacturers and vendors is critical as their interests in protecting those investments and maximizing their ROI will help to ensure the sustainability of the PICS supply chain. Investments in farmer training and sensitization (via village demonstrations, “Open the Bag ceremonies) and promotional campaigns (via radio, TV, posters, cell phone videos) have been indispensable in creating and nurturing demand for PICS bags. Facilitating indirect procurement support (“guarantee morale”) and “guaranteed markets” via the purchase of demo bags, vendor trainings, and the hiring of PICS business consultants have all been effective tools employed by the project to encourage participation among commercial vendors and expand distribution channels. The evidence further suggests that leveraging tripartite arrangements involving direct financial support for procurement should be avoided as associated risks are difficult to manage effectively due to “project bias” and moral hazard.

The Opportunity
Identifying and aligning project investments with expressed business development objectives of manufacturers and wholesalers can be a powerful tool to secure needed commercial buy-in and investments in PICS distribution. PICS technology is the result of substantial public sector investments in product development and field testing. As such, it represents a valuable asset tool to encourage participation via licensing (e.g., patent, trademark) and other exclusivity arrangements. Supporting product development, promotional and marketing activities can also encourage participation and catalyze increased commercial investments.

1. Provide direct funding support (on a cost-sharing basis) to manufacturers for product/brand development and promotional activities (e.g., press events, mobile caravans, TV/radio ads).
2. Explore exclusive and time-bound licensing arrangements with manufacturers, reinvesting nominal royalty fees to support product/brand development and promotional activities.
3. Enhance training for existing and prospective vendors on PICS technology and to strengthen inventory management and marketing skills.
4. Integrate more directly training and promotional activities into SC development efforts via co-funding, logistics, and other support.
To protect consumers and the technology’s credibility in the marketplace, effective quality control systems are needed

The Challenge
In order to be effective in reducing pest-related post-harvest storage losses, PICS bags must be manufactured to precise specifications. They must also be bundled, handled and shipped in such a way as to avoid damage in transit. Vendors and farmers should have hands-on technical training to ensure good product knowledge and that the bags are being marketed, purchased, and used as designed. In short, reliable systems for quality control are needed across the supply chain. Yet, such quality control mechanisms are costly and difficult to implement and monitor. Market competition from lesser quality hermetic storage products manufactured locally or imported from abroad is a constant threat. If ineffective, such products have the potential to jeopardize market take-up of PICS technology due to spillover effects. Partly in response, the project trademarked the PICS logo. Yet, amid weak regulatory environments, IP protection is often limited. To meet these challenges, PICS manufacturers have invested in equipment and process upgrades in efforts to improve bag quality and reduce incidences of theft and damage. Downstream, sizeable project investments in training vendors and farmers have been instrumental in embedding market-managed quality control mechanisms within the supply chain while creating and nurturing market awareness of the PICS brand as a certification mark of quality.

The Opportunity
Leveraging the PICS trademark via exclusive licensing arrangements to: 1) encourage deeper investments among manufacturers in marketing and product awareness campaigns; and 2) provide financial and technical support (from royalty fees collected) to strengthen manufacturers’ capacity to monitor and enforce IP rights with assistance from local/regional/international authorities.

1. Embed marketing specialist to develop targeted marketing campaigns (via TV, radio, print) to highlight quality differences and differentiate PICS bags from competing, lesser quality products in the marketplace.

2. Encourage cooperation with local product safety and standards agencies (e.g., SON and CPC in Nigeria) to assist in monitoring and enforcement.

3. Explore potential opportunities for patent licensing in the early stages of product development.
Importance of cowpea in West & Central Africa

Understanding the challenge

What is PICS?

Purpose of the PICS supply chain study

What have we learned?

Mapping the PICS landscape – case study summaries
Case Study - PICS Niger

HIGHLIGHTS:

• Launched in 2007

• Bags imported from Nigeria and Burkina Faso

• Nearly 1.7 million bags procured to date

• Supportive policy environment (1.4m bags by OPVN)

• Strong implication of NAR (INRAN) across project interventions

• Distribution led by regional Airtel mobile phone card wholesaler Zanguina

• Significant SC rupture in 2010-11
Nearly 1.7 million bags since 2007

- In year 1, 20,000 bags, 100% project financed
- In year 2, 100,000 bags, 75% project financed;
- In year 3 & 4, OPVN agency procures 650K and 800K bags for food banks
- Other volume buyers include volume buyers include NGOs (CRS, CLUSA), cowpea market traders
- Lower sales in 2011-12 due in part to poor cowpea harvest
PROFILE – Lela Agro Nigeria Industries Ltd.

- Located in Kano, Nigeria
- Privately owned
- Manufacturer of polypropylene woven sacks, laminated sacks, cement bags, polyethylene liner bags
- Started manufacturing PICS bags in May 2009
- Official PICS bag supplier for Niger, Benin, Togo, and Nigeria
- More than 1 million PICS bags manufactured to date
- Bags sales to National Distributor Zanguina on partial credit basis (50% advance; 50% within 45 days of delivery)
- Employs 1 marketing manager to facilitate sales
- Challenges include poor efficiencies of scale and high costs of inventory management
PICS Niger – Supply Chain Profiles

PROFILE – Ibrahim ZANGUINA

- Located in Dosso, Niger
- Official Importer/wholesaler of PICS bags since Sept. 2009
- PICS regional wholesaler for Dosso region prior to Sept. 2009
- Prior to PICS, INRAN researcher, seed producer and regional distributor of Airtel mobile phone scratch cards
  - In 2010, founded Enterprise Husa’a, private company focused on marketing of agricultural inputs and cereals in Dosso region
  - Distributes PICS bags via 5 regional wholesalers located in Tillabery, Niamey, Tahoua, Maradi, and Zinder
  - Facilitates procurement and delivery of PICS bags on partial credit basis (50% advance, 50% on delivery) to wholesalers; remaining 50% collected on consignment basis with certain vendors
  - More than 115,000 PICS bags distributed since 2009
- Challenges include estimating demand and timely collection of cash down payment and procurement
PROFILE – Oumarou Dan Malka

