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Case Study

Chatham House Procurement for Development Forum: Groundnuts Case Study

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PROCUREMENT FOR DEVELOPMENT CASE STUDY: AFRICAN GROUNDNUTS

One of the goals of the Procurement for Development Forum is to increase both the quantity and the value of food products procured from Africa for UK consumers. Within Africa, there are great opportunities for the expansion and intensification of agriculture production and we are seeking to identify particular products that demonstrate this potential for development. Although we are looking at specific food products and development impact in the zone of production, the entire food production system from resource use to transportation to waste production also effects development and must be integrated into procurement guidelines.

The following case study provides an overview of the groundnut supply chain, a commodity identified by the Forum as exhibiting potential both to increase quantity and to improve added value from a number of African countries. After a brief summary of current market conditions, the production models of some of the largest exporters are compared, with a view to highlight the primary strengths and success factors that could be transferred to African models. The study ends with an account by TWIN on how to build up the peanut industry again.

1.0 Introduction

Groundnuts (*Arachis hypogaea*), also known as peanuts or monkey nuts, are the edible seeds of a legume plant that grow to maturity in the ground. Cultivated in nearly 100 countries, over 90% of which are developing countries, the groundnut is a food staple and valuable cash crop for millions of households (CGIAR, 2004-2005). The 'nuts' are high in edible oil content (40-50%) and protein (25%), and also a good source of a variety of essential vitamins and minerals. They can be consumed directly, processed into oil or cake/meal, or further processed into confectionary products or snack food. Every part of the peanut plant is used in some way: kernels for human consumption, vines as fodder for cattle, and nitrogen fixed from its roots as nutrients for the soil. While valued in most countries primarily for its oil, the ability to improve soil fertility is being increasingly valued in countries like Viet Nam, where the plant is being grown to break the rice monoculture, as well as adding to export sales needed to secure income.

2.0 Groundnut Market

Groundnuts are processed into a number of products for the domestic and export markets. The main categories are:

- 1) processed products: oil and cake/meal,
- 2) raw groundnuts: with shell and shelled, and

3) prepared nuts: coated or otherwise processed for confectionary goods or into paste/peanut butter.

Future global demand for groundnuts appears to be secure due to snackfood markets in North America and the EU as well as in countries where groundnuts are a key ingredient in food preparation, such as Mediterranean, Indian and Asian cuisines (ARD, 2008). Further, there is also high demand from local and regional markets in countries of production as groundnuts are a staple food and key source of protein for a number of SSA and Asian countries. In fact, within recent years, Ready to Use Therapeutic Food (RUTFs) have been made with a groundnut base and used to treat severe malnutrition in young children. This offers yet another opportunity for groundnut producers to sell their product and also have a positive impact on the life and development of the domestic population.

2.1 Groundnut Production

Historically, countries in Sub-Saharan Africa (SSA) dominated both export and domestic edible groundnut markets. In the export market, there was a dramatic decline in the 1960s with exports from SSA decreasing from 77% of the global market share to 4% in the present day. There are a number of reasons for the decrease but contributing factors include low yields (from unreliable rains, lack of high-yielding cultivars, pests and diseases, low inputs in cultivation), domestic policies and reduced market pull.

