Mali Case Study: Generating Evidence for New Operative Model

A tangible approach to rice fortification

Introduction

Today, the technology is available for large-scale rice fortification that is safe and looks, tastes and can be prepared the same way as non-fortified rice. Rice is fortified in a two-step process: production of fortified kernels (FK) and blending of FK with non-fortified rice. While the technology has been developed, evidence established and consumer acceptability proven, rice fortification programs have not been significantly scaled to determine optimal business models and costs.

A number of barriers are preventing global scaling of rice fortification including lack of operational experience with public and private sector distribution, missing buy-in from governments and donors, and local complexity due to fragmented value chains and regional policies on rice. Yet, where rice is a staple food and micronutrient deficiencies (MNDs) are widespread, making rice more nutritious by fortifying it with essential vitamins and minerals can make a significant contribution to addressing micronutrient deficiencies and improving public health.

As illustrated in Figure 1, today, many of the regions affected by MNDs already receive rice through food assistance programs. Out of 330,000 MT of rice distributed by WFP in 2017, about 11,000 MT (3%) was fortified, representing a modest increase from 2% in 2016. With its global reach and organizational expertise, WFP is well positioned to catalyze the global adoption of rice fortification through market adoption and safety net programs.

In West Africa, rice consumption is increasing in urban areas, reflecting shifts in demographic and dietary patterns. More
and more countries have invested in increasing local production of rice since the 2008–2009 food crisis. Demand in the region continues to grow while at the same time micronutrient deficiencies in West Africa are some of the highest in the world. West Africa offers a good setting to pilot the introduction of fortified rice within WFP’s food basket.

To date, locally produced FK are not available on the market in West Africa, and implementing fortification of rice in the region means that FK have to be imported from overseas and blended with non-fortified rice – either locally produced or imported. To test the operational feasibility of such a business model, a project was designed to carry out rice fortification in real conditions by fortifying an initial quantity of rice for WFP distributions in Mali in order to provide lessons and generate relevant evidence to reduce operational and financial barriers for scale-up.

Project description
The Mali rice fortification project, a project awarded by WFP’s Innovation Accelerator, was designed to test a program-entry scenario for fortified rice in a large-scale WFP operation. For the first time in West Africa a WFP program distributed fortified rice through school canteens for an entire school year, thereby generating learning and demonstrating to government and the private sector that in-country fortification of locally grown rice fortified with imported FK could be feasible and cost-effective.

Given the absence of local production of FK in Mali, the pilot set out to test whether blending of imported FK with locally grown rice could work as a feasible business model, improving cost-efficiency and reducing a country’s need to consider imports of nutritious foods. The objectives of the project were to

1) implement a new operative market model: imported FK and local blending of rice;
2) generate cost transparency for program set-up and scaling; and
3) develop a regional scaling model in West Africa.

The pilot has been monitored, evaluated and documented in terms of operational aspects, key financial performance indicators and acceptability of fortified rice.

In December 2016, a tender was issued by the WFP Regional Bureau in Bangkok, Thailand – the office responsible for rice and FK procurement – for 15 MT of FK (Figure 2). The specifications for fortified rice include eight micronutrients: vitamins A, B1, B3, B6, B12, folic acid, iron and zinc. Three offers were received and a supplier in Thailand was selected who produced and delivered the order in two consignments: 14,650 kg by sea and 350 kg by air. Minor quality issues were observed for the 350 kg batch which, based on the information gathered from the supplier, was too small to ensure its homogeneity.
In total, the FK procurement process took two and a half months from production to delivery meaning that, upon arrival, 80% of the 12 months FK recommended shelf life remained, with clear lessons learned for optimizing the overall import process in the future (Figure 3).

Clearance of the FK was delayed due to miscommunication and a lack of experience in clearing this new commodity. FK were a new commodity, as they had not been imported by WFP before in Mali, and it was not clear if they should be considered as a food product. As a result, the project faced delays in the pre-clearance process and in obtaining the necessary official permissions required to import the FK into Mali and obtaining approval for integrating them into school meals.

