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Reinventing Africa into a Global Supplier of Food Goods: An Analysis of Agri-business
Development, Sustainability, Supply Chain Integration and Export in Developing Economies

A Thesis submitted in partial satisfaction
of the requirements for the degree of

Master of Business Administration

in

Management

by

Lisa Michelle Chisholm

June 2011

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ABSTRACT OF THE THESIS

Reinventing Africa into a Global Supplier of Food Goods: An Analysis of Agri-business Development, Sustainability, Supply Chain Integration and Export in Developing Economies

by

Lisa Michelle Chisholm

Master of Business Administration, Graduate Program in Management
University of California, Riverside, June 2011
Dr. Yunzeng Wang, Chairperson

This paper explores the commercial potential of indigenous African crops and models a supply chain that integrates small-scale cooperative farms with large-scale cultivation for agricultural export. The research addresses the existing systems' deficiencies while analyzing the prospect for global supply chain expansion for food products sourced from Africa to China. The model seeks to overcome current challenges and enable competitive advantage, as well as infrastructure and economic development.

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I. African Agriculture and Agribusiness

A. Executive Summary

Many players are transforming Africa's agricultural systems in ways that support the internal needs of its rapidly expanding population, setting the stage for the continent's Green Revolution. The commitment to this endeavor and the overall restructuring of domestic economies are supported by African governments that have adopted market friendly policies, private sector investment firms that have increased capital inflow, NGOs that have long-standing participation in community level development, and foreign countries that have contributed resources to assist with economic expansion at the national stage. These efforts reflect the recognition of the continent's emerging significance to the world's economy along with its evolving position in the global community of nations.

Using a case study approach, this research presents a distinct type of agribusiness for trade from Africa, potential new products for export diversification, and a supply chain model for food import into China. More specifically, the business level focus will be on systems that incorporate small-scale farmers since they represent an integral component of African economies and agriculture. Indeed, large-scale producers are paramount to the export business on a national level. However, the small holders are vital to communities and regional stability. Thus, this paper advocates a need to upgrade cultivation and distribution networks of small –scale farmers through supply chain integration.

The fulfillment of Africa's agricultural goals requires effective planning to overcome the challenges of infrastructure deficiency (roads, storage facilities, processing plants, communication systems, etc), social inequalities, political corruption, as well as limited technology, capital, human experience, financial institutions and market information. Thus far, the lesson learned in Africa is that the problems specific to rural advancement are not necessarily

bound to incentives but the real world constraints created by the social, political and physical environment. This research juxtaposes the impediments faced by an emerging Africa struggling with substantial structural change against the potential of augmented finance systems, venture sustainability and African economies to build an agricultural framework.

In the 21st century, the goal of African farming has to be twofold with commitments to abate future hunger crises while formalizing a structure that enables international food export linked to indigenous production. Although agricultural and agribusiness may seem regressive in a technically oriented world, modern farming has never been achieved in Africa on a broad scale. Without an extensive internal method to insure food provisions, only underdeveloped peasant agriculture remains to fulfill the balance of supply after relief assistance (Cohen & al., 1988, pp. 4-5). From this perspective, the wider solution for food security must relate the improvement of small-scale agriculture with the development of food trade then utilize these constructs as weapons against hunger.

The broader discussion proposes that the development of agricultural trade, supply chains and agribusiness provide cost effective systems that enable regional development, strengthen bilateral economic ties, adopt efficiencies standard to industry, increase competitiveness, and distribute monetary gains. These activities erect a more cohesive platform required to meet Africa's agricultural promise for each individual and nation. Hence, the model progresses the ideal that agribusiness is sustainable and provides economic returns that increase the benefit of capital inflows derived from supply chain partnerships, development finance institutions and foreign direct investment.

In summary, this project's endorsement of agricultural export evolves from the concept that trade expansion is hedged in favor of developing economies. Advancement of this trade sector along

with agribusiness has internal and external repercussions. In addition, each plays a catalytic role in abolishing the central divide that clouds the path towards sustained economic growth in Africa. Finally, this undertaking is part of a larger aspiration. The aim is to explore methods to diversify products sourced from Africa as a means to reinvent the continent into a global supplier of organic, exotic and stable foods, the benefits of expanding agricultural output with existing trading partners, and alternative means to build the infrastructure needed to satisfy Africa's long awaited Green Revolution.

B. Agricultural Transformation

“By 2040, it will be home to one in five of the planet's young people, and the size of its labor force will top China's. Africa has almost 60 percent of the world's uncultivated arable land and a large share of the natural resources. Its consumer-facing sectors are growing two to three times faster than those in the OECD countries.”