- Primary activity is marketing PICS bags
- Regional wholesaler of PICS bags in Niamey and Tillabery region since 2009
- Sources from Nat’l Distributor Zanguina on partial credit basis (50% advance, 50% consignment)
- Distributes via network of 7 semi-wholesalers, on cash/carry and consignment basis
- Also sells directly to retailers
- 44,910 PICS bags marketed since 2009
- Challenges include repayment default among resellers selling on consignment and estimating demand
PROFILE – Hassane Biro

- Semi-wholesaler of PICS bags in Filingue department
- Primary activity is construction services and marketing of related goods
- Marketing PICS bags since 2009
- Sources from wholesaler and childhood friend DAN MILKA in Niamey and sells on 100% consignment
- Employs his children as mobile vendors to reach nearby markets (40-120km)
- Main buyers are cowpea traders and farmers to whom he sells on cash/carry basis
- Sells at the official resale price established by project; would prefer pricing flexibility depending on volume and/or buyer type
- 4450 PICS bags sold since 2009
- Challenges include appropriately estimating demand and securing sufficient profit from limited margins
PROFILE – Malam AYA

- Primary activity is cultivating millet, cowpea and sorghum
- PICS bag retailer since 2008 in Badaguicheri department
- Sources PICS bags from semi-wholesaler LAOUALI and sells on 100% consignment
- Sells thru small network of localized resellers
- Buyers predominantly other farmers
- 1725 PICS bags sold since 2008
- Challenges include supply ruptures during peak demand periods and constrained margins due to retail price ceiling
PICS Niger – Timeline of supply chain development events and milestones

**2007**
- **JUN 2007**: World Vision, INRAN, DRAs launch training, sensitization, and bag distribution activities.
- **JULY 2007**: Due to equipment problems, Niger Plastique fails to manufacture PICS bags to required specs.
- **JULY 2007**: Niger Plastique identified to manufacturer PICS bags.
- **JUNE 2007**: Business consultant hired to identify vendors and facilitate bag orders.
- **SEPTEMBER 2007**: By December, bag demonstrations completed in 100 villages.

**2008**
- **JUNE-NOV 2008**: PICS demonstrations staged in 4,243 villages.
- **SEPTEMBER 2008**: Food Products Office of Niger (OPVN) procures 650,000 3-ply bags.

**2009**
- **MAY 2008**: Distribution agreement signed with EST Tera Salifou covering Burkina Faso and Niger.
- **JUNE 2009**: 56 rural community radio stations broadcast PICS messages in 7 local languages.
- **AUG-DEC 2008**: Radio spots begin airing in Hausa and Jirma around Niamey, Maradi, Zinder; multiple claims from buyers against Lela Agro of missing/damaged bags.

**2010**
- **JAN 2010**: Private vendors begin replacing extension agents for distribution.
- **MAR-APR 2010**: Change of regional semi-wholesalers in Tahoua, Niamey, Zinder and Maradi.
- **NOV 2010**: PICS bags changed from 80kg to 100kg; training of 49 PICS vendors.
- **NOV 2010**: Rupture in the PICS supply chain.
- **MAY 2011**: Nat’l Distributor ZANGUINA orders 77,000 from Lela Agro.
- **SEPTEMBER-OCT 2011**: Reports of illicit OPVN bags being sold at discount in markets.

**2011**
- **OCT-DEC 2010**: PICS bags advertisement spots begin airing on national TV in French, Hausa, Zarma; PICS vendor invests 20% in local radio spots.

**2012**
- **OCT-DEC 2011**: Weak sales of PICS bags due to poor harvest.
- **JULY 2011**: PICS vendor meeting convened to coordinate bag procurement for 2011 cowpea season.
• Price standardization program introduced in year 1 in effort to curb speculation and enhance affordability to end users

• Fixed gross margins for wholesalers (75 FCFA), semi-wholesalers (75 FCFA) and retailers (100FCFA)

• Ex warehouse price of $1.45 per 100kg bag compares favorably to ex warehouse price of $1.65 for bags marketed in Nigeria
PICS Niger – Vendor Network Map

- Burkinabe grain trader Tera Salifou selected as Nat’l Distributor for Niger in 2008
- Switch to new national distributor in 2009
- Network well developed in Dosso region, comprised primarily of mobile card resellers
- Network less developed in key production zones of Maradi and Zinder
- Limited network reach in rural areas
• Since 2007, nearly 1.7 million bags sold to farmers, cowpea traders, NGOs (e.g., CRS) and GoN (OPVN)

• In year 2, project facilitated procurement of 100,000 bags (nearly 30% of which went unsold) from Lela Agro, co-financing (75%) as incentive and placing on consignment with Ouaga-based grain bag distributor Tera Salifou

• Public extension agents were key to reaching rural farmers; yet “moral hazard” led to high incidences of nonpayment

• Default/repayment issues in part and departure of Nat’l Distributor precipitated replacement and SC restructuring

• In Sept 2009, new National Distributor Zanguina (in Dosso) leverages existing network of Airtel cell phone card vendors to market remaining consignment stock and expand PICS distribution

• Since 2010, Zanguina has procured and distributed more than 100,000 bags (financed in part via 12.5m FCFA bank loan)

• Weak capacity to forecast demand and manage inventory (contributing to delayed procurement/delivery, unmet demand in 2010/11 and “dead stock” in 2011/12) among top SC challenges

• Early price controls constrained margins and related incentives to invest, especially among downstream vendors, and contributed to limited retail distribution channels in rural areas

• Farmer training fundamental to building awareness and creating demand for PICS bags and SC development

• Good communication and coordination among technical, promotional and distribution teams ensured strong foundation for SC growth
Case Study - PICS Burkina Faso

HIGHLIGHTS:

• Launched in 2007

• 2 bag manufacturers; Fasoplast (Ouaga) and Lela Agro (Kano)

• More than 183,000 bags procured to date

• Rupture and reorg of SC in ’09-’10

• Since May ’11, distribution via national agro-dealer network (AGRODIA)