Selecting the right partner to operate the fortification step was the cornerstone of the project’s success (Figure 4). A Malian social enterprise, Malô, was selected to operate this step and specifically to process, sort and blend non-fortified rice procured from farmers’ cooperatives and traders in the Ségou region (Faso Jigi, ARPASO, Ely Diarra and the Office des Produits Agricoles du Mali) with imported FK. The non-fortified rice that was purchased was the most prized local variety, Gambiaka, which is grown mainly in Ségou and has limited supply nationally due to strong demand. From a financial perspective, this decision meant that good-quality Gambiaka was more expensive to procure than other locally available varieties of rice, which increased the purchase cost of non-fortified rice and the overall cost of the project.

As a new item in the distributed food basket, fortified rice not only needed to mimic non-fortified rice to ensure acceptance by children but it also required that sensitization of the school meal management committees, cooks, and teachers be

**FIGURE 2: Sourcing FK through competitive bidding**

- **Facts & figures:**
  - 15 MT of FK purchased
  - FK unit cost: US$2.34/kg
  - Total FK purchase cost: US$39,000

- **Key actions & steps taken:**
  - Quality assurance to build a reliable and competitive pool of FK suppliers
  - Competitive bidding process to optimize FK procurement cost

- **Learnings & recommendations:**
  - Need to strengthen WFP FK supplier pool
  - Classifying FK as a food item would help WFP to control and trace quality
  - Harmonizing FK specifications globally helps volume leverage

Fortified kernels were sourced from a WFP approved supplier in Thailand

School cook preparing fortified rice for school lunchtime meal, Koulikoro, Mali, January 2018
**Figure 3: Importing FK into Mali**

FRK were imported and cleared from customs via Lomé, Togo.

**Facts & figures:**
- Total import lead time: 79 days
- Shelf life left upon arrival: 80%

**Key actions & steps taken:**
- Obtaining government approvals for FK import
- Clearance of goods
- Inland transportation

**Learnings & recommendations:**
- Pre-clearance & approval processes with local authorities should start when placing the purchase request
- Documents required for clearance should be obtained prior to shipment arrival

**Figure 4: Blending FK with local rice**

In Mali, non-fortified rice was procured from cooperatives and blended/fortified in a central warehouse in Ségou.

**Facts & figures:**
- 1,485 MT of non-fortified rice procured
- Non-fortified rice cost: US$530/MT
- Fortification cost: US$32/MT
- Fortified rice cost: +5%

**Key actions & steps taken:**
- Purchase, processing, cleaning & sorting of non-fortified rice procured locally
- Fortification/blending of FK and non-fortified rice & packing

**Learnings & recommendations:**
- Pre-financing raw materials (FK + non-fortified rice) represents the biggest financial risk for the fortification partner
- Securing quality non-fortified rice at harvest time is key to minimizing sourcing costs
- Using abundantly available local varieties of rice should be preferred over prized varieties
- Strengthening quality control of locally procured rice is necessary to minimize losses
carried out to ensure that rice would be prepared, cooked, and served appropriately (Figure 5). Focus group discussions conducted with parents, cooks and students revealed that including fortified rice in the school meals was favorably perceived. No problems were encountered with preparation, and children ‘appreciated’ the taste of fortified rice.

**Discussion and recommendations**

After one year of program implementation the project found that it is technically possible to fortify rice in Africa using imported FK blended with local non-fortified rice. Once cooked, the fortified rice mimicked local rice and was accepted by all beneficiaries. In total, 1,500 MT of rice were fortified, reaching 118,657 beneficiaries who accessed fortified rice over 120 school days. The cost of fortification was US$32 per MT, representing a 5% increase compared to cleaned and calibrated local non-fortified rice. Based on a 120-day school year and 18 kg distributed per child per school year, in total it cost the project US$0.94 more per child to substitute locally procured non-fortified rice with fortified rice (Table 1).

