



USAID
FROM THE AMERICAN PEOPLE

ATTACHMENT II

TO THE

GLOBAL FOOD SECURITY RESPONSE WEST AFRICA RICE VALUE CHAIN ANALYSIS



USAID
FROM THE AMERICAN PEOPLE

GLOBAL FOOD SECURITY RESPONSE LIBERIA RICE STUDY

microREPORT #157

AUGUST 2009

This publication was produced for review by the United States Agency for International Development. It was prepared by Chris Reynolds of DAI and Mike Field of ACIDI/VOCA with funding from the Accelerated Microenterprise Advancement Project. Additional support was provided by consultants Dr. Sizi Subah and Macon Fiske Tubman.

GLOBAL FOOD SECURITY RESPONSE LIBERIA RICE STUDY

microREPORT #157

DISCLAIMER

The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

CONTENTS

- EXECUTIVE SUMMARY..... 1
- I. INTRODUCTION TO THE RICE INDUSTRY IN LIBERIA.....2
- II. BUSINESS ENABLING ENVIRONMENT4
- III. END MARKETS.....8
- IV. CHAIN ANALYSIS..... 11
- V. OPPORTUNITIES AND INCENTIVES FOR UPGRADING..... 19
- VI. STRATEGY 24
- VII. RECOMMENDATIONS FOR USAID..... 26
- VIII. TOPICS FOR FURTHER INVESTIGATION..... 28
- BIBLIOGRAPHY..... 29
- ANNEX A..... 30
- ANNEX B..... 31

TABLES AND FIGURES

TABLES

Table 1: Rice Production and Consumption in Liberia, 2001-20082

Table 2: Rice Consumption in Liberia, 2007.....9

Table 3: Rice Prices; July 2009 (in US dollars).....9

Table 4: Liberia Rice Imports by Product, 2001-2007..... 10

Table 5: Prevalence of Reported Major Causes of Post-Harvest Losses in Rice Production by Region 14

Table 6: Agricultural Labor Costs in Liberia, 2009 31

Table 7: Agricultural Input Costs in Liberia, 2009 32

Table 8: Profit/Loss Analysis based on\$3/day Labor Assumptions, 2009 33

Table 9: Profit/Loss Analysis based on\$2/day Labor Assumptions, 2009 34

FIGURES

Figure 1: Liberia Rice Value Chain Map 11

Figure 2: Map of Distribution Channels for Imported Rice, 2007 12

ACRONYMS

ADA	African Development Aid
BEE	Business enabling environment
CAADP	Comprehensive Africa Agriculture Development Programme
GAP	Good agricultural practices
GFSR	Global Food Security Response
GoL	Government of Liberia
ICT	Information and communications technology
LNRDS	Liberia National Rice Development Strategy
MT	Metric tons
SME	Small and medium enterprises
SMS	Short message service
USAID	United States Agency for International Development
WFP	World Food Programme

EXECUTIVE SUMMARY

Rice is the primary staple food of Liberians, representing over 33 percent of their food consumption and accounting for approximately 50 percent of adult caloric intake. While 71 percent of the estimated 404,000 farm families produce rice, the country still relies heavily on imports. Approximately half of Liberia's population lives in the greater Monrovia area, where the rice that is consumed is predominately imported rather than produced locally. Per capita, Liberia has the highest rice consumption rate in Africa.

The availability and price of rice is a very sensitive political consideration. The present government of Liberia (GoL) policy is to increase domestic rice production while loosening import license restrictions, opening what had been a tightly controlled license permit process for the import of rice. The physical infrastructure in Liberia is exceptionally weak, with the poor condition or nonexistence of roads frequently cited as a constraint to the flow of rice and other commodities. There are not enough mills or adequate warehouses in the country, and those that do exist are either no longer in operation or operate vastly under capacity. The most common method of milling in rural areas is either by manual pounding or with small, portable milling machines donated by NGOs.

Imported round grain rice from China, known as "butter rice," comprises approximately 85 percent of rice consumed. While butter rice has the largest share in the market, the local preference is for the more expensive parboiled rice from the United States and China. Domestically produced rice is known as "country rice" and is more important in rural households as a staple food, but can be found in markets surrounding Monrovia. According to the Ministry of Commerce, demand for rice in Liberia is 210,000 MT rice per year, while the Ministry of Agriculture quotes a much higher volume of demand at 400,000 MT per year.

The rice value chain is simple, but inefficient. The GoL and donor community are the principal actors in the enabling environment, with the private sector exerting minimal influence and the informal sector more active in local community markets. The key drivers are smallholder perceptions of rice as a safety net crop and the government reinforcing this notion by sending signals such as the announcement of investments in rice processing and efforts to keep prices low.

The end market for rice in Liberia can be defined by three channels. The first is the high-end urban channel seeking high-grade international rice or imported specialty rice. The second market segment serves the low- and mid-range urban population, and could present a medium-term goal for Liberian rice producers. The third market segment is rural market demand. Rice volumes supplied by rural producers are currently insufficient to satisfy this demand.

One of the major challenges the government faces is fostering private investment in the agricultural sector, including the rice industry and support markets. Poor relationships in the value chain have resulted in a high percentage of subsistence-based production and limited upgrading. There are numerous operational challenges, but the most immediate concern is the high cost of production due to weaknesses throughout the chain. Specifically, efficiency gains are needed in the areas of the inputs and seed industries, production, transportation and aggregation, post-harvest handling, finance and ICT.

For the Liberian rice industry to upgrade and begin to compete effectively with imported rice, there will have to be a transition to commercially based relationships from input supply to the retailing and branding of local production. The near-term vision for rice in Liberia is a system where smallholders consistently produce enough rice to fulfill household needs and commercial production is substantially increased by a range of firms and farm sizes. Private investment will build post-harvest milling, storage and processing capacity. The inputs industry will grow and develop distribution networks directly into rural communities, and support markets will emerge in support of key growth segments.

I. INTRODUCTION TO THE RICE INDUSTRY IN LIBERIA

Rice is the primary staple food of Liberians, representing over 33 percent of their food consumption and accounting for approximately 50 percent of adult caloric intake. It is produced by 71 percent of the estimated 404,000 farm families in the country, but the country still relies heavily on imports. Per capita, Liberia has the highest rice consumption rate in Africa. Moreover, rice is largely a price-inelastic commodity in the household, reinforcing the colloquial expression that “one has not eaten that day if one has not eaten rice.” Approximately half of Liberia’s population lives in the greater Monrovia area, where the rice that is consumed is predominately imported rather than produced locally. Given the importance of rice as a staple food in the Liberian diet, the price of rice has a direct and significant impact on poverty. A 2008 estimate by the World Bank identified that a 20 percent drop in the price paid by consumers for rice would reduce the poverty rate¹ by 3.4 percent.

The 2007/2008 domestic rice harvest² was estimated at 170,000 MT of milled rice, while the yearly consumption is estimated at 210,000 MT—and consumption has been steadily increasing since 2004. The current message from the Ministry of Agriculture has called for people to “return to the fields and produce rice” and to recognize “agriculture as a business.” In a coordinated effort, the Ministry of Agriculture, the World Food Programme (WFP), the Food and Agriculture Organization and the United Nations Mission in Liberia launched the “Back to the Soil” campaign on June 27, 2009. Cellcom Communications, a private-sector company, officially sponsored the initiative. The campaign is intended to motivate Liberians to return to agriculture, recognize the sector as a viable business, increase domestic food production (most notably rice) and ultimately promote food security. While demand for rice has increased with an increase in population, average yields in production have decreased from a high of 1.28 MT per hectare in 2000 to 0.9 MT per hectare in 2007/08 (see Table 1 below). Despite the national initiative to increase domestic production while simultaneously relaxing import restrictions, significant constraints persist, such as lack of access to improved seed varieties, fertilizers and pesticides, as well as insufficient incentives to invest in increased rice production.

Table 1: Rice Production and Consumption in Liberia, 2001-2008

	1990	2000	2002	2004	2005-06	2006-07	2007-08
Area (ha)	175,000	143,000	120,000	120,000	110,000	152,000	190,000
Production (MT)	180,000	183,000	110,000	110,000	100,000	144,000	170,000
Average Yield (MT/Ha)	1.03	1.28	0.92	0.92	0.87	0.90	0.9
Consumption (MT)				300,000	310,000	320,000	332,000
Food Assistance (MT)				100,000	74,000	22,000	20,000
Import (MT)	70,000	100,000	100,000	120,000	160,000	154,000	140,000
Value US\$ million	25	37	20	22	140	170	200*

Source: Ministry of Agriculture of Liberia. “Liberia National Rice Development Strategy.” Liberia: Ministry of Agriculture, February 2009 (based on 2001 and 2008 crop surveys)

¹ The headcount index of poverty is the share of the population with a level of consumption per equivalent adult below the poverty line. The poverty gap takes into account the distance separating the poor from the poverty line (while giving a zero distance to the non-poor). Source: Tsimo, “Rice Prices and Poverty in Liberia.”

² Domestic production statistics for rice in Liberia are inconsistent and often conflicting. For the purpose of this study, rice production and consumption statistics are being sourced from the “Liberia National Rice Development Strategy,” February 2009, as the most recent and approved report by the Government of Liberia.

Increasing the productivity of smallholder rice farmers will require either a shift to lowland rice production or an increase in investment in upland production, which is currently the predominant form. Easier land preparation makes upland rice less labor intensive, but it is also substantially less productive and is therefore often intercropped with other crops. The majority of smallholders participating in focus groups indicated that they view rice production as a necessity for household consumption with only limited potential as a commercial crop. Smallholders prefer to invest their labor and skills in the production of cash crops such as cocoa, palm oil and rubber, which were cited as having a higher cash value than rice. Government policy to maintain low rice prices for urban consumers has further affected the perception of rice as low in commercial viability.

Liberia's dual system of land tenure also affects agricultural productivity. The Government of Liberia (GoL) owns and administers public land, and rural indigenous communities are permitted to maintain lineage-based communal tenure. In the 2006 Comprehensive Food Security and Nutrition Survey, approximately 66 percent of agricultural household respondents indicated that they had access to agricultural land, though farm sizes were typically smaller than before the war. On average, households reported current land size of 3.3 acres (1.3 ha) per household. The highest percentage of access to land is in River Gee (90 percent), Grand Gedeh (88 percent) and Lofa (88 percent), while the lowest rates of access to land for farming were in the counties of Montserrado (39 percent), Margibi (46 percent) and Grand Cape Mount (52 percent). The current land policy, under which GoL owns all land in the country until deeded to individuals or corporate organizations, is viewed by some as an impediment to improving agriculture.