• Supportive gov’t policy (more than 200,000 bags tendered by PAPSA)

• Strong participation of FBOs in rural distribution
PICS Burkina Faso – Bag Sales

- More than 183,000 bags procured since 2007
- In year 1, 20,000 bags 100% project financed
- In year 2, 95,000 bags 75% project financed; placed on consignment
- In year 4, GoBF/PAPSA program procures 34.5K for 100% subsidized distribution to women farmers
- Other volume buyers include NGOs (e.g., OCADES, FERT, APIL, Africaire, CRS), FBOs (FEPAB, KOOM), FAO, cowpea traders
- Lower sales in 2011-12 due in part to poor cowpea harvest
PICS Burkina Faso – Timeline of supply chain development events and milestones

- **2007**
  - MAY 2007: FASOPLAST selected to manufacture PICS bags
  - AUG 2007: "Best Practice" workshop held in Ouagadougou to identify optimal delivery systems

- **2008**
  - AUG 2008: Project signs partnership agreement with National Agroecological Research Institute (INERA)
  - JULY 2007: Delivery systems held in Ouagadougou to identify optimal delivery systems
  - SEP 2007: 1st order of PICS bags arrive and are distributed in 100 villages

- **2009**
  - MAY 2008: Project partners with CRS and AFRICAIRE to support PICS bags distribution
  - MAY 2008: Business Consultant recruited to identify vendors and facilitate bag orders
  - MAY 2008: 1st “Open the Bag” Ceremony in Komki Ipala
  - JULY 2009: PICS technology reaches 454 villages
  - AUG 2009: FASOPLAST delivers 400,000 bags to OPVN and 3,000 to CRS-Senegal
  - DEC 2009: FASOPLAST launches private-labeled (Sosso Boro) 3-ply bags at a discount price
  - OCT 2009: Since May, 490 villages trained in PICS technology

- **2010**
  - MARCH 2009: Agreement signed with EST Tera Salifou for distribution of PICS bags in BF and Niger
  - APR 2009: PICS technology reaches 454 villages
  - MAY 2009: Project partners with CRS and AFRICAIRE to support PICS bags distribution

- **2011**
  - MAY 2011: BOUTAPA becomes new Nat’l Distributor for PICS bags in BF
  - OCT-DEC 2010: OCADES distributes 1,600 vouchers (50% subsidy) in Kaya and Sanmentagua
  - SEPT 2010: Cooperative de passore buys 480 bags from vendor in Ouahigouya
  - OCT 2010: Women’s Association KOOM receives 2,000 PICS bags from MoA
  - JUNE 2011: PAPSA procures 34,500 bags from FASOPLAST
  - AUG 2011: 56 vendors trained in Ouagadougou and Bobo on PICS technology and marketing strategies; BOUTAPA procures 10,000 bags

- **2012**
  - OCT-Dec 2011: PICS trainings staged in 25 markets across BF for retailers and end users; radio messaging broadcast
• Analysis of Fasoplast bid offer for 170,000 sacks suggests pre-tax production cost of 670 FCFA/bag of 100 kg

• Ex warehouse price of 850 FCFA/bag, or $1.65, (including 18% VAT) to PICS National Distributor BOUTAPA

• Price standardization program implemented in year 1 to curb speculation and enhance end user affordability

• Fixed gross margins for wholesalers (75 FCFA), semi-wholesalers (75 FCFA) and retailers (100FCFA)
• Switch to new national distributor in 2011

• Members of agro-dealer association (AGRODIA) constitute majority of vendors

• Wholesalers BOUTAPI and SAWADAGO cover central and western regions respectively

• Limited reach in rural areas
• In year 1, project sourced 20,000 bags from local manufacturer Fasoplast for training demos

• In year 2, project switched to Kano-based Lela Agro en lieu of Fasoplast when the latter refused to match Lela’s more competitive price

• In year 2, project co-financed (75%) procurement of 95,000 bags (>50% unsold) from Lela Agro, purchasing nearly 20% for use as training demos and placing remainder on consignment with Ouaga-based grain bag distributor Tera Salifou

• In year 3, project’s decision to shift production away from domestic producer Fasoplast to Kano-based Lela Agro led to coordination rift and breakdown of PICS supply chain

• Use of public extension agents for “last mile” consignment distribution contributed to payment default by Ets Tera Salifou and resulted in major SC overhaul during 2010-11 and a new national distributor (BOUTAPA Sarl)

• Fasoplast continues to manufacture and market 3-ply bags (e.g., supplying OPVN in Niger) and launched its own private-labeled, 3-ply bag line (i.e., Sosso Boro) in 2009

• Significant delays in bag imports and delivery in 2008-09 resulted in supply rupture and non-availability of PICS bags during peak demand

• Market competition from Kano-based Lela Agro forced Fasoplast to lower ex warehouse price; in recent years, 100% tax levy on grain storage bag imports represents new barrier for Lela Agro

• During 2010-11, CRS implements voucher program (50% subsidy) in 3 provinces (Gnagna, Namintegua and Sanmatengua) to stimulate demand for PICS technology

• PICS business consultant training of private vendors in 25 markets across Burkina Faso on PICS technology was highly effective in encouraging new entrants into PICS distribution

• GoBF-led project PAPSA purchased 34,500 bags during 2010-2011 for distribution and has released a procurement bid for 170,000 additional bags for the 2012-2013 season
HIGHLIGHTS:

- Launched in 2008
- 1 manufacturer (Lela Agro in Kano); supplies 5 neighboring markets
- More than 376,000 bags manufactured to date
- Manufacturer maintains inventory to facilitate sales
- High level participation by gov’t ADPs in distribution
- Dynamic market amid growing competition/demand/sales
PICS Nigeria – Bag Sales

- Nearly 356,000 bags procured since 2008
- In year 1, project co-financed (50%) of 9,800 bags; remaining 50% by Lela Agro
- In year 2, project co-financed (50%) 100,000 bags; 70% used for demos
- In year 3 & 4, vendors fully financed and procured total of 214,200 bags
- Sales in year 4 represent more than 50% increase over year 3
PICS Nigeria – Organizational Mapping of the Supply Chain