Operating fortification of rice is a cross-functional exercise that requires collaboration with and between government entities, the private sector and civil society, both at the national and the international level. Coordination and ownership of the project are critical factors to ensure adequate follow-up on activities, diffusion of information and communication across teams. From an operational standpoint, a number of key considerations and strategic actions should be considered going forward for program implementation:

**FK production:**

- Large batches through aggregation of demand and standardization of specifications are required in order to ensure homogeneity of batches of FK produced.

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**TABLE 1: Operating expenses**

<table>
<thead>
<tr>
<th>Cost categories</th>
<th>Cost</th>
<th>MT</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cleaned and calibrated non-fortified rice (1,485 MT)</td>
<td>US$30.78</td>
<td></td>
<td>88.31%</td>
</tr>
<tr>
<td>Non-fortified rice cleaning, calibrating &amp; material handling costs</td>
<td>US$20.12</td>
<td></td>
<td>3.35%</td>
</tr>
<tr>
<td>By-products/impurities (50 MT)</td>
<td>US$17.86</td>
<td></td>
<td>2.97%</td>
</tr>
<tr>
<td>Fortification costs</td>
<td>US$32.28</td>
<td></td>
<td>5.37%</td>
</tr>
<tr>
<td><strong>Total cost for 1,500 MT of fortified rice</strong></td>
<td><strong>US$601.04</strong></td>
<td></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>
TABLE 2: Operating cost breakdowns

<table>
<thead>
<tr>
<th>Operating costs</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean, calibrated non-fortified rice</td>
<td>88.31%</td>
</tr>
<tr>
<td>Electricity/diesel</td>
<td>0.19%</td>
</tr>
<tr>
<td>Packaging</td>
<td>1.35%</td>
</tr>
<tr>
<td>Production workers</td>
<td>1.25%</td>
</tr>
<tr>
<td>Material-handling laborers</td>
<td>0.73%</td>
</tr>
<tr>
<td>Management staff</td>
<td>0.92%</td>
</tr>
<tr>
<td>Losses (impurities, stones, weighing differences)</td>
<td>0.02%</td>
</tr>
<tr>
<td>By-products (broken kernels, rice bran)</td>
<td>2.95%</td>
</tr>
<tr>
<td>FK</td>
<td>3.80%</td>
</tr>
<tr>
<td>FK transport and clearance</td>
<td>0.47%</td>
</tr>
<tr>
<td><strong>Total cost of fortified rice</strong></td>
<td><strong>100.00%</strong></td>
</tr>
</tbody>
</table>

- Ensuring that a competitive pool of FK-certified suppliers is built to enhance competition, reduce lead times and improve quality and consistency in general.

**FK blending**
- The model operated under this project meant that selecting the right partner to operate the blending step was the cornerstone of the project’s success. A detailed assessment of the local rice fortification supply chain should systematically be performed at inception phase to investigate best operational solutions based on the capabilities and capacities of local millers and other potential partners to integrate the value chain – from rice procurement to milling, sorting, blending and repackaging.

**FK classification**
- For WFP programs, reclassification of FK as a food item within WFP’s nomenclature is needed for budget systems, product quality control, traceability and reporting purposes.

**FK shelf life**
- At scale, and given the relatively short shelf life of FK (12 months), it will be important to work with suppliers to minimize lead times especially in cases where FK are pre-positioned for a long period of time.

**Import process**
- Anticipating arrival, documentation and approval requirements are needed in-country to optimize total import times.

This project provided detailed information on the different costs incurred by the fortification partner in cleaning non-fortified rice, calibrating it and fortifying it. It showed that the financial burden of the logistics setup tested relations with the fortification partner, who takes on all the financial and technical risks. For small- and medium-sized enterprises and cooperatives in countries where interest rates are extremely high, pre-financing the cost of key raw materials (non-fortified rice and FK) represents a considerable upfront investment and cash flow risk.