II. BUSINESS ENABLING ENVIRONMENT

A. GLOBAL

The international food price crisis of 2008 had a direct impact on the price and availability of rice in Liberia, and this underscores the fact that national policies and markets are significantly affected by global conditions. The increasing price of rice on the world markets led to national policies to open the rice import market in Liberia with the goal of increasing the quantity and reliability of supply. The global financial crisis of 2009 has also impacted the price and availability of financing for rice imports to Liberia, as well as for other commodities and inputs. These external factors set the stage for a national situation requiring an adaptive system of policy, production and marketing that can react to world markets.

B. REGIONAL

The Government of Liberia, in its determination to boost food production, has allocated \$5,472, 000 to the agricultural sector in the 2008/2009 budget, a 68 percent increase over the previous year. However, this represents 2 percent of the national budget, falling short of the 10 percent budgetary allocation agreed upon by African governments under the Comprehensive Africa Agriculture Development Programme (CAADP). The GoL is scheduled to sign a CAADP compact by July 2009.

C. NATIONAL

LIBERIA NATIONAL RICE DEVELOPMENT STRATEGY

The Liberia National Rice Development Strategy (LNRDS), published by the GoL in 2009, outlines the strategic objectives and interventions planned by the government for the next 10 years. The first focus of the Ministry of Agriculture is to build a national certified seed production system, replicating improved and hybrid seed varieties. The Seed Bank Program will be led by the Ministry of Agriculture through the national Central Agriculture Research Institute, with no current plans to include the private sector. In June 2009, the first consignment of 26 MT of high-yielding rice seed (mostly NERICA varieties) arrived in Liberia, delivered by the Africa Rice Center and purchased by USAID through the Global Food Security Response Program (GFSR). A second consignment of 24 MT will be delivered in the upcoming months. Support to the Seed Bank Program will come from three locally operating NGOs—Greenstar, Africare and Catholic Relief Services.

According to the LNRDS, the strategy is to increase domestic production through improved productivity of existing upland rice and expanding the area of production for irrigated and lowland rice, recognizing the potential for two harvests of lowland rice in a single season. The 2009 area of production for rainfed rice (upland and lowland) is estimated at 210,000 ha (190,000 ha for upland and 20,000 ha for lowland), while irrigated rice is estimated at 2,000 ha. The 2018 targets set by the GoL anticipate rainfed production to cover 222,000 ha (190,000 ha upland and 32,000 lowland), while irrigated rice will represent 10,000 ha. The total domestic rice production (including upland, lowland and irrigated) is expected to increase from 200,000 MT in 2009 to 330,000 MT by 2018. To achieve these results the main emphasis for upland rice will include the use of certified seeds and to a lesser degree fertilizer, and the reduction of pre- and post-harvest losses through Good Agricultural Practices (GAP), extension services, improved storage and

the eventual use of pesticides. For irrigated rice, the primary areas of focus will be on certified seeds, use of fertilizer and reduction of pre- and post- harvest losses through extension services, water management and GAP.

Rice is one of three strategic commodities the GoL monitors carefully (the other two being petroleum and cement). While the GoL does not maintain publicly owned warehouses specifically for rice, the Ministry of Commerce monitors the supply of rice in private warehouses on a weekly basis, ensuring that national reserves do not fall below a 6-month supply of 2.1 million bags (105,000 MT), based on the estimated monthly consumption demand of 350,000 bags (17,500 MT) for Liberia. The GoL does not have a separate and formal strategic national reserve of rice, but it does leverage and influence the flow of rice imports to maintain the reserves in Liberia through the granting of licenses for rice imports.

POLITICAL CONTEXT AND INFORMAL REGULATORY ENVIRONMENT

The availability and price of rice is a very sensitive political consideration. Liberia suffered “rice riots” in the late 1970s and recognizes the need to ensure public confidence in the supply of rice in the country, be that through imports or domestic production. This mono-crop culture, where Liberians link rice to their national identity and wellbeing, presents two issues. The first issue is the GoL’s policy efforts to ensure stable stocks and reasonable prices for consumers, especially urban consumers. The present GoL policy is to increase domestic rice production while loosening import license restrictions, opening what had been a tightly controlled license permit process for the import of rice. Local production efforts are weighted towards government controls and direct government and donor participation in directing seed rice production and supporting direct delivery of inputs and services to subsistence farmers and state-owned mills. The second issue is the potential moral hazard that has come to fruition in other, similar mono-crop cultures. The close association of Liberians to rice presents an opportunity for using rice as a lever for political gains. In other countries, mono-crop cultures have been leveraged through interventions into the market to increase or decrease the price, distribute seed and inputs, and establish *ad hoc* import or export bans before elections. The greater the controls the government organizes, the greater the likelihood that the opportunity cost will be relatively low to engage in such political tactics.

The Ministry of Commerce insists there are no price controls on the import of rice and that it allows international markets to determine the price. Nonetheless, the ministry enforces a maximum margin of \$1 on FOB price per 50 kg sack of “butter rice”—the most common variety consumed, considered the staple rice in Liberia.³ Parboiled rice does not have a margin requirement, and the wholesale price is dictated by local market demand. The GoL takes pride in the fact that the price of imported rice is lower in Liberia than in the neighboring countries of Guinea, Sierra Leone and Côte d’Ivoire, as are the prices of the other nationally strategic commodities, petroleum and cement. The national policy on the informal export of rice from the domestic market or transshipment of rice to neighboring countries is unclear. Transport operators state that shipping domestic supplies of rice over national borders is not allowed or, at least, requires a special license or permit. However, during interviews with local traders it was noted that the informal market is driving some low-cost rice from Liberia into neighboring countries where the price of rice is higher, leading to increased profits. When asked to estimate the volume of rice traded informally under this scenario, those being interviewed declined to provide estimates and changed the topic of the conversation. Wholesalers in Monrovia have noticed that rice retailers from counties neighboring Côte d’Ivoire such as Grand Gedeh and River Gee purchase more rice than they consume.

The perceptions of informality and network relationships are strong in Liberia and extend not only to business transactions but also to the court system. In the near term, this may not be critical, but over the medium to longer term the quality, integrity and confidence in a nonpartisan judicial system based on the rule of law will become critical

³ Butter rice is imported round grain rice from China.

as the business enabling environment becomes more formal. In particular, effective and efficient dispute resolution will be key to fostering a competitive and adaptive agricultural sector.

PHYSICAL INFRASTRUCTURE

Physical infrastructure is exceptionally weak in Liberia. The poor condition or nonexistence of roads is frequently cited as a constraint to the flow of rice and other commodities—both for moving imported rice from Monrovia to the countryside and for transporting domestic production in rural areas to local regional markets. There is a private train service operated by Geoservices Inc. that runs between Monrovia and Bong Mines in Bong County. The service runs three days a week and includes both passengers and cargo. For a fixed price of 50 LBD (\$0.75), a 50 kg sack of rice can be transported anywhere along the line. In 2008, 315 MT of imported rice travelled this way from Monrovia, and 7.7 MT of domestic rice was sent to the Monrovia market.

There are not enough mills or adequate warehouses in the country, and those that do exist are either no longer in operation or operate vastly under capacity. The FAO, WFP and other donors have introduced portable mills randomly in the countryside, but these are community focused and not ideally located for commercial rice production. To encourage domestic production and improve agro-processing (milling) by cooperatives, the WFP has launched a Purchase for Progress program to be implemented in the counties of Lofa, Nimba and Bong. The plan is to guarantee the purchase of rice from local farmers and provide them with milling and storage services. From 2009 to 2010, WFP will purchase a minimum of 1,400 MT of domestic country rice, valued at more than \$1 million from no fewer than 5,600 smallholder farmers, primarily those who are members of participating associations. An additional \$1.5 million will be provided to the program to help build the capacity of farmer cooperatives in agro-processing.

The most common method of milling in rural areas is either by manual pounding or with small, portable milling machines donated by NGOs. There are no milling facilities for rice in Monrovia, but there is some private-sector interest in investing in mills, which could be used not only for the milling of rice but also the polishing of older rice to improve appearance and retain market value. Overall, there are currently no reliable milling services in Liberia, and the lack of a dependable electricity supply needs to be addressed before further investment in new milling infrastructure can be expected to occur.

D. LOCAL

The local enabling environment in Liberia can be defined by three major characteristics. The first is the local norms and beliefs that drive social, commercial and political networks and behavior patterns. Communal land tenure structures are an important element of these norms. The second characteristic is the effectiveness of key local public goods services that affect quality of life—particularly health and education services. The third is the overall effectiveness of enforcement practices.

Liberian rural communities are primarily subsistence farming communities that rely on friends and family networks to absorb and diffuse risks. This is key to understanding why many in the community have negative reactions to behaviors that are perceived to limit the reliability of individuals with regards to the network. For example, increased individual wealth arising from more commercially oriented agriculture is viewed negatively since it may allow the individual to change his or her role in the community, thus weakening the overall network. Relief work has bolstered this resistance to commercial agriculture by inadvertently promoting farming inputs as public goods to be provided free of charge by NGOs and the government. Similarly, some relief programs have devalued the process of learning and upgrading by paying farmers to participate in agricultural trainings. The combination of traditional risk absorption and relief delivery practices has fostered a rural society that favors social structures as opposed to commercial networks, and risk-averse behavior patterns. This is manifested in a number of ways, including:

- distrust of the private sector and limited or no long-term commercial relationships;
- negative reactions by community members towards any farmers that show independence through upgrading; and
- negative perceptions of individual wealth accumulation.

The second characteristic is the provision of key public goods, including health and education. The health system is improving slowly, but preventative health care services, especially in rural areas, are not easily accessible. The educational system—especially in rural areas—is even more problematic. Education is provided through a top-down system that is imposed on the local population, fostering division between the school (and the Ministry of Education) and the community that causes a lack of ownership by the community. The content is often considered irrelevant to the rural population, as it contains minimal links to agriculture or rural livelihood practices. Agriculture is not viewed socially or culturally as a “business” and is seen as an occupation of last resort.

The third characteristic is the lack of formality in law enforcement throughout the system. While this is not a substantial issue for smallholders, it is a growing problem for small and medium enterprises (SMEs), including the three main input firms that sell to smallholders, the transport industry, and potentially post-harvest services such as milling. For larger, better-connected firms such as importers, the informal enforcement poses less of a problem since these firms use their connections to avoid informal fees. Some input firms indicate that up to a 30 percent fee is paid informally to get their supplies out of the port. Transporters say they are regularly stopped by police without justifiable cause, often resulting in long delays as they negotiate an informal fee to get back on the road. The inconsistency and uncertainty of enforcement tends to be concentrated on the parts of the chain least able to defend their interests or leverage political networks. The result is a growing perception among SMEs and smallholders that the process is biased against them, resulting in shortened time horizons in which they seek to recoup their investment.