Leke et al, *“What's Driving Africa's Growth”*

For many years, African nations have concentrated efforts in extraction and export of raw or unfinished goods thereby failing to capture value-added dollars associated with commodities. In addition to this shortsighted approach, the wealth generated by this trade has fostered conflict. Access and ownership of natural resources has generated internal hostilities instead of infrastructure development and capital assistance to satisfy regional needs. These misgivings shed light on how and why agricultural trade from Africa should differ from the principal exports. Despite the challenges, a synthesized view of a Green Revolution in Africa should embrace trade development to not only meet the external demand of an open market, but also the internal requirements for infrastructure, education, income and other support to maintain efficient agricultural systems that positively impact communities. Given the environmental thresholds that have to be achieved for food production to compete in the international marketplace and the dire needs of the continent's impoverished population, it is equally important for agribusiness practices to support the reversal of the social and ecological damage of prior movements and

enable small holders and traditional farming techniques to co-mingle with modernized farming systems. Hence, the outcome of agribusiness expansion in Africa should be dual purpose with an ability to satisfy foreign and domestic dimensions for sustainable growth. In shaping a model of African agribusiness, the achievement of these benchmarks is critical.

C. Frame of Reference: Exemplary Case Studies

This study of diverse food products for export begins with an examination of two crops indigenous to Africa. The products highlighted in this study include the African miracle fruit (*Synsepalum dulcificum*), and another native food source, the baobab tree (*Adonsonia digitata* L.). Before presenting an integrated model for commercial food distribution, a contemporary reference frame for an African agribusiness is offered. This model's reference frame for collaborative farming of a novel fruit originated from an amalgamation of three examples. These include Açaí fruit, Blue Skies Company and Cuban agriculture. The combination exemplifies exotic fruit product commercialization, community based food export agribusiness, and upward scaled organic farming systems with technological and resource constraints.

1. Açaí Palm

Açaí is a small purple fruit that grows in the tops of tall slender palm tree native to the Amazon Rainforest. The fruit contains a large central hard seed, surrounded by a thin flesh, which comprises about 90% of the fruit. This morphology may contribute to the high nutritive value of the outward edible portion. The fruit is naturally low in sugar and produces a highly delectable taste when sweetened. The tree is distinguishable from many other palms because it is a renewable or sustainable resource. (Sambazon, 2011) Specifically, the Açaí palm tree possesses a multi-stem root originating from a single root system, or clump, which enables a new stump to form after harvesting the fallen palm. (Sambazon, 2011)

The multiplicity of uses for Açai palm tree is comparable to the baobab tree. Both trees play a major role in local subsistence and function as dietary staples within their respective indigenous communities. Due to the lack of sugar and acidity, both the Açai berry and miracle fruit are highly perishable without cold storage intervention. However, both are highly multifunctional with regard to dietary and medicinal supplement uses and provide high nutrient value above the spectrum of mainstream fruits. In addition, each of these plant foods has marketable value as an organic product.

2. Certified Organic Fair Trade Tropical Fruit Distributors

There are global market leaders in the fair trade of tropical fruits – namely organic and fresh cut – that are paving the way for the mass introduction of exotic goods into the primary markets of food exchange. In the case Açai, a company such as Sambazon, has taken the lead as a distributor. The firm markets its working commitment with NGOs to build a supply of organic and sustainable Açai (Sambazon, 2011). Blue Skies Company, located in the UK, collaborates with African collectives to produce source processed tropical fruits for the international market. The company exemplifies an innovative market driven business model that maintains commercially viable methods for working with the poor farmers and improving product quality through supply chain management.

Notably, the exemplar for this paper's model is the Blue Skies Company. It is the first company in the world to achieve EurepGAP certification (now GlobalGap, which creates standards for safe and sustainable agriculture around the world) for a group of farmers in Africa. In addition, the company is audited for Fairtrade, British Retail Consortium (BRC), International Food Standard (IFS), Business Social Compliance Initiative (BSCI) and certified as 'Ethical Trade Organic' by the Soil Association. In 2007, they launched an online traceability system called 'Caretrace' in

partnership with Waitros to allow customers to find where their fruit comes from. The website allows consumers to watch videos, view maps and look at photographs of farmers who supply fruits.