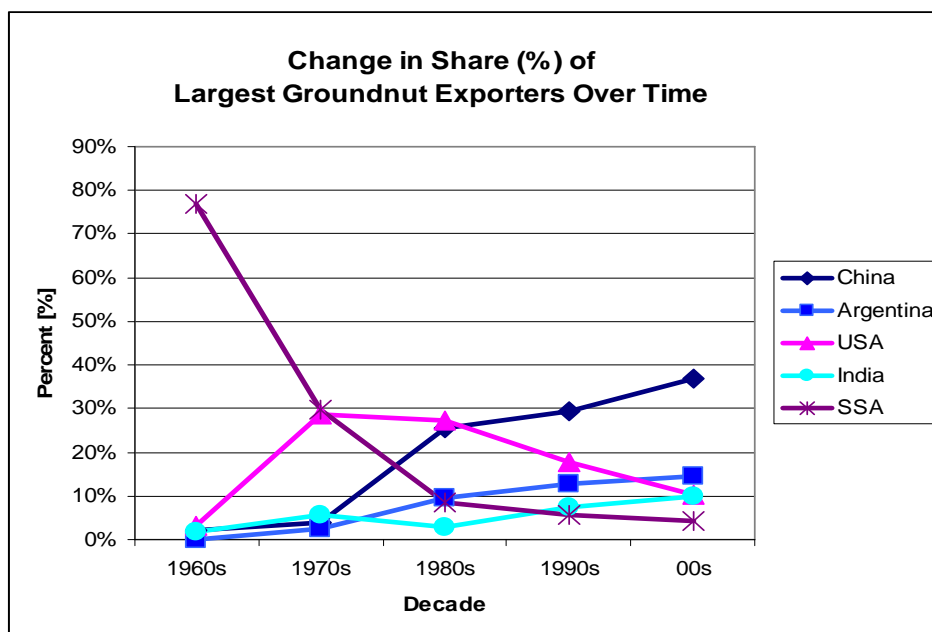


Figure 1: Export Market from 1960s to 2007. SSA includes all regions except for North Africa, with top exporters Nigeria, Senegal and Niger. ¹

¹ Source: FAOSTAT. Data points calculated by adding annual export figures, with periods categorized into: 1961-1970, 1971-1980, 1981-1990, 1991-2000, and 2001-2007.

In contrast, during this same period, China became a powerhouse of production and during the period 2001-2007 was the first ranked exporter and producer, with 37% and 39% of the market share, respectively (Table 1). Factors that facilitated the rapid expansion of China into the groundnut markets include: agricultural reforms in the late 70s, development of a market economy, increased inputs into groundnut production, and use of improved varieties with better techniques.

Table 1: Ranking of Groundnut Producers and Exporters from 2001-2007.²

AVERAGE ANNUAL GROUNDNUT PRODUCTION 2001-2007				AVERAGE ANNUAL GROUNDNUT EXPORTS 2001-2007			
RANK	COUNTRY	QUANTITY (MT)	VALUE (\$1000)	RANK	COUNTRY	QUANTITY (MT)	VALUE (\$1000)
1	China	13,936,443	\$6,659,185	1	China	700,391	\$535,174
2	India	6,869,829	\$3,118,157	2	Argentina	272,869	\$209,137
3	Nigeria	3,280,514	\$1,513,606	3	USA	191,650	\$179,909
4	USA	1,821,787	\$839,700	4	India	188,064	\$130,301
5	Indonesia	1,381,771	\$613,237	5	Netherlands	116,776	\$146,751
6	Myanmar	890,829	\$400,768	6	Viet Nam	62,514	\$35,384
7	Sudan	782,286	\$373,734	7	Nicaragua	55,237	\$37,558
8	Senegal	526,637	\$207,548	8	Brazil	31,140	\$20,769
9	Viet Nam	442,929	\$206,326	9	South Africa	25,832	\$19,731
10	Ghana	426,664	\$188,782	10	The Gambia	19,000	\$4,521
World total		35,827,740	\$15,439,896	World total		1,893,826	\$1,602,040

Note: Production estimates for 'with shell' groundnuts only; export estimates for 'with shell', 'shelled' and 'prepared' groundnuts.

While it is unlikely SSA will recapture its dominance in the export market, many countries have remained strong producers for the domestic market. Countries like Nigeria, Senegal and Ghana, for instance, are among the top ten global producers and occupy 12% of the market as groundnuts continue to be an important food staple in many households. Groundnuts are also important in many Asian households within countries such as China, India, and Indonesia, which are ranked as the first, second and fifth largest producers, respectively. These countries only export a fraction of production as the majority is consumed domestically. Among other top ten producers, there are also those like

² Data was collected from the FAOSTAT database for the last seven years of groundnut production and trade from 2001 to 2007. These values were then averaged, to provide general information on current market leaders.