III. END MARKETS

The end market for rice in Liberia is primarily defined by imported round grain rice from China, known as “butter rice,” which comprises approximately 85 percent of rice consumed. While butter rice has the largest share in the market, the local preference is for the more expensive parboiled rice, which accounts for about 15 percent of the market. Parboiled rice comes from the United States and from China, though the rice from the United States is perceived to be of higher quality. Domestically produced rice is known as “country rice.” It is short, round and yellowish white, often with black flecks and is easily identified in local markets. Country rice is more important in rural households as a staple food, but can be found in markets surrounding Monrovia for the few urban consumers who seek the porridge quality of the rice. According to the Ministry of Commerce, demand for rice in Liberia is 210,000 MT rice per year; this translates to approximately 5 kg of rice consumed monthly per person. The Ministry of Agriculture, on the other hand, quotes a much higher volume of demand at 400,000 MT per year. The inconsistency in the numbers on rice consumption and production foster some concerns about how to understand or facilitate food security if the information upon which decisions are being made is not of a reasonable level of accuracy.

A. END MARKETS

The principal market for rice is Monrovia, which is heavily dominated by imported rice. Monrovia drives the baseline price of both domestic and imported rice that is distributed to rural areas. The principal public retail markets in Monrovia include Red Light (named for the historical traffic light), Rally Town, Waterside and Duala. The next wholesale and retail links are segmented into geographic aggregation markets outside of Monrovia that include Zwedru, Ganta, Sanniquelle, Gbanga, Tubmanburg, Buchannan, Voinjama and Kakata. These are further broken down into local markets, typically near a group of communities. High-end supermarkets were not observed to carry domestically produced rice. Rural populations first consume local rice and then purchase imported rice if there is money available once domestically produced supplies have been exhausted.

B. RICE CONSUMPTION

The per capita consumption of rice in Liberia is approximately 60 kg per year, compared to the average in West Africa of 19 kg per year. While rice consumption is consistently high across Liberia, the distribution between imported and domestic rice is notable. Imported rice is consumed by high percentages of both urban and rural populations—97 percent and 79 percent of households, respectively. However rural households overwhelmingly consume the domestically produced rice (80 percent), while urban households rely on domestic rice far less (17 percent). This is due to the taste preference for imported rice in urban settings, the availability of imported rice over domestic rice in urban markets, and the lower price for imported rice over domestic “country rice” in the Monrovia markets.

Table 2: Rice Consumption in Liberia, 2007

	Percentage of Households Consuming Rice		Average Consumption for all Households (estimated and converted to US\$ for 2007) ⁴		
	Domestic Rice	Imported Rice	Domestic Rice	Imported Rice	Total
Rural	80%	79.2%	\$216	\$172	\$388
Urban	17.1%	97.3%	\$26	\$305	\$331

Source: Tsimpo, Clarence and Quentin T. Wodon. "Rice Prices and Poverty in Liberia." World Bank Policy Research Working Paper No. 4742. World Bank, 2008; from 2007 Core Welfare Indicators Questionnaire in Liberia Survey

C. CONSUMER PREFERENCES

Throughout Liberia, consumer preferences seem to be driven primarily by price (see Table 3 below), but as wealth is starting to be created in various segments of the urban population, the rice market is beginning to segment towards different quality ranges within the three distinct segments of parboiled, butter and country rice. Country and butter rice are viewed as more suitable for children because of their filling qualities, while parboiled is better suited for adults. Country rice, due to the artisanal nature of processing, maintains some of the rice bran on the grain and fosters the perception that it is more nutritious and is preferred by parents for their children. Country and butter rice are also perceived to be better for porridge as they are easier to break down by manual pounding into a flour-like consistency. To help serve the lower end of the parboiled market, lower-quality and mixed grades of parboiled rice have been introduced at lower prices. There is growing concern among many Liberians about the high starch content in imported butter rice, which is believed to lead to diabetes. As a result, a new variety of low-starch butter rice has been introduced by Group 7 Holding importers.

Table 3: Rice Prices; July 2009 (in US dollars)

Rice Segment	CIF 50kg	Wholesale 50kg	Farm-gate 50kg	Monrovia 50kg	Monrovia 50kg	Retail Market		
						Redlight 50 kg	Bong 50kg	Lofa 50kg
Parboiled (US)	\$30	\$35	-	\$36	\$36	-	-	-
Parboiled (China)	\$30	\$34	-	\$35	\$35	-	-	-
Medium-Grade Parboiled (Various)	-	-	-	-	-	\$53.73	-	-
Low-Grade Parboiled (Various)	\$21	\$25	-	\$25	\$25	\$35.82	\$53.73	-
Butter (China)	-	-	-	-	-	\$35.82	\$35.82	\$35.82
Low-Starch Butter (China)	\$26.50	\$30.50	-	\$31.50	\$31	-	-	-
Country Rice (Bong)	-	-	\$26.87	-	-	\$44.78	\$35.82	-
Country Rice (Lofa)	-	-	\$26.87	-	-	\$62.69	-	\$35.82

Source: Collected by Authors in Liberia, August 2009

D. MARKET TRENDS AND DEMAND

Based on local interviews, the trend appears to be moving away from traditional butter rice towards lower- and medium-grade parboiled (more broken pieces, black flecks, mixed varieties of rice, etc.) and low-starch varieties of

⁴ Household averages (not individual) collected during the 2007 CWIQ survey and extrapolated by the authors in: Tsimpo, "Rice Prices and Poverty in Liberia." Monetary estimates were originally in Liberian dollars, converted to US dollars with an average exchange rate in 2007 of LBD 67= US \$1.

butter rice. However, butter rice still comprises the majority of the rice consumed in Liberia. Traditional country rice still has an important role in rural markets and is the first source of rice for rural smallholders. The number of rice importers has been increasing as the GoL has relaxed requirements for import licenses. With the increase in the number of importers, there are recent increases in market segmentation and a trend towards specialization of importers in specific segments.

E. RICE IMPORTS

The number of importers of rice is increasing despite the national campaign to increase local rice production. The market to import rice is open, but according to one importer, it can only be a profitable business for two or three importers due to the small national market in Liberia and low population density. Any business in Liberia can import rice as long as they follow the established process: i) register as a local business, ii) submit a letter to the Ministry of Commerce indicating the desire to import rice, the quantity, source, grade and price, and iii) provide an invoice or proof of ownership of a shipment. There are currently five licensed importers of rice: Fouta Corporation, SDTM, Abranata and Sons, Harmony Trading Ltd., and Group Seven Holding. Melan Inc. applied for a license in May 2009, and approval is still pending. Fouta Corporation is the largest importer, currently controlling 50-55 percent of the import market, and aiming to increase that share to 60 or 70 percent. According to an interview with a representative of Fouta, the company currently imports approximately 210,000 MT annually. As noted above, import statistics are inconsistent, with the GoL reporting official import numbers and individual importers suggesting higher numbers. The inconsistency can partially be attributed to annual volumes anticipated by importers that the GoL has not factored into projections. The second leading importer is SDTM, which is actively trying to get ahead of the growing market segmentation by bringing in a range of parboiled qualities from various sources.

Table 4: Liberia Rice Imports by Product, 2001-2007

Product	2001		2002		2003		2004	
	Volume (MTs)	Value US\$	Volume (MTs)	Value US\$	Volume (MTs)	Value US\$	Volume (MTs)	Value US\$
Paddy	0	0	0	0	0	0	200	181
Brown Rice	2143	599	18	12	23	17	5689	843
Milled Rice	89911	15130	68300	12097	0	9654	173286	30224
Broken Rice	3479	729	100	22	557	148		3887
Total	95,533	16,458	68,418	12,131	580	9,819	179,175	35,135

Product	2005		2006		2007	
	Volume (MTs)	Value US\$	Volume (MTs)	Value US\$	Volume (MTs)	Value US\$
Paddy	698	639	544	518	1	1
Brown Rice	72	35	57	34	3004	1277
Milled Rice	0	36189	206885	49651	145723	34228
Broken Rice	0	122	93	20	35	12
Total	770	36,985	207,579	50,223	148,763	35,518

*Value in US\$1,000s

*Milled rice includes semi-milled and wholly milled rice as well as both polished and unpolished.

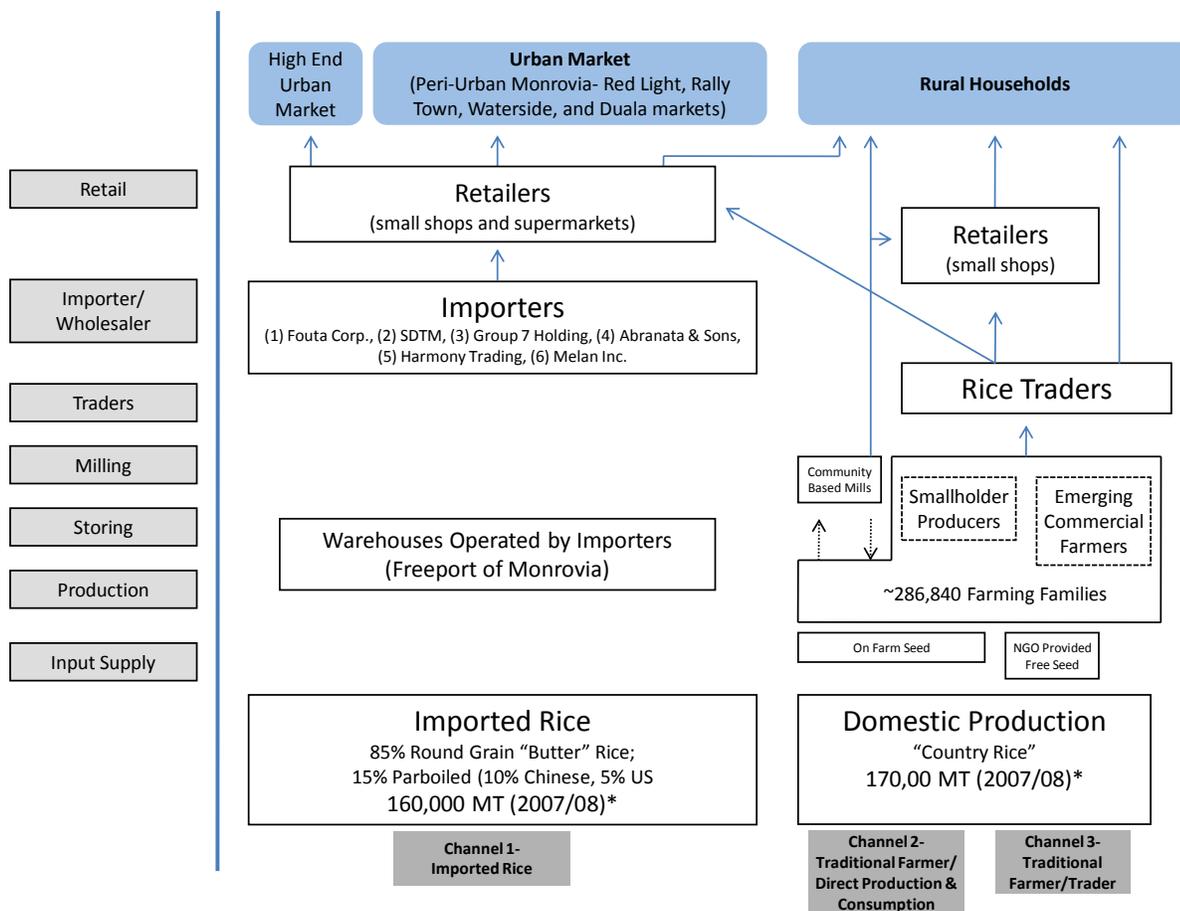
Source: International Trade Center calculations based on COMTRADE data; accessed using TradeMap, www.trademap.org