Background: Blue Skies Products initially started as a large-scale fruit processor that wanted to consolidate the trading relationships with its various small-scale local suppliers. Blue Skies Products helped its affiliate BSOC, a collective of 80 pineapple farmers in Ghana, enable systems and facilities required for EurepGap certification in order to trade with major European retailers, and organic certification by the Soil Association and Fairtrade certification (Blue Skies - Quality Fresh Cut Fruit, 2011). Blue Skies also helped the farmers with financing and built a series of free drop off points for pineapples before collection by a Blue Skies vehicle, free of charge. By January 2005, the company received certification to supply processed pineapples to the Fairtrade market and in turn promoted BSOC's application for Fairtrade certification. Blue Skies' achievements enabled them to process and market the farmers' Sugar Loaf pineapples to European supermarkets on Fairtrade terms. (Blue Skies - Quality Fresh Cut Fruit, 2011)

Distribution partner companies, such as Blue Skies, distinguish themselves by their ability to trade goods within a framework of sustainable initiatives that embrace conservation and economic development. They also utilize smallholders who maintain family or community based plots. The food gathering collaborations in rural communities provide product sourcing from the neediest participants in native agriculture systems. Hence companies such as Blue Skies not only provide a vital economic link to developing nations, they also stand at the forefront of promoting awareness of exotic and organic food value while meeting demand from a growing consumer base and enabling sustainable management of traditional resources.

3. Cuban Agriculture

Although sourcing from organic farming continues to expand, industrial food production is primarily dependent upon large-scale single crop cultivation systems. Many of the world's immense farms operate with mechanized apparatus dependent upon fossil fuel consumption and agro-chemical insecticides. The notable differences between these two systems, organic and non-organic, include the scale of production and environmental impact of agrarian tools required for propagation. The trade off for industrialized farming is lower prices at the grocers in exchange for higher distress to the environment. Although the debate ranges on the true cost of ecological damage, choosing alternative green approaches in the agricultural sector does not have to be based solely on the degree of environmental impact.

In view of business goals where price and competitiveness are closely linked, other factors relating to profitability present a more compelling argument for support of low-tech farming. As one researcher points out, "organic agriculture performs better on a per hectare scale with respect to both direct energy consumption (fuel and oil) and indirect consumption (synthetic fertilizers and pesticides)" (Wright, 2009). Cultivation systems found in Africa are summarized in Table 1.

Table 1 African Cultivation Systems

Homestead gardens
Mixed crop fields
Small plots adjacent to farms
Plots specifically cultivated for droughts
Gathered foods

Source: Traditional Food Plants from Food and Agriculture Organization of the United Nations

One reference for large-scale organic or low intervention farming is agriculture in Cuba. Up to 1980s, Cuba relied on a highly industrialized (fuel, machinery, chemical fertilizers and pesticides) agricultural system which was dependent on imported inputs and capital goods (Wright, 2009).

In 1989, Cuba lost its Russian trading partners during the dissolution of the Soviet bloc and had to enter the global sugar market at a time when international commodity prices plummeted (Wright, 2009). The early 90s realized a steep reduction in agricultural inputs and food imports used to maintain the country's population. Cuba then faced a crisis comparable to many developing nations in Africa. Food security mandates helped drive the development of technologies based on animal traction versus engine tractor power, organic and compost versus synthetic based fertilizers, microbial versus agrochemical based pesticides, and resistant plant varieties along with crop rotations versus single crop cultivation.

The take away is that food insecurity and political will targeted to meeting national food production goals can lead to greater self-reliance whether a country takes an industrial or organic approach to food production and security. From this viewpoint, the objective for countries in Africa that do not face land scarcity is to meet internal as well as transnational and foreign trade demand for food goods. Overcoming the obstacles to meet those future demands includes developing human capital and a better understanding of the subsistence crops that currently have little or no baseline data on yield and cost-effectiveness (National Research Council (U.S.) Board on Science and Technology for International Development, 1996). In order to increase venture building, a greater comprehension of the challenges and surrounding issues affecting agrarian development is necessary.

II. Issues Affecting African Agribusiness, Agricultural Development and Trade

The prior model for African agribusiness presents a supply chain that insures the export of quality processed fruit through an integrated approach that begins at the small holder's farm. However, the economic success of the chain is largely dependent upon adaptability and growth. From this

perspective, expanding business capability requires an assessment of factors that hinder these goals. Following is a summary of collective challenges in Table 2.