Argentina—the second largest exporter—that export the majority of production, with less than a quarter consumed domestically as roasted peanuts or candy. Finally, there are a few countries such as The Netherlands, currently ranked fifth largest exporter, which imports large quantities of groundnuts and re-exports as value-added prepared peanuts.

2.2 Production of Added Value Groundnut Products

For countries with access to investment capital and technology such as The Netherlands, there is an orientation towards prepared nuts and other processed products given the high unit value offered. These products include roasted and coated groundnuts, ground flour and groundnut oil, which have a number of applications including bakery, confectionery and the general consumer market. The products with greatest value per unit according to 2007 FAOSTAT figures is peanut butter at \$2456 USD/MT, followed by groundnut oil (\$1580), and prepared nuts (\$1336). But actual profit will depend on the type of processing required and the costs associated with various inputs. For instance, peanut butter generally requires processing activities of peanuts to include sorting, blanching, roasting and grinding; after which inputs like sweeteners, salt, stabilizers and crushed peanuts are added.

Producer countries like China, US and Argentina have developed more coordinated supply chains in order to become more competitive in production, whereas non-producer like the Netherlands, Germany and Belgium have also gained access by importing groundnuts from main producers and re-exporting as value added products. Based on market evidence, there appears to be opportunities for countries in SSA to expand the export of groundnuts. However, they will first need to ensure food safety by preventing and controlling aflatoxin contamination. In the long term, they will also need to scale up production, improve productivity and become more competitive by adapting to a changing demand and investing in infrastructure and capacity (ITC, 2001).

3.0 Export Models of Production

An overview of current production models is provided to highlight potential capacity issues and limitations of SSA. Taking examples of best practices from some of the top exporting countries United States, Argentina and China, a more defined picture of investments and requirements needed by SSA is outlined below.

3.1 Models of Production

3.1.1 Sub-Saharan Africa

Groundnut production in African countries fluctuates greatly. Yields per hectare are typically low, because of a combination of production factors such as:

- mostly non-irrigated cultures and unreliable rains;
- small-scale, traditional farming with little mechanization and increased cultivation on marginal land,
- outbursts of pests and diseases;
- inefficiencies in distribution of seeds and fertilizers (ARD, 2008) coupled with use of low-yielding seed varieties; and
- political instability and unsupportive sectoral policies (ITC, 2001).

Combined with undeveloped production, SSA's global market position is further marginalized by reduced competitiveness and limited demand for groundnut oil (due to availability of a variety of substitutes) coupled with an inability to shift industry focus to prepared peanuts, as other export leaders have done (ARD, 2008). Efforts to improve productivity through development of new varieties has also led to minimal success, primarily because of the lack of goal oriented research to specifically target high demand markets (Ibid). However, as noted in Table 1, domestic production is important for Nigeria, Senegal and Ghana (ranked second, eighth and tenth) and earnings are reaching almost \$2 billion collectively.

3.1.2 United States

The US is the third largest exporter and fourth largest producer of peanuts. Only 25,000 farmers are engaged in production as it is heavily mechanized and requires small labour inputs (Haas, 2005). The main varieties produced in the country are Runner, Virginia, Spanish and Valencia peanuts, with a new variety—the Florunner—dominant since the early 1979s. Export earnings are about \$184.4 million annually but exports have been on a downward trend since the early 1990s due to stiffening world competition and changes to the peanut program in the 2002 Farm Act, US (Ibid).

The structure of the groundnut industry in the US is primarily due to farm policies that placed a quota placed on the amount of peanuts for the domestic food use market, with the rest to be exported or diverted to lower value meal and cake markets (Ibid). Under the old system, sales were controlled by governmental quotas but price was determined through private contracts with shellers, which were often negotiated prior to planting and thus not necessarily reflective of market price (USDA, 2008). With the adoption of the new Farm Bill in 2002, however, industry power has shifted away from the shellers as peanut producers are now eligible for the same set of supports (marketing loans, direct payments, and counter-cyclical

payments) available to producers of other mainstream crops (HAAS, 2005). The result is an increasingly vertically integrated system, where growers are shellers and manufacturers.