IV. CHAIN ANALYSIS

A. STRUCTURE OF THE RICE VALUE CHAIN

I. VALUE CHAIN MAP

Figure 1: Liberia Rice Value Chain Map



*Imported rice figures for 2007/08 include both traditional imports and food assistance. The numbers are based on statistics officially recognized by the GoL in the 2009 LNRDS

2. VALUE CHAIN ACTORS AND FUNCTIONS

The value chain for rice in Liberia is not overly complex and is dominated by importers and their distribution channels. The main actors in the value chain are importers, wholesalers, traders, local farmers and retailers. The main functions of the value chain for domestic rice are production, harvesting, storage, milling, wholesaling and retailing.

Importers, Wholesalers and Distribution: With imported rice dominating the volume of rice in the chain, the primary flow of rice is from the Freeport of Monrovia, to the warehouses of the importers/distributors, from where it is sold to licensed retailers for national rice distribution (See Figure 2 below). The importers are also the principal wholesalers of rice, who are required to sell only to retailers that can prove they have received a rice dealership license from the GoL; licenses are renewed annually.

Figure 2: Map of Distribution Channels for Imported Rice, 2007



Source: “Comprehensive Assessment of the Agriculture Sector (CAAS-Lib)—Volume I Synthesis Report,” 2007

Production: The domestic production of rice is informal, with smallholders often producing just enough for their family network and selling any excess on the local community market. According to commercial input firms however, and verified through discussions with farmers, there is an emerging segmentation of farmers into emerging commercial, entrepreneurial and subsistence farmers.

Full-scale commercial production of rice is still not operational in Liberia, although there are current investments underway to develop commercial rice production. The most notable is the African Development Aid (ADA) project in Lofa County, partially funded by the Government of Libya. The newly registered “Liberian Rice Development Corporation” is also looking for opportunities in commercial rice production, as are a couple of the current importers of rice in Liberia, but they are waiting to see incentives from the GoL, such as duty-free agricultural machinery, input supplies and tax holidays, as well as signals from the government that the enabling environment will be supportive of a private, commercial operation in Liberia.

Millers: There is minimal milling of rice in Liberia, with virtually all domestic production being milled either by hand or with portable mills which have been randomly distributed throughout the countryside by donors. There are plans to rehabilitate state-owned mills through a WFP “Purchase for Progress” program (see above under Physical Infrastructure), but the overwhelming majority of domestic rice that is currently being milled is through the portable mills or by hand.

Wholesalers: The principal wholesalers of rice are also the importers, who sell directly to retailers or have their own distribution networks to the counties outside of Monrovia. Some traders also function as wholesalers who in turn retail rice in the local informal markets, but they concentrate on domestic and not imported rice.

Traders: Traders serve a key role in bringing domestic rice to regional markets within Liberia. Typically, they travel to remote rice growing regions (usually an area where they have historical connections) and purchase rice from local farmers, either milled or paddy. They bring domestic “country rice” to the regional markets of Red Light, outside of Monrovia, and the county markets of Zwedru, Ganta, Sanniquelle, Gbanga, Tubmanburg, Buchanan, Voinjama and Kakata. The wholesalers of importer rice in Monrovia sell directly to retailers who will either contract transportation services directly or supply their own transportation.

Input Supply: Seed rice has predominately been distributed for free by donors and NGOs, which has discouraged commercial seed demand. There are three seed companies in Monrovia—T.R Enterprises, Inc., Green Farming Inc., and Anarco Trading Enterprises. More common in the stores is the sale of vegetable seeds, which are viewed as having a higher return on investment. In addition, farmers have been hesitant to pay for new varieties of rice seed because of bad experiences with the poor quality of some donated rice seed. Retail prices in May 2009 for rice seed varieties LAC 23 and Suakoko 8 were approximately \$18 per 25 kg bag.

Fertilizer is nonexistent outside of Monrovia due to high costs, lack of availability and weak technical knowledge in application; and there are minimal supplies in the capital. Urea, Triple Super Phosphate (TSP) and 15-15-15 were the only fertilizers observed in Monrovia, with a cost of \$60 per 50 kg bag, regardless of the type of fertilizer. The commercial 50 kg sacks have also been broken down and repackaged in smaller sizes of 25 kg, 5 kg and 1 kg. While the duties on the import of seeds and tools were removed in April 2009, they still exist for fertilizers (7 percent) and pesticides.

B. SYSTEMIC CONSTRAINTS IN THE VALUE CHAIN

I. BEE CONSTRAINTS TO THE FUNCTIONING OF THE VALUE CHAIN

The business enabling environment affects the value chain in multiple ways and at all levels. The overall chain is simple, but inefficient. The GoL and donor community are the principal drivers of the enabling environment, with the private sector exerting minimal influence and the informal sector more active in local community markets. The key drivers at present are smallholder perceptions of rice as a safety net crop and the government reinforcing this notion by sending signals such as the announcement of investments and efforts to keep prices low. The government influences the value chain through direct interventions, including direct and indirect price controls, indirect control of the seed rice industry, and planned direct investments in milling.

A small number of smallholders do produce a smaller second field of rice as a cash crop or security for the first field, but the practice is not common. The land and labor required yield higher returns on cash crops such as cocoa, palm oil or rubber. The preference has been towards working in upland rice, which is the traditional method of producing rice, but the GoL, donor community and NGOs are promoting a shift towards higher-yielding irrigated rice. While it is widely understood that lowland rice is higher-yielding, there is smallholder resistance to adopting the practice due to:

- perceived additional labor requirements;
- perceived need for specialized inputs to establish and maintain lowland rice, such as elaborate irrigation systems, rubber boots, specialized tools, etc.; and
- fear of disease from exposure to working in flooded rice tank.

Negative feedback is often directed at individuals and communities that challenge the status quo. Although private-sector education and promotional campaigns delivered through input firms, buyers and community leaders could limit the negative feedback and even fostering positive feedback for wider change, such a strategy has yet to be applied in the Liberian context.

The lack or poor condition of infrastructure is a considerable constraint in the value chain, including damaged feeder roads, abandoned, inefficient or under-utilized mills and warehousing in varying degrees of disrepair. Domestic producers and traders often cite the poor condition of roads as a major obstacle to the flow of rice from production areas to community- or Monrovia-based markets. The unreliability of transportation due to poor road conditions often prevents surplus production from being brought to market and makes it difficult to deliver inputs to production areas.

2. CONSTRAINTS TO ACCESSING END MARKETS

The end market for rice in Liberia can be defined by three channels. The first is the high-end urban channel seeking high-grade international rice or imported specialty rice. It is not feasible for rice producers in Liberia to target this segment in the near to medium term because the benefits of meeting market requirements do not justify the costs.

The second market segment serves the low- and mid-range urban population, and could present a medium-term goal for Liberian rice producers. It is a growing segment and represents rice that can be produced and delivered by local producers.

The third market segment is rural market demand. Rice volumes supplied by rural producers are currently insufficient to satisfy this demand. Meeting the needs of the rural population by upgrading basic production is the near-term goal of the local rice industry. In addition to a lack of seeds and labor, which were commonly cited constraints to rice production, post-harvest losses have been estimated at between 40 and 50 percent (see Table 5, next page). Most farmers acknowledged that they do not receive regular visits from extension agents; however they tend to focus on the causes of post-harvest losses as a major constraint to production rather than a lack of extension services.

Table 5: Prevalence of Reported Major Causes of Post-Harvest Losses in Rice Production by Region

	Grand Cape Mount, Bomi and Grand Bassa	Lofa, Bong and Nimba	Maryland, Grand Kru and Grand Gedeh
Rats/Mice	87%	93%	87%
Birds	14%	33%	34%
Poor Storage	20%	14%	32%
Human Theft	2%	1%	5%
Bird Attacks	95%	89%	91%
Threshing	76%	66%	94%
Pounding	89%	69%	92%

Source: “Post Harvest Crop Assessment—Liberia: Rice and Cassava.” Ghana: ITTAS Consultancy Ltd, August 2008

C. VERTICAL AND HORIZONTAL LINKAGES, GOVERNANCE AND INTER-FIRM RELATIONSHIPS

I. VERTICAL LINKAGES

In contrast to other crops that have rebounded quickly in post-conflict Liberia, such as rubber and palm, the rice industry has languished due to substantial gaps in the input, production, post-harvest, processing and aggregation functions. There is little private investment, and as a result the vertical relationships that have formed are short-term in nature and driven by opportunistic (“zero-sum”) negotiating perspectives, leading to a high degree of distrust between value chain actors. Since so few commercial processors, millers or retailers are dependent on local production, there are limited economic incentives for developing longer-term, more trusting relationships in the domestic rice value chain.

The one set of relationships that could foster greater smallholder production is the inputs industry. The GoL and donor community have indicated that upgrading of the inputs industry is a priority as means to increase smallholder productivity. The non-rice seed industry is primarily a retail distribution network that delivers products, services and knowledge to its clients. It is very weak, with only a few formal firms active and a range of local informal traders selling via local markets to smallholders. While donor programs continue to provide free inputs to many smallholders, the commercial inputs industry is also selling products, primarily fertilizer and crop protection products, to farmers. Poor record keeping makes exact amounts difficult to ascertain, but input firms have noted that rice producers purchase very little seed, fertilizers or pesticides. The fact that there is an established foothold (albeit small) in the smallholder market is a critical entry point for further commercialization. Input firms have the potential to sell services in addition to products, particularly post-harvest services such as post-harvest crop protection, improved storage and processing via mobile mills.