Lela Agro (Kano)

A.A. MINANGI (Gombe)

Yakuba BALARABE (Kano)

Sani TALLAFI (Bauchi)

OTHERS (Kaduna, Plateau, Niger, Zamfara, Kebbi, Nassarawa, Adamawa, Katsina)

ADPs (Kogi, Gombe, Nigeria, Bauchi, Nassarawa)

ADPs

ADPs

ADPs

ADPs

ADPs

SMALLHOLDERS

COOPERATIVES

COWPEA TRADERS

PROCESSORS

MANUFACTURING

WHOLESALING

SEMI-WHOLESALING

RETAILING
PICS Nigeria – Timeline of supply chain development events and milestones

- **2008**
  - **JAN 2008**
    - Lela Agro in Kano selected as manufacturer of PICS bags for Nigeria, Burkina Faso and Niger
  - **APRIL 2008**
    - Purdue signs contract with IITA to implement PICS activities in Nigeria
  - **MAY 2008**
    - Agreement signed with Lela Agro to manufacture PICS bags on basis of 50% project advance
  - **MAY 2008**
    - PICS business consultant hired to identify vendors and facilitate orders

- **2009**
  - **JAN 2009**
    - IITA and partners implemented PICS activities in 103 villages
  - **JAN 2009**
    - Decision to establish exclusive agreement between Purdue and Lela Agro vs. tripartite with distributors
  - **JUNE-DEC 2008**
    - Lela Agro in Kano selected as manufacturer of PICS bags for Nigeria, Burkina Faso and Niger
  - **SEP 2009**
    - Lela Agro invests in radio and TV advertising
  - **SEP 2009**
    - 1000 “fiches techniques” distributed to vendors/technicians in Hausa and English
  - **MAY 2009**
    - Since June 2008, Lela Agro manufacturers and delivers 9800 PICS bags
  - **SEP 2009**
    - Since June 2008, Lela Agro manufacturers and delivers 9800 PICS bags
  - **DEC 2009**
    - Gombe state Agricultural Development Authority (ADP) sponsors radio spots in several local markets

- **2010**
  - **MAY 2008**
    - Agreement signed with Lela Agro to manufacture PICS bags on basis of 50% project advance
  - **MAY 2008**
    - PICS business consultant hired to identify vendors and facilitate orders
  - **JAN 2009**
    - Lela Agro raises manufacture cost of PICS bags by 10%
  - **MAY 2009**
    - Since June 2008, Lela Agro manufacturers and delivers 9800 PICS bags
  - **SEP 2009**
    - IITA in collaboration with partners (Progreen, State ADPs in 20 states, RIU, and others) conducted demonstrations in 10490 villages
  - **SEP 2010**
    - Lela Agro delivers 85,200 bags to PICS bag vendors
  - **MARCH 2011**
    - Lela Agro sponsors more radio/TV advertising
  - **JUNE 2011**
    - PICS business consultants hired to grow distribution network and facilitate bags sales
  - **MARCH 2011**
    - Lela Agro sponsors more radio/TV advertising
  - **JUNE 2011**
    - PICS business consultants hired to grow distribution network and facilitate bags sales

- **2011**
  - **SEP 2009**
    - Lela Agro in Kano selected as manufacturer of PICS bags for Nigeria, Burkina Faso and Niger
  - **SEP 2011**
    - IITA in collaboration with partners (Progreen, State ADPs in 20 states, RIU, and others) conducted demonstrations in 10490 villages
  - **DEC 2010**
    - “IITA and partners implement demonstrations in 400 additional villages
  - **DEC 2010**
    - IITA airs PICS messages through radios and film shows
  - **JUNE 2011**
    - PICS business consultants hired to grow distribution network and facilitate bags sales
  - **DEC 2011**
    - PICS business consultants hired to grow distribution network and facilitate bags sales
  - **JUNE 2012**
    - Lela Agro sponsors more radio/TV advertising
  - **MARCH 2011**
    - Project and Lela Agro discuss and explore potential to introduce biodegradable PICS bags

- **2012**

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• Lela Agro’s ex warehouse price (including 10% VAT) of 260 NGN for the domestic market is more than 7% higher than its equivalent for bags destined for export to Niger.

• Price standardization program implemented in year 1 in effort to curb speculation and enhance affordability to end users

• Standard margins for wholesalers (20 NGN), semi-wholesalers (20 FCFA) and retailers (20-25FCFA); however, actual retail pricing varies ($2-3/bag) from one market to the next
Network covers roughly 14 states in the northern and Middle Belt regions

ADPs active in wholesale, semi-wholesale and retail distribution in several states

4 regional wholesalers covering Sokoto, Zamfara, Gombe, Plateau and Nassarawa
PICS Nigeria – Summary Highlights

• Since 2008, more than 376,000 bags manufactured by Lela Agro. Of these, roughly 80% were sold to farmers, cowpea traders, cowpea processors and other buyers. The remainder were distributed as demos during farmer training event.

• The project entered into co-financing (50%) arrangements with Lela Agro and offered a "guaranteed market" via the purchase of demo bags in year 1&2 as a strategy to lower market risks to Lela Agro and encourage their investments.

• During year 1&2, Lela Agro sold to vendors on consignment. Due to widespread abuse and non-payment, the company now largely operates on 100% cash procurement basis, extending credit terms (50% down, 45-60 days) and selling on consignment only to a limited number of trusted vendors.

• Delayed procurement and/or delivery of bags resulted in unmet demand during peak marketing season in 2009-10.

• To expedite sales and delivery, Lela Agro has maintained since 2010 a running stock of PICS bags but inventory costs are prohibitive.

• Producing the right number of bags based on reliable forecasting of demand remains one of Lela biggest challenges.

• While a “fixed” pricing program was promoted in Nigeria as elsewhere, retail prices in Nigeria have varied considerably ($2-3/bag) from one market to the next, suggesting a dynamic pricing environment.