The cost of non-fortified rice is the number one input for fortified rice, as illustrated in Table 2. It is the main driver of all costs, representing 88% of the total cost of fortified rice for this project. Sourcing quality non-fortified rice was the most difficult initial obstacle for Malô, both technically and financially. In order to obtain the required 1,485 MT of non-fortified rice necessary for the project, Malô had to purchase, process, and calibrate 1,535 MT of non-fortified rice prior to blending it with FK, representing a 3% loss (50 MT) in by-products and losses. Sourcing quality non-fortified rice is therefore the most capital-
### TABLE 3: Fortification costs

<table>
<thead>
<tr>
<th>Fortification costs categories</th>
<th>Cost</th>
<th>MT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity/diesel</td>
<td>US$0.45</td>
<td></td>
</tr>
<tr>
<td>Production workers</td>
<td>US$1.78</td>
<td></td>
</tr>
<tr>
<td>Material-handling laborers</td>
<td>US$2.77</td>
<td></td>
</tr>
<tr>
<td>Management staff</td>
<td>US$1.60</td>
<td></td>
</tr>
<tr>
<td>FK cost</td>
<td>US$22.87</td>
<td></td>
</tr>
<tr>
<td>FK transport &amp; clearance</td>
<td>US$2.81</td>
<td></td>
</tr>
<tr>
<td><strong>Total fortification cost/MT</strong></td>
<td>US$32.28</td>
<td></td>
</tr>
</tbody>
</table>

### Sourcing quality non-fortified rice

- A cost-effective approach to sourcing non-fortified rice will be to use varieties for which supply is abundant throughout the country and which face less commercial pressure.

- Pre-financing farmer cooperatives’ rice-growing costs represents a win-win situation for the farmers and the fortification partner.

- By providing farmers with quality seeds and fertilizers in exchange for contractually agreed-upon prices and quantities of paddy or non-fortified rice, farmers would reduce their bank financing needs and costs, while the fortification...
partner would be better able to ensure quality control from planting to milling, reduce uncertainty/volatility related to prices and availability, and be more competitive.

In addition, the project highlighted that the cost of local non-fortified rice is highly subject to demand and supply forces and varies significantly throughout the year based on harvest quality, stock availability and consumer preferences. Supply is generally tight as the country enters the lean season and loosens up according to the productivity of the new harvest. This seasonality is illustrated in Figure 6. From November 2017 to May 2018, the cost of Gambiaka in Ségou increased by nearly 9%, while fortification was calculated to increase the cost of non-fortified rice by about 5%.

Given the potential of rice as a vehicle to reach beneficiaries globally, improving access to quality, affordable and locally produced non-fortified rice globally is vital to rice fortification efforts. This is something that WFP has already embraced through its leadership of the Missing Middle Initiative project which aims to strengthen Malian rice producer organizations by improving the quality of paddy and non-fortified rice and attracting private sector investment in the rice supply chain.

**Conclusion**

This project aimed to provide lessons related to programming distribution of fortified rice through WFP school meals with a view to documenting operational challenges and giving direction on opportunities to explore for optimization and replication within the West Africa region. Despite the challenges the project can be considered a success in that it highlighted critical organizational and operational factors that should be monitored before and during implementation.

The project opened new avenues to explore for optimization and further reduction of the various fortification costs. The model tested, whereby fortified rice was produced through imported FK that was then domestically blended, has shown that in addition to contributing to the well-being of beneficiaries, rice fortification also stimulates the local economy through the purchase of local products and job creation. In total, 1,300 members of Faso figi contributed non-fortified rice to the project and Malô created 40 full-time jobs, including production staff, supervisors and quality control managers.

Mali is experiencing food and nutrition insecurity linked to difficult agro-climatic conditions and a high level of poverty, exacerbated since 2012 by the political and security crisis. At least 50,000 new displaced persons are expected in 2018 in Mali and WFP, along with other partners, plans to provide emergency food and nutrition assistance to cover their immediate food and nutritional needs. Safety net programs through cash transfers, food vouchers or school meals will enable the poorest to access balanced food baskets. In this context, making fortified rice more accessible locally is an intervention that has the power to significantly contribute to the local economy while also improving food security, nutrition and the well-being of populations at risk.

**References**