The GoL is interested in promoting the development of the seed industry, but not by offering incentives for investment and a reasonable enabling environment. Instead, it provides funding for two NGOs and one commercial firm to grow seed rice for eventual sale, although the specifics on how the retail distribution will work are unclear. This sends a signal to the private sector to stay away, and this will likely slow the development of critical linkages to input distribution networks. This could evolve into a major constraint, as smallholder adoption of improved seed varieties is critical to their ability to increase yields without much additional improvement in on-farm practices.

According to farmers, the traders working through the local markets called “gobyeshops” (pronounced as if it were Gorbachev) are perceived as using exploitative negotiation tactics. The gobyeshops do have a strong organizational structure with a clear hierarchy that at times leads to informal collusion on pricing. However, the traders work in multiple crops (rice is a relatively small part of their business) and prices are widely known. It is therefore unrealistic that they would have much interest or ability in being overly predatory. The lack of trust in these relationships is in part a result of farmers’ poor planning and production practices that make them desperate to sell at harvest time. There are few quality requirements that result in price differentials and there are almost no quality-differentiated market channels.

According to the main importers, imported rice flowing into Monrovia and then filtered into the countryside seems to flow smoothly with organized margins. Importers interviewed did not have any specific relationships issues with their distribution networks, but they did say they do not monitor much past the first layer of transactions. In any event, the importers indicated that most imported rice (about 70 percent) stays in Monrovia.

2. HORIZONTAL LINKAGES

In some communities, Liberian farmers have revitalized traditional forms of cooperation, primarily to manage labor shortages that are tied to slash-and-burn extensive agriculture practices. These informal forms of cooperation could be harnessed to reduce transaction costs around the purchase of inputs and the marketing of production. Any efforts to this end should consider local preferences for or against cooperation. In some communities, cooperation during commercial transactions is seen as problematic as people do not want others to see how much money they have to invest. For example, farmers will often buy multiple small volumes of inputs from input firms, so that others in the community do not see them making large purchases.

Donors and government are promoting the formation of formal cooperatives, initially by revitalizing pre-war cooperatives. This presents a number of potential concerns. First, the formalization process is often driven by a need to access assets and resources, creating an unsustainable driver of cooperation. The WFP with the GoL have established rules where only selected formal cooperatives that have registered with the Cooperative Development Agency can access the Purchase for Progress program. The process is distorting incentives in the market place via political favoritism for these farmers over others and the potential for GoL and WFP to send unintended price signals. The second concern is about the process donors follow in cooperative formation. Specifically, many donors push cooperative organization in order to balance power between farmers and traders or input firms. The key problem is the perception of these firms as adversaries to farmers that is driving how commercial relationships are formed and conducted. The purpose of cooperation is to deal with specific joint issues such as mutual labor shortages and possibly creating interest among buyers and input providers to invest in and establish more effective relationships with the farmers. At present, many government and donor activities are not driving effective cooperation.

However, there is a donor effort to assist input firms to foster cooperation by using community members to act as agents. The village agent organizes purchases of inputs on an individual basis, but presents them to the input firm as a bulked order. The village agent receives a commission for this bulking service. While only in the initial stages, the process presents an alternate way for cooperation to be achieved without a formalized farmer organization.

Transporters cooperate fairly well through their union, but other actors in the value chain need to learn how and when to cooperate. For example, input firms face problems in the port's informal application of rules, but they have not worked together to present a united message that could carry more weight. The private sector in general is not engaged as a group to counter policies that might limit their opportunities, such the government's investment in mills.

D. SUPPORTING MARKETS NECESSARY FOR UPGRADING

Support markets in Liberia are generally very weak with limited depth and capacity to provide anything but the most basic services and products. The key support services for rice and the broader agricultural sector can be grouped into finance, cross-cutting and sector-specific services.

I. FINANCE

The financial sector in Liberia is primarily made up of banks and insurance companies. A few donor-supported microfinance organizations are active, but at present they focus on solidarity-based lending and have not scaled up, making them less immediately relevant to economic growth. There are large regional banks that have entered the market, such as Eco Bank and the United Bank for Africa (UBA), but they are starting cautiously with regard to commercial lending. Banks in general are very liquid and have limited opportunities to place their funds. Most if not all the excess liquidity is short-term, so longer-term investments are not advisable. Understanding of agriculture, including the terms appropriate for agricultural businesses, is almost nonexistent in the banking sector. The link between the financial sector and the equipment industry is also nonexistent. Leasing is on the agenda of most banks,

but not available to SMEs. Micro-leasing tied to equipment dealers may present a way to engage microfinance organizations in more commercial agricultural activities, but would require further upgrading of microfinance institutions.

Insurance companies are active in the market, but offer only basic products. Crop production insurance, warehoused crop insurance and other types of agribusiness insurance products are not available. If such products were available, it is unclear if the market could support them as there are only a few fully commercial agribusinesses and only one in the rice sector (the Libyan-supported commercial rice concession ADA). Over the longer term, as commercial production, milling and storage scale up, these types of products will become important. Liquidity in the insurance industry is likely to be high and represents a possible near-term source of capital for commercial ventures.

2. CROSS-CUTTING

ICT is an important sector and is growing primarily through mobile phone services. Linking this industry to the agricultural sector is important. The key is to make the link commercially viable and appropriate for both sides. Immediately, leveraging already active technology such as community radio or SMS to increase the flow of market, production and technical information would be useful. In the near to medium term there is potential for the financial sector to use ICT for mobile banking services for the unbanked, and both sectors are interested in this prospect. Commercial radio is a popular and widely used tool that reaches a broad audience in Liberia, both in peri-urban areas as well as in the remote countryside. The stations and programs could be an efficient means to extend broad-based and specific market information. Legal services are another cross-cutting theme that will eventually play an important role in the agricultural sector as commercialization evolves. In particular, legal service in the area of alternative dispute resolution is of growing importance and will be critical for SMEs entering the rice industry. The informality and cost in terms of time delays in the courts is an issue according to non-agricultural firms, and this is likely to affect agricultural firms once the pace of commercialization increases—and with it, corresponding contracts, agreements and disputes. Legal services are also potentially important in regards to lobbying efforts, which will be an increasingly important component of a commercial agricultural sector and thereby the rice industry.

Transporters seem to be relatively organized as a service sector, with two major voluntary unions coordinating this services market. Pricing transparency and limited concerns expressed by farmers and traders indicate that while efficiency improvements could be made, there are no major relationship issues with transporters. Transport is mostly controlled by a combination of traders and transport unions, giving farmers the option to organize transport separately or include it as part of the transaction if the sale is made to traders at the farm gate. The result is that, despite the bad reputation of traders, choice within the transport system limits how aggressively they can apply their predatory practices.

3. SECTOR-SPECIFIC

At present, equipment dealers are not actively selling to Liberian farmers because donors dominate the client space, crowding out other clients in terms of size of order and perceived reliability of payment. As a result, many of the equipment dealers are not building distribution and service networks. Even the few donor programs that are focusing on building an equipment supply chain are doing so based on artisanal blacksmiths that are not scalable or reliable for replacement parts as their ability to make uniform components is minimal.

V. OPPORTUNITIES AND INCENTIVES FOR UPGRADING

A. ENABLING ENVIRONMENT UPGRADING

While there are many challenges facing Liberia, the relational and institutional structures, including the formal and informal rules that drive behavior, are not yet calcified with vested interests. The fluid state of the political, economic and social fabric of the country will remain to an extent as long as donors and the UN continue to be important components of the enabling environment. The substantial public goods roles that they are directly taking on further destabilize the situation as they foster uncertainty by shielding key ministries from taking responsibility and by devaluing the importance of the private sector in developing wealth and associated tax revenue. The GoL has stated its intention to take on more of these roles and try to coordinate areas that it cannot at the moment take on. The GoL's interest in expanding its role presents an important opportunity to upgrade and improve the stability of the business enabling environment.

Policy is not static: it is a process of participatory formation around an objective, public education, implementation and enforcement, monitoring and oversight. Liberia's current focus on specific written policies as a solution at the expense of the other components of the process leaves the overall policy system unable to adapt effectively. Economic and particularly agricultural policy that is designed to foster development needs to be adaptive and resilient when dealing with the fast-moving dynamics of the local, national, regional and global enabling environments. Opportunities exist to upgrade the business environment in the following ways:

- develop transparent and open stakeholder networks
- develop public education processes and channels to inform and empower firms and farmers with knowledge of the rules and their rights
- invest in enforcement capacity, including strengthening incentives that drive enforcement practices
- invest in oversight and management capacity, including transparent and clear performance-based incentives
- invest in the monitoring and assessment capacity of industry associations, civil society, research organizations, independent media and governmental organizations to ensure effective checks and balances of interests

Ineffective Public Goods and Market Signals

Whether intended or not, the current enabling environment has made the private sector and rural communities highly susceptible to signals sent by government and donors. Emerging from a relief-dominated economy, private firms and farming communities remain dependent on either the short-term petty trading of goods or donor programs to generate income. Broader and more sustainable economic growth requires a greater emphasis on developing productive and other private-sector industries that can add value and create wealth. Donors and the government continue to send controlling and distorting signals either directly through their actions (i.e., free inputs, purchasing output, investing in government rice mills, etc.) or indirectly through the proposed setting of a price range for seed rice, setting the margins on imported rice, and pushing specific organizational structures such as cooperatives to access public goods services. Such signals crowd out the private sector, foster continued reliance on unsustainable structures—including donors, the WFP market, government mills, etc.—and devalue investment in upgrading.

- develop the capacity of industry stakeholders to present their issues and concerns to government in a constructive and effective way
- link all stakeholders into the transparent and defined policy assessment and adjustment processes

SPECIFIC POLICY PRIORITIES

One of the major challenges the government faces is fostering private investment in the agricultural sector, including the rice industry and support markets. The main policy priorities to strengthen the private sector should include the following:

- increasing the efficiency and transparency of the processes for starting and operating businesses
- developing clear and transparent incentives for private investment including foreign direct investment via taxes, development of a one-stop shop for investors, and clear guidelines on current regulation
- shifting from interventionist practices to providing regulatory and oversight frameworks that allow commercial networks to form and flourish—focusing on input, seed and agro-processing industries
- improving enforcement mechanisms and practices, including credible mechanisms for commercial entities to communicate improper or inconsistent enforcement practices
- establishing a clearer policy and oversight framework for linking quasi-public research entities and commercial distribution entities for both inputs in general and post-harvest practices. Research would not be exclusively on new seed varieties, but also include the use of a wide range of inputs and post-harvest practices
- increasing the pace of infrastructure investments focusing on roads, utilities, water, electricity and ports
- improving the relevance and capacity of the educational system at all levels to the commercial agricultural sector through content, practices and engagement with commercial entities
- improving judicial processes, especially for commercial disputes (e.g., contract, credit defaults, etc.) including the emergence of guidelines for alternative dispute mechanisms

B. INDUSTRY-LEVEL UPGRADING

Poor relationships in the value chain have resulted in a high percentage of subsistence-based production and limited upgrading. They have encouraged exclusively price-based competition and the emergence of a vested trading class that controls much of the trade passing through the rural production channel to the poorer mass market channel. It is critical to leverage the changing urban consumer patterns to foster multiple channels with more appropriate governance structures as a means of changing incentives and pressuring value chain actors to upgrade. This can be achieved by the following:

- **Facilitate directed channels.**⁵ For local production to compete in the emerging market channels, investments will be required in seed varieties, other inputs, grading, storage and processing. The current market system does not have the capacity or incentives in place to invest or upgrade as required. Competing in these segments will require new stakeholders to invest in the processing or production sides of the rice sector. However, they will need to rely on or supplement their own production with smallholder production, and will therefore need to manage a smallholder supply network. Strong commercial incentives such as the ADA rice concession investment may be leveraged for this purpose.