BOX 1: Best Practices in Seed Production (United States)

One of the critical success factors for the U.S. groundnut market was the development of a high yield variety (Florunner) appropriate to climate and end use. To develop and retain high quality seeds on an annual basis, the United States first invested in the development of the new variety and then enlisted commercial companies to dry, store, shell and treat the seed to commercial grade quality (Haas, 2005). These companies control the seed produced by retaining growers under contract to produce the seed and then buying the seed to prepare for germination/sale that season.

In contrast, farmers in SSA generally rely on informal sources of seed, which is selected from the harvest, resulting in lower quality final product and often seeds of diminishing and variable quality (ARD, 2008). More recent efforts have been introduced to support seed multiplication and distribution using varieties developed by ICRISAT in SSA.

The U.S. is one of the largest groundnut exporters today due to government support mechanisms set up to protect peanut producers, largely in the form of input subsidies and loans. Although flawed in a number of respects, it demonstrates the need for government involvement and participation in the development of export industry. Domestic policies need to be consistent with industry goals.

3.1.3 Argentina

Unlike the other countries, Argentina produces primarily for the export market (approximately 90%), with limited domestic demand for groundnuts (ARD, 2008). This has made the country more responsive to the global market, as illustrated by the shift in production from groundnut oil to high quality prepared nuts during the late 1970s when price for groundnut oil decreased. Unlike SSA, which continued oil production for its domestic market for the next 3 decades, Argentina invested in better technologies and new varieties.

BOX 2: Best Practices in Partnerships (Argentina)

The key to success for Argentina was the creation of strategic partnerships with research institutions, the private sector and universities. Together, these partnerships helped create new groundnut varieties, improvements in marketing and practices at the production and postharvest stages as well as technological developments in control of pests, diseases and aflatoxin contamination (ARD, 2008). Further to these efforts, production has become more vertically integrated, with producers linked to processing/exporting companies by contractual agreements, through which inputs and technical assistance are provided (ARD, 2008).

3.1.4 China

At present, China is the world's largest groundnut producer, with over 3.6 million hectares under groundnut cultivation and an average of almost 14 million tons annually since 2001 (FAOSTAT). Such growth is exceptional, as China only entered the export market in the late 1970s, becoming the top exporter a decade later (FAOSTAT). Initial success was primarily due to advantages from market reforms, as well as increased use of high-yielding seed varieties and agricultural inputs such as fertilizers, pesticides, insecticides, mechanization and irrigation (ITC, 2001).

China's model of production is highly fragmented and more similar to the small-holder system in SSA than the other models but it has been the most successful of all the major producers. This is largely due to a number of competitive advantages including:

- large supply of low cost labour to hand shell the nuts and limit loss due to damage;
- selection of highest quality nuts for export market, which is less than 10%, from total production; and
- minimal aflatoxin contamination due to favourable climatic conditions (dry season) during harvest (ARD, 2008).

3.2 Constraints in Groundnut Production—Aflatoxin

The primary constraint affecting the export of groundnuts from Africa is aflatoxin, a naturally occurring toxin that can infect a number of crops—including groundnuts—and can result in acute and chronic poisoning in humans and animals on ingestion. The health impacts of ingestion in humans include stunted growth and development as well as an increased risk in liver cancer (IARC, 2002; ICRISAT). Countries of import, as well as producers like the US and Argentina, have recognized the severity of impact on human health and the need to set and/or meet aflatoxin requirements. However, the investment required to do this is considerable. For instance, U.S. producers spend in excess of \$27 million USD annually—and even more during years of drought—to meet aflatoxin standards (USDA, 2008). With similar funds for mitigating aflatoxin risks lacking in SSA, countries have not been able to follow suit and address aflatoxin contamination issues. Consequently, millions in SSA are ingesting infected groundnuts daily, either through home grown groundnuts and other staples that can be contaminated by aflatoxin eg. maize produced in subsistence level farming or purchased from other commercial productions.