• Evidence suggests that many large Nigerian grain traders in Kano and elsewhere remain skeptical of promoting PICS technology, many viewing it as a threat to their business model and livelihoods.

• The MoA via its localized ADPs have been critical to reaching farmers in rural areas. In some states, enterprising ADPs or groups of extension agents operating independently are responsible for the vast majority of retail sales.
HIGHLIGHTS:

- Launched in 2009
- 2 local bag manufacturers (EmbaliMali, Emballage Miankala)
- More than 69,500 bags sold
- High production costs, high retail price
- 2 national distributors (Faso Kaba in Bamako, Agri Sahel in Segou)
- Well organized distribution around 2 quasi-independent vendor networks
- Strong collaboration among partners (e.g., IER, World Vision)
69,500 bags procured since 2008; roughly 16 percent used as demos

In year 1, project co-financed (80%) of 25,000 bags sourced from EmbaMali; remaining 20% by wholesalers

In year 2, 100% of 35,000 bags procured from EM financed by Faso Kaba

In year 3, 100% of 9,500 bags procured from EM financed by Agro Sahel

Poor cowpea harvest in 2011 curbed demand significantly

Volume buyers include WFP, IER, PVM)
PICS Mali – Organizational Mapping of the Supply Chain

- EmballMali (Bamako, Mali)
- Emballage Miankala (Koutiala, Mali)
- FASO KABA (Koulikoro)
- Agri-Sahel (Segou)
- (Kayes)
- (Koulikoro)
- (Sikasso)
- (Mopti)
- (Segou)

N=2
N=2
N=24

MANUFACTURING
WHOLESALEING
SEMI-WHOLESALEING
RETAILING
SMALLHOLDERS/COOPERATIVES/MARKET TRADERS/NGOs/FOOD BANKS

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**PICS Mali – Timeline of supply chain development events and milestones**

### 2009
- **FEB 2009**
  - EmballMali selected as primary manufacturer for PICS bags in Mali
- **JUNE 2009**
  - Promotional campaign launched on 21 radio stations and local TV in 8 languages
  - Contract signed with EmballMali to supply PICS bags; Project orders 25,000 to place on consignment with 3 distributors
- **NOV-DEC 2009**
  - PICS training launched with 2111 villages reached in Segou, Sikasso, and Kouïtiala
- **FEB 2009**
  - PICS business consultant hired to identify identify vendors and facilitate bag orders
- **MAY 2009**
  - Agreements signed with wholesalers Agri-Sahel, KENE AGRI, and Faso Kaba to cover distribution in Segou/Mopti, Sikasso, and Kouïtiala/Kayes, Koulikoro respectively
- **JULY 2009**
  - Project signs agreement with partners World Vision and IER to support training and bag distribution
- **NOV-DEC 2009**
  - PICS training launched with 2111 villages reached in Segou, Sikasso, and Kouïtiala

### 2010
- **JUNE 2010**
  - Distributors shift from EmballMali to Emballage Miankala due to lower costs
- **JUNE 2010**
  - 6-month promotional campaign launched on 21 radio stations and local TV in 8 languages
- **JUNE 2010**
  - Project ICEM (USAID) purchases 30,000 bags from Faso Kaba
- **OCT 2009**
  - IER purchases XXXX bags to be distributed via extension
- **DEC 2009**
  - Posters distributed in English, French and in local languages in Segou, Sikasso, and Kouïtiala
- **JUNE 2009**
  - Contract signed with EmballMali to supply PICS bags; Project orders 25,000 to place on consignment with 3 distributors
- **DEC 2009**
  - Distributor KENE AGRI in Sikasso drops out due to low sales
- **SEP 2010**
  - Grain vendors trained at Bla, Kolokani on the use/benefits of PICS technology and sales/distribution strategies
- **OCT 2010**
  - Restaurant managers in Bla sensitized on health hazards associated with chemicals in foodstuffs
- **OCT 2010**
  - Distributor Agri-Sahel and Faso Kaba procure 33,000 bags from Emballage Miankala
- **SEP 2010**
  - Project ICEM (USAID) purchases 30,000 bags from Faso Kaba

### 2011
- **MAY 2011**
  - Meeting with partners World Vision, IER and others in Bamako to plan activities for 2011/12 season
  - Project ICEM (USAID) purchases 30,000 bags from Emballage Miankala
- **MARP 2011**
  - Open the Bag ceremonies at Bla, Sinzana, and Touna with grain vendors
- **MAY 2011**
  - Meeting with partners World Vision, IER and others in Bamako to plan activities for 2011/12 season
  - Market traders trained in the use and benefits of PICS technology
- **SEP-NOV 2011**
  - Market traders trained in the use and benefits of PICS technology
- **JUNE 2011**
  - Workshop in Sikasso to discuss how PICS bags can be part of the post-harvest strategy in Mali
  - Workshops held in Sikasso to discuss how PICS bags can be part of the post-harvest strategy in Mali
- **MARCH 2011**
  - Meeting with partners World Vision, IER and others in Bamako to plan activities for 2011/12 season

### 2012
- **SEP 2011**
  - Agri-Sahel and Faso Kaba order 5,000 bags from Emballage Miankala
- **MARCH 2011**
  - ‘Open the Bag’ ceremonies at Bla, Sinzana, and Touna with grain vendors
- **MAY 2011**
  - Meeting with partners World Vision, IER and others in Bamako to plan activities for 2011/12 season
- **SEP 2011**
  - Agri-Sahel and Faso Kaba order 5,000 bags from Emballage Miankala
EmbalMali’s ex warehouse price (including 18% VAT) of $1.85 per bag highest among 9 PICS bag manufacturers

EmbalMali sources 2 polyethylene inner liners from sister company Fasoplast, paying roughly $0.40 per unit. Emballage Miankala pays $0.50 for the same liners

Emballage Miankala’s ex warehouse price marginally more competitive ($1.80 per bag)

Consequently, average retail price at which bags are marketed to farmers among the highest across 10 PICS countries

Upstream transportation costs between manufacturer, wholesalers and semi-wholesalers approximately 50 FCFA ($0.50) per bag

Price standardization program implemented in year 1 in effort to curb speculation and enhance affordability to end users
• 2 vendor networks covering 5 cowpea producing regions

• Faso Kaba network (approx. 100 vendors and 18 wholesale outlets) covers Kayes, Koulikoro and Sikasso

• Faso Kaba is a commercially-oriented network of certified seed producers/distributors

• Agri Sahel network covers Segou and Mopti

• Agri Sahel is a network of private agrodealers
PICS Mali – Summary Highlights

- Both EmbalMali and Emballage Miankala have high fixed costs. 40-50% of overall production costs are related to the costs of outsourcing production of polypropylene inner liners.