⁵ In directed channels, small-scale producers are dependent on a much larger buyer that often wields a great deal of power and control and closely monitors the entire production process. In such channels it is common for the larger firm that “directs” the producers to provide technical assistance; such buyers may (or may not) also provide inputs, credit, transport or other services.

- **Facilitate a more competitive inputs industry.** Fostering directed channels is critical, but will take time as the returns on investment are currently unclear and potential investors are therefore wary. Upgrading the inputs industry, however, would have an immediate effect on production—including that of subsistence farmers. The inputs industry at present is very weak, and an upgrading strategy should focus on encouraging a shift from extensive to intensive farming through the use of improved inputs and farming practices to maintain soil fertility and increase productivity.
- **Foster channel-to-channel competition.** Upgrading the general market channel with the vested trader class and subsistence farmers that are unlikely to transition to commercial rice production will be difficult in the near to medium term. The process of aggregating product is incremental, and economic and social incentives are often at odds. When new channels emerge with different relationships (such as directed channels), support will need to be provided to those smallholders who attempt to shift from subsistence to commercialization. This may be achieved by assisting firms with outgrower networks, trader/broker representatives of such firms or processors to reach out to these emerging commercial smallholders with a package of embedded services and a guaranteed market. Through competitive pressure, upgrading in the new channel is likely to also drive upgrading in the general market channel over time.
- **Facilitate commercialization through growth.** Fostering directed channels, upgrading the inputs industry, and encouraging competitive pressure on the general market channel to upgrade will result in a range of opportunities to increase the pace of commercialization. Two critical benchmarks in the commercialization process are shifting the balance from extensive to intensive farming of rice cultivated through new investment and individual farm upgrading, and multiple harvests per year from irrigated and mechanized farming practices.
- **Facilitate more effective support markets.** Finance and ICT are particularly important support markets, but they can also distract from more important relationship or incentive-based constraints. Finance in the near term needs to be focused on alleviating liquidity problems for actors in the chain that can drive productivity gains and upgrading—actors such as equipment suppliers, services providers, processors and possibly larger firms (through trade credit). Smallholder input credits should not be the focus in the near term unless directly linked to an assured market through a directed relationship. Input credit for smallholders without the pressure to shift beyond subsistence farming practices is likely to result in increased risk to all involved without the required gains to cover the risks.

C. OPERATIONAL UPGRADING

The rice industry has numerous operational challenges. Many, though not all, can be eased through public goods infrastructure investments and enabling environment improvements. The most immediate concern is the high cost of production due to weaknesses throughout the chain. Specifically, efficiency gains are needed in the areas discussed below.

1. Inputs industry

The inputs industry requires upgrading at all levels, including building a viable wholesaling function, retail distribution networks, and services and equipment aspects of the industry. The industry must also develop promotional campaigns that educate farmers about the needs for and benefits of inputs. Distribution networks must directly link into rural communities in order to leverage the emergence of local service markets for spraying and tillage/land preparation. Inputs providers must shift their business model from one of maximizing margins per unit to one of increasing the number of clients reached and products and services sold. This change in business model will require:

- distribution networks (people) at first, with physical outlets (bricks and mortar) following once significant volumes are being sold;
- marketing and promotional efforts based on farmer education;
- expansion outside sizeable towns that is based on ordering point—with orders made or paid for in advance, where possible, to reduce risks and costs and foster the rapid growth of the inputs sector;
- shift inventory, marketing and sales tactics to meet the financial flows of smallholders;
- provision of services for chemical crop protection;
- delivery and sales tactics that bundle services and products; and
- changes in management structure to facilitate responsiveness to customer trends—including decentralization and mid-level management development.

2. Seed industry

The seed industry for rice is just emerging. The link between research and commercial production and distribution needs to be facilitated within a viable and appropriate certification oversight process. While this is a critical role for government, the production and distribution functions should not be driven or controlled by donors or government, as is currently being proposed.

3. Production

On-farm production must be weighted toward commercial production that focuses on SMEs rather than solely on large, concession-based schemes. Active commercial entities such as importers, buyers and traders and emerging commercial smallholders should be supported in facilitating or engaging in small- and medium-scale commercial production. The investment and knowledge flows needed by farmers to upgrade should come from input firms, emerging commercial farmers in the community, and buyers (trader and brokers), as well as through outgrower schemes. It should be through these relationships that the GoL and donors provide support to smallholders. Through these commercial networks, subsistence farmers will be able to identify and move through a series of incremental, low-risk steps toward becoming more business-oriented and productive. As a result of this process, subsistence farmers will be able to produce enough rice to meet their subsistence needs, which will then allow them to move quickly into a range of commercial crops for wealth creation purposes. Some farmers will choose to further expand their rice production for commercial purposes.

4. Transportation

Transporters are relatively well organized, but more can be done to improve efficiency and harmonize local transport patterns with the prioritizing of market infrastructure for upgrading. For example, the Red Light Market combines wholesale and retail and is situated almost directly on the main transport road between the high-production areas and Monrovia. The movement of commercial trucks through the market place is slow and dangerous. There are plans to move the market, but it will be important to engage transporters in the discussions and decisions on market infrastructure.

5. Aggregation

Aggregation must be closely linked to transport, but opportunities also exist to introduce new business models that shift the incentives from adversarial transactions to alliance-based transactions. At present, there are no uniform quality standards and price premiums are not given for higher quality produce; thus there is no incentive for farmers to upgrade production. Shifting incentives to strengthen cooperation, especially at the aggregation levels, via brokerage services or more directed channels is critical. Although this shift is likely to be a longer-term effort, since it requires engaging many vested interests that are likely to take time to change, as a starting point, traders should be engaged to assess their interests in moving to brokering services or more transparent buying practices.

6. Post-harvest services and processing

Building reliance on public funds for scaling up post-harvest handling and processing capacity will ensure on-going inefficiency and limited outreach as public funds are scarce and there are substantial competing demands for them. At the same time, the private sector will not enter a market where signals imply that the government wants a monopoly or at least an active role as a direct service provider. While this situation would be a disaster for the rice industry in any country, it is especially problematic for Liberia, where post-harvest handling and processing accounts for up to 50 percent of losses. Improving efficiency in these areas through new private-sector investment would substantially improve food security and help stimulate the commercialization of the rice industry. Larger processors can be encouraged to enter the market through interventions that facilitate finance, organize directed supply chains, provide linkages to input firms and assist with marketing and branding for urban markets. In addition, with appropriate assistance, opportunities exist for smallholder organizations, input firms, processors and buyers to develop post-harvest services, such as threshing and parboiling, and appropriate storage facilities.

7. Finance

Finance needs to be commercially driven and targeted to the functions and relationships in the value chain that will bring the greatest upgrading (returns) to the industry. In rice, the actors with the greatest upgrading potential are the inputs industry, including equipment and service suppliers; the emerging and existing commercial producers seeking to mechanize; and entrepreneurs intent on launching milling, storage, processing and/or marketing businesses. Of course, efforts should target not only rice farmers, but also those producing other crops. Opportunities exist for finance to go beyond credit to push savings and planning (insurance) services for smallholders and to foster the monetization of rural economies via ICT-based transaction services. Equity and bond mechanisms (especially for SME commercial ventures) have the potential to attract the excess liquidity in insurance companies and pension funds, as well as drawing in international social investors.

8. Information and Communications Technology

There are opportunities to incorporate ICT into building chain efficiency: in particular, scaling up and expanding the use of short message service (SMS) technologies to create more dynamic information exchanges, and electronic transaction, town-transfer⁶ and payment services.

D. PRODUCT AND BRANDING UPGRADING

The rice end market is starting to segment around starch content and quality. The complexity of this segmentation is likely to continue as local production increases and new seed varieties enter the input market.

Branding opportunities for Liberian rice are limited and will remain so until the efficiency challenges are overcome. As efficiency improves, there are two branding opportunities. The first is for country rice, which is becoming increasingly important as a source of food for children. Value chain actors can build on the perception that country rice is particularly good for children because of its high starch content.

The second is a longer-term goal and exists in parboiled rice—the demand for which is growing, according to importers. Since there is also increased segmentation by quality among middle-income urban dwellers, local rice production could potentially take advantage of these two trends. If parboiling capacity can be increased—which will require substantial investment—there will be multiple opportunities to establish brands of parboiled rice based on variations in quality. Marketing around support for Liberian local rice can be leveraged to advance both of these branding opportunities.

VI. STRATEGY

The Liberia rice industry is nascent and unable at present to meet the demand from urban populations, and at times even to cover basic rural family needs with subsistence production. The many short-term, opportunistic trading relationships are not effective in fostering upgrading at the farm or processing levels. Furthermore, these weak relationships are supported by an ineffective enabling environment that fosters uncertainty and encourages a short-term mind set. The result is that for the Liberian rice industry to upgrade and begin to compete effectively with imported rice, there will have to be a transition to commercially based relationships from the input to the retailing and branding of local production. The challenge is how to balance substantially speeding up this commercialization process while supporting the slow upgrading process of rural subsistence farmers to ensure that they are more consistently able to provide for their own needs. These are not mutually exclusive goals, as in the long run a competitive rice value chain will provide food security, but in the near to medium term the commercialization process will need to focus on fostering commercially oriented investments that are not likely to be driven by or even include subsistence farmers.

The strategy outlined below is designed to achieve this dual track by i) incorporating, where possible, smallholders that demonstrate a willingness to upgrade and commercialize, and ii) lowering the risk for subsistence farmers to take on manageable upgrading steps via improvements in the inputs industry. The strategy is built on the upgrading opportunities discussed in the previous section—in the enabling environment, at the industry level, throughout the functions of the chain, and with the product and its branding.