BOX 3: Aflatoxin

Aflatoxin is a naturally occurring mycotoxin that can poison humans and almost all animals and remains the biggest barrier for export due to food safety concerns. Produced by fungi in the *Aspergillus sp.*, namely the common fungus *flavus* and the rarer fungus *parasiticus*, the toxin can contaminate a variety of agricultural commodities but most commonly maize, peanuts, cottonseed and tree nuts (IARC). Poisoning primarily occurs through ingestion of contaminated food and milk, but it can also occur as a result of occupational exposure in agricultural workers and for those in oil mills and granaries (ICRISAT, 2010). The level of toxicity may either be acute—when large amounts of the toxin are consumed in short periods—or chronic due to ingestion over long periods of time.

Acute toxicity may result in death and/or inhibition of carbohydrate and lipid metabolism but this type of poisoning is most common in livestock due to the large amounts of poison that needs to be ingested for the symptoms to occur. When animals consume aflatoxin-contaminated feed they produce milk contaminated by an aflatoxin metabolite that is known to be carcinogenic, producing tumors and liver cancer in test animals (ICRISAT, 2010). Acute toxicity has been reported in many African countries as well as India, China, Thailand and others. Most recently, 2.3m bags of maize from Kenya have been declared unfit for human consumption by the government due to presence of high levels of lethal aflatoxins, which have killed at least one child (BBC News, 2010). The crop was harvested in the drought- and famine-prone Eastern Province and went bad because farmers lacked the appropriate storage facilities.

Chronic toxicity is more common in humans but symptoms such as lowered milk or egg production in livestock and stunting of development in humans may not be attributed to aflatoxin. Although the full implications of exposure are unknown due to lack of medical testing and study, there is evidence of strong correlations between aflatoxin exposure and liver cancer, particularly in areas with endemic infection of hepatitis B and C viruses (IARC, 2002).

To change direction and to prevent consumption of contaminated product by developers, domestic governments in SSA need to set concentration limits and also provide best practices to prevent infection in production and post-harvest. Regardless of progress made in these areas, a recent study examining concentration levels in exports indicated that African suppliers may actually be at a comparative disadvantage when striving to meet regulations. Constraints associated with production of aflatoxin and available infrastructure includes:

- poor quality seeds,
- severe weather conditions (drought stress and high temperature/humidity during pod maturation),
- shortcomings in input supply arrangements,
- poor cultivation practices,
- insufficient operations for crop storage and logistics, and
- lack of quality management practices.

Aflatoxin remains a huge problem because contamination can occur at any stage of the production cycle from pre-harvest to storage, with potential for cross contamination if crops are rotated and stored in the same facility. There are also several environmental conditions

present in many African countries such as warm climate and high humidity that predispose crops to aflatoxin contamination, making it difficult to eliminate from the supply chain (ICRISAT). It is possible to reduce contamination but significant investment must be made. First, countries in SSA need to set domestic standards in line with international requirements. Next, good practices in on-farm activities at all stages, need to be disseminated to all subsistence and commercial farmers to mitigate infection and potential spread of contamination. Finally, appropriate screening procedures should be put in place, to prevent ingestion of aflatoxin, regardless of product destination.

3.3 Alternatives for Production: Regional Markets

If SSA producers can meet food safety requirements—and aflatoxin regulations in particular—additional market opportunities within the region may open up. One of the most immediate needs is the demand for production of Plumpy'nut, a ready to use therapeutic food (RUTF). Developed by Nutriset, a French company, Plumpy'nut is a peanut based nutritional product available for treatment of severe malnutrition in children age 6 to 24 months.