- In 2011, Emballage Miankala invested in machinery upgrades to enable in-house production of liners, lowering production costs by as much as 15% and increasing capacity and avoiding procurement delays.

- Among challenges, PICS bag manufacturers face high/rising/variable costs of raw materials, costly and unreliable power supply, materials procurement delays (e.g., inner liners from Fasoplast).

- In 2010, Faso Kaba’s delayed receipt (October) of PICS bags sourced from EmbalMali resulted in systemic rupture in supply during peak demand period and unsold inventory.

- In 2010-11, wholesaler Faso Kaba handicapped by high default rates (>50%) among extension agents tasked with downstream distribution on consignment; Faso Kaba now operating on 50%-down credit basis.

- Margins among downstream vendors constrained by “fixed” retail price set at 1150 FCFA/bag.

- Agri Sahel has relied extensively on downstream consignment sales within its long-standing network to encourage participation and expand distribution.

- Direct purchase of demo bags (“guaranteed market”) and investments in promotional activities (training, media, sensitization, “Open the Bag” ceremonies) offered compelling economic and risk mitigation incentives for wholesalers to invest in the technology.

- To assist manufacturers, wholesalers and other vendors in marketing and supply chain management, project recruits first “PICS Business Consultant.”
HIGHLIGHTS:

- Launched in 2009
- In 2009, 25,200 bags imported from Nigeria
- SC led by grain merchant GANSOU
- Delayed launch in 2009 of technical/promotional activities
- SC breakdown due to poorly organized distribution, weak sales and related payment default
In year 1, project co-financed 25,200 bags sourced from Lela Agro

- 12,500 bags for Benin; 47% used for training demos, roughly 20% sold
- Bags distributed to vendors and marketed on consignment basis
- 12,700 bags for Togo; 30% used for training demos; 49% sold
- Volume buyers included IITA-Benin, 3 local NGOs
- No new procurement since 2009
PICS Benin/Togo – Organizational Mapping of the Supply Chain

- **Lela Agro** (Kano, Nigeria)
- **Patient AKOUTOU** (Lome)
- **Leopold GANSOU** (Cotonou)
- **EXT**
- **Local NGOs**

**Flowchart:**
- **Manufacturing** → **Transporting** → **Wholesaling** → **Semi-wholesaling Retailing** → **Smallholders/ Cooperatives/ Market Traders NGOs**
In 2009, 25,200 bags procured from Lela Agro in Nigeria at price (tax exempt due to IITA’s involvement) of 875 FCFA per bag.

Ex warehouse price of $1.70 per 100kg bag is 17% higher than its equivalent for bags destined for export to Niger.

Prices (and margins) “fixed” in year 1 at the semi-wholesale (925 FCFA) and retail (1000 FCFA) levels by GANSOU and project partners.
• PICs National Distributor for Benin is grain trader GANSOU with headquarters in Cotonou

• GANSOU’s network is comprised of more than 30 grain merchants located across Benin

• GANSOU’s primary business is collecting, bulking and shipping cowpea and other crops from production zones to consumption markets

• Public extension agents (CERPA), family relations, and other “non-commercial” personnel filled gaps in geo-coverage
• PICs National Distributor for Togo is grain trader GANSOU with headquarters in Cotonou

• Wholesaler Patient AKOUTOU is GANSOU’s representative located in Lome

• AKOUTOU’s primary business activity is import and distribution of school/office supplies

• PICS Business Consultant instrumental in expansion of vendor network during 2009-10

• AKOUTOU’s vendor network covers 5 regions (Maritime, Plateau, Central, Kara, Savane) and includes 18 semi-wholesalers and more than 32 retailers
• Organizational structure, market orientation (output) and revenue model (buying cheap grains at harvest, selling chemicals) of grain trader Gansou poorly adapted to the activity of PICS bag marketing.

• Gansou’s limited up-front investment (20%) and low volumes/margins of PICS marketing provided insufficient incentives to reinvest and grow activity

• Weak incentives among semi-wholesalers selected by Gansou and partners to market PICS bags on 100% consignment stock basis with low margin/volumes and limited profit-making potential

• Implementation and media promotion of “fixed” reference prices in year 1 by project and partners discouraged participation in PICS distribution among downstream vendors due to constrained margins

• Impact of radio/media initiatives dampened by ad-hoc, inopportune implementation in relation to the marketing season and delinked from other SC development activities

• Project purchased nearly a third to a half of total bags supplied to Togo and Benin respectively for farmer training demos to motivate and encourage vendor participation, project (via its local partner IITA-Benin)

• In Benin/Togo, project initiated a new strategy training semi-wholesalers and other vendors on PICS technology to strengthen their marketing capacity and encourage new entrants

• Delayed delivery of PICS bags (October) and lack of promotional activities (and low demand) contributed to poor sales in year 1
Case Study - PICS Senegal

HIGHLIGHTS:

• Launched in 2010

• 1 local bag manufacturer (COFISAC)

• 25,000 bags manufactured and delivered to date

• 100% financed and distributed in year 1 by farmer union (CADEC/MEC)

• Restructuring of SC in 2011 linked to poorly structured financing

• COFISAC-driven expansion in year 2 via new private vendor network
In year 1, 10,000 procured by CADEC (100% financed by micro-finance institution MEC; 20% annual rate for 24 months)