A. VISION FOR THE VALUE CHAIN AND FOOD SECURITY

In the near term the vision for rice will include ensuring that smallholders consistently produce enough rice to fulfill household needs, thereby enabling them to increasingly enter commercial production of a range of crops, including rice. Commercial production by a range of firms and farm sizes will substantially increase. Private investment will build post-harvest milling, storage and processing capacity. The inputs industry will grow and develop distribution networks directly into rural communities, and support markets will emerge in support of key growth segments. However, the vision for rice must fit within the context of a broader competitive agricultural sector. Therefore, the longer-term vision is a rice industry that is part of a diversified, competitive and adaptive agriculture and natural resource sector that delivers broad-based wealth creation.

B. VALUE CHAIN COMPETITIVENESS STRATEGY

A value chain competitiveness strategy for rice must start with near-term goals, but be implemented so as to establish a platform for the longer-term competitiveness of the broader agricultural sector. In order to accomplish this, the rice value chain upgrading strategy should focus on increasing commercial production and encouraging private-sector investment throughout the chain at all functional levels. Much of this can be done by leveraging the incentives and activities of existing actors—importers, smallholders taking on commercial practices, input firms and other businesses—to encourage or facilitate the entry of others actors (including foreign investors) into the value chain.

Linking smallholders to more directed channels where possible should be a priority to establish reliable supply chains that include effective vertical relationships resulting in ongoing upgrading. Linking service market opportunities for

⁶ A town-transfer service refers to an urban-to-rural or rural-to-urban transfer of funds. Town transfers can promote urban-to-rural remittances, potentially reducing the need for sales of assets in order to access cash.

production and post-harvest services into these directed channels will be critical to increasing the pace of commercialization.

Subsistence smallholders will not be the drivers of the industry's commercialization process, as their transition to more commercially oriented farming practices will take place over a longer period and should not be focused solely on rice. The near-term focus for smallholders in terms of rice will be to facilitate their ability to more easily and consistently meet their basic food requirements by linking them to more competitive and growing input and seed industries. As commercial networks evolve and the number of smallholders that move beyond subsistence farming grows, the links established by the early-adopting commercial smallholders can be used by others in the community that want to increasingly commercialize their agricultural production.

C. UPGRADING TRAJECTORY

The main initial indicators of success in moving this strategy forward include the following:

- input firms have direct distribution links into smallholder communities via formal commercial relationships
- educational promotional events are conducted by input firms
- smallholders increasingly invest in their farms, as measured by the purchase of inputs
- localized private spraying services emerge
- localized post-harvest services—especially threshing, drying and spraying—emerge and are linked to commercial input firms
- private investment in milling and storage services increases
- the market for imported rice is increasingly segmented
- a higher percentage of local rice is produced on commercial farms
- smallholder yields increase
- rice producers increasingly use mechanized land preparation
- directed channels for smallholder rice production emerge
- government implements transparent and participatory policy cycles
- government and donors signal a move towards improved management of public goods
- conservation practices (and reduced extensive farming practices) are increasingly applied
- income from rice and non-rice crops increases
- commercial finance enters the services and processing functions
- investment are made in ICT and ICT is used to foster knowledge flows and communication and decrease transaction costs

VII. RECOMMENDATIONS FOR USAID

A. IMPROVE THE POLICY PROCESS AND BETTER MANAGE MARKET SIGNALS

At the national level, the focus should be on addressing the practical weaknesses of a poorly formed and implemented policy process cycle. The importance of rice can be leveraged to introduce or strengthen many of the missing or weak components of the cycle. As part of this process, substantial capacity building is needed at the upper, mid and lower levels of government to understand the importance and dangers of unintended (or even intended) signals to the private sector. If the private sector is to drive growth and generate wealth at multiple levels of society, then incentives that draw them into the rice industry and broader agricultural sector are critical. At present the government and donors are signaling to the private sector either to stay away, in the worst case (e.g., milling), or in the best case, to enter at their peril (production, inputs industry, finance, processing, etc.).

B. STRENGTHEN THE INPUTS INDUSTRY

A competitiveness strategy for the inputs industry as a whole should not be dependent solely on rice, but should recognize rice as a major initial demand-driver for the majority of smallholders. Upgrading in the inputs industry will help the rice subsector as well as the agriculture sector as a whole. Specifically, it is critical to shift the inputs industry to a solutions-based industry that delivers products and services as a means to overcome labor limitations and intensify production. The industry must grow through increased volumes of products and services sold to a broad clientele, not through increased margins per product or service. Linking smallholders to emerging post-harvest, milling, storage and processing services will also be important and where possible these services should be tied to and build upon relationships with input providers.

C. IMPROVE ACCESS TO FINANCE

Finance needs a dual-pronged upgrading strategy. The first prong is to build the capacity of mid-level and junior staff in the financial sector to effectively research, design, market, assess and manage various financial products for the agricultural sector. In the near term, the focus should be on the banking sector, with the insurance sector following closely behind when opportunities present themselves. Capacity could be built through an open technical assistance window, whereby financial service providers could apply for cost-shared technical assistance. The second prong is facilitating new entrants into the financial sector that specifically target rural populations, agriculture and agribusiness. In particular, the strategy should target mobile banking for the unbanked, investment banks, social venture capital firms, pension funds, insurance firms and equipment dealers (tied to leasing firms or banks).

D. LEVERAGE OPPORTUNITIES IN ICT

The ICT support market is critically important in Liberia. The high transaction costs associated with dispersed rural populations and poor roads mean that developing more trusted relationships will be dependent on lowering the costs of communication, information flows and transactions. There are technologies already in use and others based on mobile phone networks that could be better harnessed to lower costs and foster more effective relationships. The key is to integrate the technology into existing or emerging business models, as opposed to developing a new application or technology. The crossroads between banking for the rural unbanked and new technologies and innovations (e.g.,

SMS, scratch cards, etc.) has brought about a range of town-transfer and transaction services that have become proven business models. Public information systems via SMS are already widespread in the region, but not harnessed in Liberia as of yet by market players for price discovery, tracking shipments, sourcing products or promoting services and products. The driving criterion for using ICT must be cost effectiveness for the actors based on their end goals. Local ICT firms can also be leveraged to develop links to and client relationships with the agricultural sector in general and the rice sector specifically.

VIII. TOPICS FOR FURTHER INVESTIGATION

- **Segmentation of the End Market:** The end market is changing with a shift towards parboiled rice of various levels of quality, but the pace of this change is unclear. The urban versus rural divide in consumption patterns needs to be better understood, as well as how changing consumption patterns will affect the value chain. A better understanding of the dynamics of the end market is essential for new investment, especially in the area of processing.
- **Segmentation and Emerging Commercialization Process in the Smallholder Sector:** Critically important at this point in the development of the rice sector in Liberia is a better understanding of the dynamics within the smallholder production segment. There are multiple indications—including the purchase of inputs, links to commercial buyers and a range of production practices—that there is some shift within the smallholder producer segment from subsistence to more commercially oriented production. However the pace and scale of this change is not well understood. The value of this information is critical not only to donors to understand the change process, but also for commercial actors to understand the opportunities within this sector (e.g., smallholders as consumers of inputs and services).
- **The Flows of Imported Rice through Liberia to other Countries:** According to the figures available there is an oversupply of rice, which could make sense given the suppressed price of rice in Liberia compared to neighboring countries. However, the exact flow of this excess rice is unclear. Does it actually flow informally to neighboring countries, or is it stored at various locations along the distribution channels internal to Liberia, and/or is there a more formal arrangement specifically forming to take advantage of this perceived arbitraging opportunity?
- **Risk Appetite of Commercial Investors to Invest in Production, Milling, Storage, Processing and Branding of Local Rice:** Multiple private investors indicated their interest in investing in seed, production, milling, etc., but they say that government policies are either hostile to non-Liberians, unclear, enforced informally, and/or unsupportive of clear land rights that would be required to invest substantial funds. The GoL, on the other hand, clearly states its interest in attracting more investment (local and foreign). The overall policy process—from participatory design to enforcement to assessment to policy improvement—is not working well and is partly responsible for this disconnect, but a better understanding of the key constraints and the real costs associated with them is critical.
- **Increased Nutrition through Improved Varieties of Rice:** Chronic malnutrition remains systemic in Liberia and any discussion of improved rice varieties should include nutritional content and the potential affect on the nutritional situation of Liberians, especially rural Liberians. Understanding and including nutritional information in the discussion is especially important for rural smallholder production, since domestic rice will remain a major source of calories for such communities.
- **How to Address Financing Needs for the Procurement of Inputs:** The financial sector is weak, but more analysis is needed to understand the broader sector-level constraints as well as the liquidity constraints specific to agriculture that, if addressed, will result in upgrading. Issues include overall liquidity, the nature of the funding available to lend and current business strategies (target markets).

BIBLIOGRAPHY

- “Africa Rice Trends—Overview of Recent Developments in the Sub-Saharan Rice Sector.” Africa Rice Center (WARDA), 2007 (Brief).
- Coalition for African Rice Development (CARD) and Japanese International Cooperation Agency’s *Cooperation for Rice Promotion in Africa- African Japanese Plenary Workshop on Sustainable Rice Production* (Presentation).
- “Comprehensive Food Security and Nutrition Survey (CFSNS).” Government of Liberia and the United Nations, April 2006.
- Defoer, Wopereis, Jones, Lanson, Erenstein, and Guei. “Challenges and Technical Opportunities for Rice-Based Production Systems for Food Security and Poverty Alleviation in Sub-Saharan Africa.” Food and Agriculture Organization Rice Conference, February 2004.
- Flower, Todd. “Liberia Agricultural Markets: Production and Marketing Systems for Selected Crops in Liberia.” Mercy Corps, May 2007.
- “The Impact of High Prices on Food Security in Liberia.” Joint Assessment, Government of Liberia, July 2008.
- “Liberia Core Welfare Indicator Questionnaire (CWIQ) Survey.” Liberia Institute of Statistics and Geo-Information Services, Government of Liberia, the World Bank, and the United Nations Development Programme, 2007.
- “Liberia Participatory Poverty Assessment.” Liberia Institute of Statistics and Geo-Information Services and the United Nations Development Programme, August 2008.
- Ministry of Agriculture of Liberia. “Comprehensive Assessment of the Agriculture Sector (CAAS-Lib)—Volume 1 Synthesis Report.” Liberia: Ministry of Agriculture, Government of Liberia, 2007.
- Ministry of Agriculture of Liberia. “Comprehensive Assessment of the Agriculture Sector (CAAS-Lib)—Volume 2.1 Sub-sector Reports.” Liberia: Ministry of Agriculture, Government of Liberia, 2007.
- Ministry of Agriculture of Liberia. “Comprehensive Assessment of the Agriculture Sector (CAAS-Lib)—Volume 2.2 Sub-sector Reports.” Liberia: Ministry of Agriculture, Government of Liberia, 2007.
- Ministry of Agriculture of Liberia. “Comprehensive Assessment of the Agriculture Sector (CAAS-Lib)—Volume 2.3 Crosscutting Issues.” Liberia: Ministry of Agriculture, Government of Liberia, 2007.
- Ministry of Agriculture of Liberia. “Food and Agriculture Policy and Strategy (2008-2013)—From Subsistence to Sufficiency.” Liberia: Ministry of Agriculture, Government of Liberia, July 2008.
- Ministry of Agriculture of Liberia. “Liberia National Rice Development Strategy.” Liberia: Ministry of Agriculture, February 2009.
- “Post Harvest Crop Assessment—Liberia: Rice and Cassava.” Ghana: ITTAS Consultancy Ltd, August 2008.
- Tsimpo, Clarence and Quentin T. Wodon. “Rice Prices and Poverty in Liberia.” World Bank Policy Research Working Paper No. 4742. World Bank, 2008.