BOX 4: RUTF—Plumpy'nut®

Plumpy'nut is a nutritional paste made from peanuts, sugar, milk powder, oil and mixture of vitamins and minerals and packaged in single serving foil packages of 500 calories each or in tubs. It does not need refrigeration or to be mixed with water and has a shelf life of 24 months. In addition, rations can be issued to families in bulk and do not need specialized care so women can treat their children at home.

Although initially manufactured in France, Nutriset has franchised its operations so there are currently factories in operation in: Niger, Ethiopia, Malawi, Tanzania, the Democratic Republic of Congo, Ghana and South Africa. The franchisees have to buy the vitamin/mineral mix from Nutriset but they are able to procure its own peanut paste from local sources with technical support and support for quality control from Nutriset (Gast, 2007). However, provision of Plumpy'nut with local peanuts is contingent on all product meeting UNICEF's food safety regulations with aflatoxin at <5ppb.

Table 2: Nutritional information on peanuts and Plumpy'nut

Nutritional Comparison of Peanuts and Plumpy'nut	Raw Peanuts		Plumpy'nut				
	Per 100g	Per pkg (92g)	Per 100g	Per 100g			
Energy (kcal)	567	500	543				
Protein (g)	25.8	11.6	12.6				
Total lipid (g)	49.2	29.5	32.1				
VITAMINS				MINERALS			
A	0 IU	910	989	Calcium (mg)	92	320	348
D (mcg)	0.0	16	17	Potassium (mg)	705	1111	1208
E (mg)	8.3	20	22	Magnesium (mg)	168	92	100
C (mg)	0.0	53	58	Zinc (mg)	3.3	14	15
B1—Thiamin (mg)	0.06	0.6	0.65	Iron (mg)	4.6	11.5	12.5
B2—Riboflavin	0.14	1.8	2.0	Sodium (mg)	18	< 290	315
B5—Pantothenic Acid (mg)	1.8	3.1	3.4	Selenium (mcg)	7.2	30	32.6
B6 (mg)	0.35	0.6	0.65				
B12 (mcg)	0.00	1.8	2.0				
K (mcg)	0.00	21	23				

Source: USDA, 2009; Nutriset and IDPAS.

3.3 Recommendations for Increasing SSA Groundnut Exports

Given the historical dominance of SSA in the export market, and the continued high production rates for domestic markets, there is great potential SSA to increase its capacity and export share. With the largest exporter, China, set to become a net importer of peanuts the need to explore SSA's export potential is increasing. However, there must be sufficient incentive by way of reliable market demand to justify the investments recommended by organizations such as ICRISAT, IARC and ITC, which are needed to reach regulation aflatoxin standards and increase competitiveness. Such recommendations for investment include:

Phase 1) Improve Aflatoxin Management Strategies (ICRISAT & IARC):

- increase awareness on aflatoxin as a public health issue to stakeholders (communities, government);

- provide training in aflatoxin control and prevention to farmers, with focus on female farmers that are primary peanut growers;
- reduce contamination of groundnuts and cross contamination of other crops with pre- and post- harvest practices (i.e. use of driers, improved storage, etc.);
- limiting drought and high temperature stress at end of cropping season;
- implement quality control methods and safety standards;
- establish certified national quality control laboratories, in charge of issuing export quality certificates;
- develop and promote technologies to produce mycotoxin free products; and
- implement integrated aflatoxin management programmes, covering all contamination-related issues, including mould formation and spreading, detoxifying the product and routine monitoring.

Phase 2) Improve production capacity (ITC):

- develop high-yield varieties for specific locations based on end user needs, with varieties to include characteristics such as resistance to drought, diseases, suitability for mechanized harvesting, type of soil etc.;
- encourage regulatory measures to control the flow of contaminated shipments in national and international trade; and
- promote exports through market prospecting and generic promotion of national products.