- Project participation only as moral guarantor
- Year 2, 15,000 bags procured by new national distributor YATOU
- COFISAC offered terms (30% down, 45-days) due to long-standing business relationship
- Of 25,000 total bags procured to date, project purchased 11,062 (44%) for training demos
PICS Senegal – Timeline of supply chain development events and milestones

- **OCT 2010**
  - PICS messaging broadcast via local radio stations in Louga

- **AUG 2010**
  - CADEC/MEC order 10,000 bags from COFISAC

- **DEC 2010**
  - PICS messaging broadcast via local radio stations in Louga, Kébémer and Niakhène

- **MAY 2010**
  - Project signs agreement with partner NGO (CADEC) and ISRA to support PICS technology training activities

- **OCT 2010**
  - 660 villages trained in use/benefits of PICS technology

- **FEB 2011**
  - CADEC/MEC announce plans to procure 30,000 PICS bags for 2011-2012 cowpea season

- **APRIL 2011**
  - ‘Open the Bag’ ceremonies organized

- **MAY 2011**
  - ‘Open the Bag’ ceremonies staged in Khandane and Kandala
  - Local CADEC/MEC order 15,000 bags from COFISAC
  - 29 vendors trained in use/benefits of PICS technology

- **JUNE 2011**
  - New partners (FAPAL, Solidarite International, PADER, GMO, Millenium village, SOS) stage bag demonstrations in the North and East

- **AUG 2011**
  - 96 facilitators trained on PICS technology in Nguer Malal, Ngueune Sarr, Koki, Kébémer and Mëckhë

- **MAY 2011**
  - Reports of widespread, intensive use of PICS bags for groundnut and millet storage
COFISAC’s high production costs include 2 polypropylene liners (300 FCFA each) sourced from Polyethylene Senegal and fuel for operating generator when grid offline.

COFISAC’s 2010 ex warehouse price of 845 FCFA ($1.65) per bag is competitive with Lela Agro and Fasoplast ($1.65) and significantly lower than Emballage Miankala ($1.80). COFISAC raised its price to 950 FCFA per bag in 2011.

CADEC and MEC implemented a price management program (based on a loan repayment plan) that fixed the retail price at 1150 FCFA ($2.24) and earmarked nearly nine-tenths (87%) of available margins to service the loan.

Under this arrangement, CADEC, FADEC and vendors at the retail level receive margins of 5 FCFA ($0.01), 14 FCFA ($0.03) and 25 FCFA ($0.05) respectively.
• Manufacturer COFISAC identifies Momar Yatou Syll in August 2011 as new national distributor

• Grain/legume trader with 8-year history selling COFISAC products

• Marketing infrastructure includes 5 outlets (in Sagatta, Ndiagne, Leona, Barale, Geoule)

• Vendor network of predominantly agrodealers also covers Kaolack, Diourbel, Pekesse, Gossas, and Tamba Counda

• PICS bags are marketed at semi-wholesale level on consignment basis, retail level on cash/carry
• In 2009, MEC financed CADEC’s purchase of 10,000 bags with credit of 3 million FCFA at 20% annual interest rate for 24-month period (fees added 3% to principal). Under such terms, generating sufficient turnover to service mounting interest and pay off its debt has proven difficult.

• A farmers’ union, CADEC has a socially-driven mandate to provide goods and services to its members. As such, it lack necessary dynamism and is generally poorly structured to drive PICS distribution and supply chain growth.

• Access to credit is not in itself an advantage as prevailing interest rates are too prohibitive to support procurement and marketing of PICS bags, a highly seasonal activity

• In 2011, delayed delivery of bags by COFISAC resulted in delayed distribution, unmet demand during peak demand period, and “dead stock”

• Fixed pricing programs constrain margins, particularly among downstream vendors, dampening investments in PICS marketing activities

• By purchasing nearly half of procured bags for use as training demos, project has effectively employed a “guaranteed market” as incentive tool to encourage buy-in/participation from vendors.

• Due to importance of social capital, involvement of manufacturer in selection of PICS national distributor can be advantageous to the efficient functioning, growth, and sustainability of the supply chain
Case Study - PICS Ghana

HIGHLIGHTS:

• Launched in 2010

• 1 local manufacturer (Poly Sacks)

• More than 56,000 bags manufactured to date

• Bottleneck created by debt default by Nat’l Distributor

• Dynamic market environment with strong growth potential

• Opportunity to stimulate regional competition at production level
• In year 1, 28,000 bags purchased by ND Seedshop on partial credit (50%) terms

• Project participation as moral guarantor

• Project purchased 13,800 bags (51%) (via local partner Word Vision) for demo use

• In year 2, 4 regional wholesalers jointly procured 10,000 additional bags following Seedshop default
PICS Ghana – Organizational Mapping of the Supply Chain

Polytank (Accra) → Transportation → Wholesaling

Prince Yao Kovey (Bolkatanga) → Smallholders/Cooperatives/Market Traders

Antiku Abdulaye (Wa) → Nathan Biassey (Wa)

Issaka Wumpini (Tamale) → Abukani Nansa (Savelugu)

Ejura District School Feeding Program

MANUFACTURING → TRANSPORTATION → WHOLESALING → RETAILING → SMALLHOLDERS/COOPERATIVES/MARKET TRADERS/GOV’T
Poly Sack’s ex-warehouse price of 2.25 GHS ($1.20) is the lowest among 9 manufacturers on record.

Transportation costs to ship PICS bags from Poly Sack’s plant in Accra to Tamale, Bolga-Tanga, and Wa (700-800km) is 14 GHS, or $0.07). This suggests that marketing distances and transportation costs are relatively insignificant in determining final retail cost.

PICS wholesalers in Ghana currently capture roughly half (55%) of available margins.
• SC led by 3 regional wholesalers in Upper East (Bolga and Bawku), Upper West (Wa) and Northern region (Techiman)

• Network primarily comprised of GAIDA (Ghana Agro-dealer Association) members
PICS Ghana – Summary Highlights

- Standardized PICS bags specs (100kg) fail to accommodate standardized measurement of 40 bowls used by Ghanaian cowpea vendors in local markets. There is need to increase the length of the sacks 1-2 inches.