ANNEX A

KEY INFORMANTS/INTERVIEWS

Greenstar Inc.
Dr. Sizi Subah, General Manager
Phoenix Complex, Clartown
Monrovia, Liberia
+(231) 6557-104
Email: sizisubah@yahoo.com

Fouani Brothers Corporation
Ibrahim H. Fouani
UN Drive, Mamba Point
Monrovia, Liberia
+(231) 5660-077
Email: Monrovia@fouani.com

Fouta Corporation
Cherif M. Abdallah, Chairman
Vai Town, Bushrod island
Monrovia, Liberia
+(231) 6514-079, +(231) 5514-079
Email: groupecontinental@yahoo.com

Group 7 Holding
J. Roosevelt Vogar, Sales Manager
+(231) 6644-581

SDTM
Anwar Ezedine, Managing Director
+(231) 6448-245
Email: sdtmlib@yahoo.com

Africare
Chris Seubert, Country Representative
98 Sekou Toure Avenue
Mamba Point
Monrovia, Liberia
+(077) 297-658

Email: cseubert@africare.org

Ministry of Agriculture/USAID Ag Policy Project
(Public Sector)
Quan Dinh, COP, USAID Technical Assistance to
the Ministry of Agriculture
+(231) 06-657-921
Email: qdinh2@yahoo.com

Ministry of Commerce & Industry
Prof. Moses Roberts, Assistant Minister for Industry
P.O. Box 9041
Ashmun & Gurley Streets
Monrovia, Liberia
+(231) 6407-229
Email: gbagiya@yahoo.com

Cooperative Development Authority
G. Momoh Tulay, Registrar General
Tubman Boulevard
5th Street Sinkor
Monrovia, Liberia
+(231) 6518-759, +(231) 6437-143
Email: gibsonmomoh@yahoo.com

Liberian Business Association (LIBA)
D. Alvin Mccay
24th Street, Sinkor
Monrovia, Liberia
+(231) 662-6061
Email: libainc@yahoo.com

Geoservices Inc. SMD
Phoenix Complex (Old Peugeot Garage)
Clartown, Monrovia, Liberia

ANNEX B

SUPPLEMENTAL STATISTICS AND ANALYSIS

Table 6: Agricultural Labor Costs in Liberia, 2009

Labor Description	Person days		
	Traditional	Good practice	Good practice w/ technology*
Upland Rice			
Selection of site	1	1	1
Brushing	25	30	30
Felling of trees	10	10	10
Burning	2	2	2
Clearing	15	15	15
Sowing of seeds	12	12	12
Construction of fence	27	40	40
Weeding	15	21	5
Scaring of birds	10	30	5
Harvesting	22	25	25
Estimated Total	139	186	145
Estimated Cost @ 3 USD/person day	\$ 417.00	\$ 558.00	\$ 435.00
Estimated Cost @ 2 USD/person day	\$ 278.00	\$ 372.00	\$ 290.00
Swamp Rice			
Selection of site	1	2	2
Brushing	15	21	21
Felling of trees	5	10	10
Burning	2	2	2
Clearing	17	20	20
Destumping	20	40	40
Construction of main drain	23	26	26
Construction of the flood way bund	18	20	20
Construction of the head dyke	9	12	12
Construction of the tail dyke	8	10	10
Construction of the peripheral bunds/canal	42	50	50
Construction of internal bunds	25	30	30
Digging	40	50	50
Leveling	18	25	25
Nursery	2	2	2
Transplanting	25	25	25
Weeding	25	25	5
Harvesting	30	40	40
Scaring bird	10	30	5

Labor Description	Person days		
	Traditional	Good practice	Good practice w/ technology*
Maintenance of plots, dykes and drains	15	20	20
Estimated Total	350	460	415
Estimated Cost @ 3 USD/person day	\$ 1,050.00	\$ 1,380.00	\$ 1,245.00
Estimated Cost @ 2 USD/person day	\$ 700.00	\$ 920.00	\$ 830.00

* not mechanized

Table 7: Agricultural Input Costs in Liberia, 2009

Description of Technology	Cost per unit	Upland per hectare				Lowland per hectare			
		Traditional		Good practice		Traditional		Good practice	
		Units	Costs	Units	Costs	Units	Costs	Units	Costs
Herbicides									
Sidalsate	\$20.00			3	\$60.00			2.5	\$50.00
Supraxone	\$20.00			3	\$60.00			3	\$60.00
Topextra	\$10.75			3	\$32.24			2.5	\$26.87
Estimated cost (plus application)			0		\$152.24		0		\$136.87
Pesticides									
Sunpyrifos	\$25.00			3	\$75.00			2	\$50.00
Endocel	\$25.00			3	\$75.00			2	\$50.00
Atali	\$25.00			2	\$50.00			1.5	\$37.50
Dusban	\$30.00			2	\$60.00			2	\$60.00
Nreko	\$30.00			3	\$90.00			2.5	\$75.00
Cymethoate	\$30.00			3	\$90.00			2.5	\$75.00
Cyren	\$30.00			3	\$90.00			2.5	\$75.00
Estimated cost (plus application)			0		\$530		0		\$422.5
Fertilizer									
Urea	\$62.69				\$-			3	\$188.06
TSP	\$45.00				\$-			3	\$135.00
NPK	\$67.16			3	\$201.49			3	\$201.49
Estimated cost			0		\$201.49		0		\$524.55
Equipment									
Bird nets	\$20.00		0	1	\$20.00		0	1	\$20.00
Estimated cost			0		\$20.00		0		\$20.00
TOTAL ESTIMATED COSTS			\$-		\$903.73		\$-		\$1,103.92

Table 8: Profit/Loss Analysis based on \$3/day Labor Assumptions, 2009*

In KGs				50 kg bags		
Yields	Traditional	Good practice	Good Practice w/ technology*	Traditional	Good practice	Good Practice w/ technology*
Upland	900	1500	2000	18	30	40
Lowland	1200	3000	5000	24	60	100
Irrigated		4000			80	
Price at Farmgate per KG	\$0.54					

Description	Traditional		Good practice			Good Practice w/ technology*	
	Lowland	Upland	Lowland	Upland	Upland irrigated	Lowland	Upland
Income per hectare							
Income based on .54USD per KG	\$644.78	\$483.58	\$1,611.94	\$805.97	\$2,149.25	\$2,686.57	\$1,074.63
Total Income	\$644.78	\$483.58	\$1,611.94	\$805.97	\$2,149.25	\$2,686.57	\$1,074.63
Costs per hectare of production							
Labor	\$1,050.00	\$417.00	\$1,380.00	\$558.00	\$558.00	\$1,245.00	\$435.00
Inputs	\$-	\$-	0	0	0	\$1,103.92	\$903.73
Transportation (50km*.01USD/km/KG)	\$13.43	\$10.07	\$33.58	\$16.79	\$44.78	\$55.97	\$22.39
Total Costs	\$1,063.43	\$427.07	\$1,413.58	\$574.79	\$602.78	\$2,404.89	\$1,361.12
Net Income	\$(418.66)	\$56.51	\$198.36	\$231.18	\$1,546.48	\$281.68	\$(286.49)

* not mechanized

* Labor requirement assumptions drawn from the Committee on Food Aid (CFA) taking into consideration valuable contributions, suggestions and other inputs made by other Non-Governmental and non- Profitable organizations, both local and International that has long been in the business of Agriculture in Liberia. The title of this document is "CFA Guidelines for implementing Food Support to Local initiatives Project in Liberia", March 4, 2005.

Table 9: Profit/Loss Analysis based on \$2/day Labor Assumptions, 2009*

In KGs				50kg bags		
Yields	Traditional	Good practice	Good practice w/ technology*	Traditional	Good practice	Good practice w/ technology*
Upland	900	1500	2000	18	30	40
Lowland	1200	3000	5000	24	60	100
Irrigated		2500	3000		80	60
Price at Farmgate per KG	\$0.54					

Description	Traditional		Good practice			Good Practice w/ technology*		
	Lowland	Upland	Lowland	Upland	Upland irrigated	Lowland	Upland	Upland irrigated
Income per hectare								
Income based on .54USD per KG	\$644.78	\$483.58	\$1,611.94	\$805.97	\$1,343.28	\$2,686.57	\$1,074.63	\$1,611.94
Total Income	\$644.78	\$483.58	\$1,611.94	\$805.97	\$1,343.28	\$2,686.57	\$1,074.63	\$1,611.94
Costs per hectare of production								
Labor	\$700.00	\$278.00	\$920.00	\$372.00	\$372.00	\$830.00	\$290.00	\$290.00
Inputs	\$-	\$-	0	0	0	\$1,103.92	\$903.73	\$903.73
Transportation (50km*.01USD /km/KG)	\$13.43	\$10.07	\$33.58	\$16.79	\$44.78	\$55.97	\$22.39	\$33.58
Total Costs	\$713.43	\$288.07	\$953.58	\$388.79	\$416.78	\$1,989.89	\$1,216.12	\$1,227.31
Net Income	\$(68.66)	\$195.51	\$658.36	\$417.18	\$926.51	\$696.68	\$(141.49)	\$384.63

* not mechanized

* Labor requirement assumptions drawn from the Committee on Food Aid (CFA) taking into consideration valuable contributions, suggestions and other inputs made by other Non-Governmental and non-Profitable organizations, both local and International that has long been in the business of Agriculture in Liberia. The title of this document is "CFA Guidelines for implementing Food Support to Local initiatives Project in Liberia", March 4, 2005.