4.0 Facilitating Farmgate to Retail Shelf Supply Chains: Re-establishing Southern African Peanuts in the UK & European Market

The demise of the peanut industry has been attributed to macro economic environment in the 1970's and 1980's. Peanut production is largely a smallholder crop in Africa reliant on trading intermediaries. Poor linkages with export markets has meant that smallholders have not had access to market intelligence, technology and infrastructure needed to engage with large-scale food export industries. A few organisations have attempted to re-engage with smallholder peanut farmers eg. Tradecraft and Twin, but there has been no sizeable SSA peanut products sold with European retailers for the past three decades.

In spite of the numerous barriers to market entry, the smallholder organisations in Southern Africa, with support from Twin, have achieved a number of small but significant breakthroughs into the European retail market. These include securing own-brand sales through most of the major UK supermarkets, and the launch of Europe's first fairtrade nut company, Liberation Foods CIC, in which the producer partners have a 42% shareholding.

At the heart of this success is the co-ordination of an integrated supply-chain approach which has allowed valuable insight into the weakest parts of the supply-chain that would have otherwise remained hidden. Visibility from the farm gate to retail-shelf enables feedback loops on issues such as crop quality and market requirements. This knowledge, which cannot be transmitted in chains interrupted by traders and middlemen, has ensured that investments are appropriately targeted to respond to the feedback from the market. As a result, these organisations have been able to develop systems for producing high quality, reliable goods and services. These systems include:

- **Implementing traceability** down to the individual farmer level which has allowed the most severe cases of contamination to be identified and preventative measures to be put in place (i.e. discouraging farmers from wetting the peanut shells prior to shelling)
- **Improving storage** – used advice from experts to adapt storage facilities to reduce moisture and humidity. Using data loggers to monitor storage conditions
- **Introducing mechanised processing**, including shellers, electronic sorting and grading.



Figure 2: Before and after pictures of shelling, groundnut storage and processing.

Despite the success, all partners involved, and particularly the producer partners have had to overcome several obstacles in order to deliver products that satisfy the stringent requirements prescribed by European retailers. Building awareness of food quality standards in countries where local food safety is often poorly regulated is no easy feat. Neither is

building a market-orientated outlook within organisations that have traditionally focussed on production constraints. Farmers are understandably reluctant to make additional investments in areas such as quality management and traceability when local markets will absorb crops of all quality. Their primary concerns concentrate on covering immediate costs and needs, whilst issues such as quality standards and import requirements are of secondary importance. The smallholder system itself is not structured to deliver uniform quality as it is comprised of small plots of land, scattered over a wide area and farmed by a multitude of different people.

Smallholder organisations wishing to engage with the large-scale food industries, will find it difficult to do so without long term partnerships with direct market linkages. Matching supply and demand is an iterative process and securing partners who are empathetic to the development process is essential. Effective aflatoxin management must start at the very beginning of the value-chain with the farmers, and therefore necessitates a comprehensive rural education programme. In order to scale-up it is imperative that appropriate measures are implemented at each stage of the supply-chain with extensive collaboration between the private and public sector.

Twin and Liberation Foods, have also worked on the retail side to make the incremental interventions necessary to challenge commercial attitudes to trading with smallholders in Africa. The balance of timing between building a steady supply-chain and engineering new market opportunities is of critical importance. Equally, if not more important, is seeking new markets which can absorb non-compliant or lower quality product such as splits or small nuts. This is an important risk-management strategy, particularly given the lottery of aflatoxin testing.

5.0 Conclusion

This case study on groundnut production in Africa illustrates an opportunity for the Forum Members and other UK businesses to increase the quantity of groundnuts imported from a number of African countries. To meet buyer requirements, significant investments into ensuring food safety and improving production capacity must first be made by producers. However, for producers to justify such investment there must be sufficient incentive by way of reliable market demand and commitment from supply chain partners empathetic to the development process. In the long term, public-private partnerships will also be needed to strengthen market linkages and to make critical investments in infrastructure and technology which will be needed for African producers to scale up export production and to become more competitive.

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