- Outstanding debt of Seedshop (former Nat’l Distributor) remains major bottleneck for future procurement and marketing of PICS bags in Ghana. Need/scope exists to explore procurement arrangements elsewhere.

- Anecdotal evidence suggests that innovative marketing video (profiling cowpea farmer/trader Hannah Nsiah in Hiawanwou in Ejura district) that project developed in April 2011 and broadcast on local TV stations highly effective in creating awareness and stimulating demand for PICS technology

- Project promotional initiatives also included development and diffusion of cell phone videos as low-cost medium to expose more rural farmers to PICS technology.

- Stakeholder feedback suggests that PICS Business Consultant played effective/influential role in supporting and strengthening procurement, marketing, and inventory management and identifying new vendors and buyers of PICS bags.

- Mainstreaming of PICS among public extension and NGOs like World Vision important for growing demand and sustainable expansion of the supply chain
HIGHLIGHTS:

- Launched in 2010
- 1 manufacturer (Lela Agro) in Kano
- 1 wholesaler in Cameroon (Agro-dealer GIC-DEMRI)
- 2 wholesalers in Chad
- In Chad, strong participation of local NGOs in training activities and bag distribution
- Mobile ‘Caravans’ used effectively to reach rural markets.
- Sourcing arrangements established between Chadian vendors and Cameroonian suppliers
- Strong demand despite high retail prices ($2.80-$3.20) in Chad
PICS Cameroon – Bag Sales

- No direct financial support from project for procurement; only “guarantee morale”

- Of 30,000 procured in 2010, project purchased roughly 1/3 (10,172) at retail price (1200 FCFA/bag) for use as training demos (“guaranteed market”)

- In 2010, Lela Agro extended terms (25% down, 25% on delivery, remaining 50% after 60 days)

- 4,600 bags resold to PICS wholesalers and NGOs in Chad

- For 15,000 procured in 2011, Lela Agro extended terms (0% down; 0% on delivery, 25% within 15 days of delivery, remaining 75% within 30 days after 1st payment installment
PICS Chad – Bag Sales

- No direct financial support from project for procurement; only “guarantee morale”

- PICS wholesalers procure 7500 bags from Lela Agro for 2010-11 season

- Lela Agro sells 7500 bags on credit (50% down payment; 50% on delivery)

- MARTIN also procured 2000 bags in 2011 and 1500 bags in 2012 from GIC-DEMRI in Cameroon

- Local NGO CECADEC procured 1000 bags in 2011 from GIC-DEMRI in Cameroon

- In 2011, wholesalers procure 4,000 additional bags from wholesaler GIC-DEMRI in Cameroon

- Project NGO partner (ASSAILD) purchases roughly 1080 bags in 2010 and 3,000 bags in 2011 from wholesalers at retail price for demo use (“guaranteed market”)
• Lela Agro’s ex-warehouse price (in 2011) of 730 FCFA ($1.40) per bag for GIC-DEMRI is among the most competitive, is consistent with that for Niger ($1.45), and nearly 11% higher than its equivalent for bags sold in Nigeria’s domestic market.

• Transportation costs, handling fees, custom’s duties/taxes to ship PICS bags from Lela Agro’s plant in Kano to Garoua (840 KM) is approximately 83 FCFA/bag, or $0.16).

• While retail bag prices in Cameroon are competitive relative to elsewhere, retail prices (and related margins) in Chad are among the highest in the region ($2.80-3.20/bag)
PICS Cameroon – Vendor Network Map

- GIC Demri’s agro-dealer network covers upper northern regions

- Wholesaler outlets in North cover Ngaoundere, Guide, Pitoa, Touboro, Kaélé, Yagoua Miganga

- Wholesale outlets in Far North cover Maroua, Kousséri Mokolo

- GIC-DEMRI’s head office and warehouse in Garoua, with 2nd warehouse in Maroua

- non-GIC-DEMRI resellers cover other markets

- Limited use of consignment sales with resellers
• No project financing support for procurement

• Project NGO partners (ASSAILD) purchases roughly 50% of bags in 2010/11 from wholesalers for demo use (“guaranteed market”)

• In 2011, 4,000 bags procured from wholesaler GIC-DEMRI in Cameroon

• MARTIN also procured 2000 bags in 2011 and 1500 bags in 2012 from GIC-DEMRI in Cameroon

• Local NGO CECADEC procured 1000 bags in 2011 from GIC-DEMRI in Cameroon

• Project
PICS Cameroon/Chad – Summary Highlights

- Project played a critical role as moral guarantor in convincing Lela Agro to extend credit terms to Cameroonian and Chadian wholesalers, effectively avoiding any direct financial risk.

- Project’s “guaranteed market” purchase of 15-30% of PICS bags procured by wholesalers in Cameroon and Chad was critical to influencing their decision to get involved and invest their own capital in PICS bag distribution.

- Selected as national distributor by the project, agro-dealer GIC-DEMRI leveraging a fairly extensive vendor network in the northern region and complementary product lines was well placed to lead PICS distribution.

- High incidences of missing and damaged bags during procurement/delivery and the difficulty in handling large volume bales (300 bags/bale) were an oft-cited challenge among wholesalers in Cameroon and Chad. To address these challenges, Lela Agro revamped its quality control and baling system.

- GIC DEMRI, with logistical and financial support from PICS technical partner IRAD, organized “mobile caravans” during weekly markets, which became an effective marketing strategy to reach into more remote, rural markets and increase bag sales.

- In Cameroon, administrative challenges in coordinating, developing and delivering messaging to local radio stations resulted in delayed diffusion and missed opportunities to link marketing to localized PICS bags vendors.

- Hired in April 2010, the PIC Business Consultant was instrumental in facilitating procurement orders, identifying new markets and vendors to expand distribution, and strengthening coordination among PICS technical and promotional teams and PICS vendors.

- Project facilitated sourcing relationships between Chadian buyers and volume suppliers of PICS bags (Lela Agro, GIC-DEMRI in Cameroon)
Thank You!

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