Table 2 The Business Role in Strengthening Food Value Chains

	Agricultural Production	Storage and Transport	Processing and Packaging	Selling and Trading	Retail Distribution
Challenges	Farmers lack access to inputs; they need local distributors, financial services and training for improved seeds, fertilizer, and water management	<ul style="list-style-type: none"> - Storage facilities are inaccessible or poorly managed - Transport costs are very high and infrastructure is very poor 	<ul style="list-style-type: none"> - Prices fluctuate, and farmers lack access to price information and finance - High transaction costs and few market linkages for small producers - Irregular supply and quality for large buyers 	<ul style="list-style-type: none"> - Lack of facilities or capital for on farm processing - Lack of commercial-scale processing facilities - Few appropriate packaging technologies - Lack of food fortification regulation and incentives 	<ul style="list-style-type: none"> - Lack of retail outlets for essential products and services in poor regions - Lack of business linkages to help existing retailers expand or diversify
Effective Business Models	<ul style="list-style-type: none"> - Agro-dealers expansion (through training and finance) - Consumer financial services (vouchers or microfinance) - Irrigation equipment and services 	<ul style="list-style-type: none"> - Provision of storage services and infrastructure 	<ul style="list-style-type: none"> - Sourcing from small farmers, producer groups and cereal banks - Market information services via telecom/IT - Financial services for entrepreneurs 	<ul style="list-style-type: none"> - Small-scale processing for local markets - Commercial-scale processing for national and regional markets - Appropriate packaging - Food fortification 	<ul style="list-style-type: none"> - Retailer expansion (through training, equipping and finance) - Retailer diversification (expanding products and services offered) - Transport/delivery services

Source: WEF_FB_BAACH Green Revolution Africa Report 2008

A. Uncertainty

Numerous events can have a major effect on the evolution of the agri-business industry in Africa.

A good example is climate change. Even though there is a serious deficiency in impact research, the implications from existing studies show that Africa is the most vulnerable continent in the world to climate change (Dinar, Hassan, Mendelsohn, & Benhin, 2008, pp. 1-9). Using UIUC and POLD global climate change models and experimental coefficients, the results show a likely continent wide impact of 6% to 100% reduction in agricultural GDP in 2100 (Egypt, Gabon,

Sahara) (Dinar, Hassan, Mendelsohn, & Benhin, 2008). In the economic realm, the general concerns include currency risks and inflation since these factors can negatively affect trade growth. Another unknown is whether African growers can achieve scale advantage and improve infrastructure.

The downstream components of the supply chain also present areas of ambiguity. The question of whether consumers will increase demand for African produce remains. The added twist in this deliberation comes from the growing internal competition on African soil from large-scale grocery chains. Several multinational firms are setting up stores through foreign direct investment. As one researcher notes, the “interest in the expansion of retail food chains and the perceived problems resulting from competition between these new, sophisticated supply chains and the most basic of food distribution networks in emerging economies have been greatly debated in the literature” (Weatherspoon & Ross, 2008). The multinational supermarket chains possess the power to shift domestic food production. This point relates to the concept that demand based on the local and regional levels helps nurture domestic growth of African agribusiness (Felgenhauer & Labella, 2009).

As market liberalization and urbanization drive the spread of large international chains (Felgenhauer & Labella, 2009), the small owner-operated grocery stores are slowly disappearing. Notably, these businesses were once the foot hole for local farmers’ entrance into agri-business supply chains. As stated by Pick n' Pay's CEO, his chain’s growth in the Southern Africa supermarket business is a direct result of the informal market converting to the formal market (Weatherspoon & Ross, 2008). In conclusion, these transitioning environments are a complex matrix of demand and potential supply availability through formal and informal sectors. This transformation marks the start of future ambiguity for local distribution networks and suppliers.

B. Need for Improved Technology

Global supply chains currently utilize genetic technology, nanotechnology and information technology to create smaller, faster, smarter and flexible control and monitoring systems (Hewett, 2006, p. 39). This triad of innovations significantly improves the quality and delivery of food products. However, adequate integration of these technologies presents a challenge to developing countries wishing to compete internationally. Favorable attributes for supply chains include: 1) strategic alliances for firms with specialized skills; 2) organizational structures that support communication, transparency and information sharing; 3) human resource partnerships and a common vision with all chain participants; and 4) advanced information and computer technology (Hewett, 2006). Following is an examination of factors that impede progression towards those attributes.

1. Knowledge Factors: Technology Utilization

Biotechnology can be used to induce productive traits with health conferring properties and positive qualities under various conditions. For example, control of fruit ripening by altering the genetic control of ethylene biosynthesis has been achieved for a number of crops (Hewett, 2006, p. 41). Another bioengineering tool, nanotechnology, represents the creation of functional materials, devices and system through extremely miniaturized objects. The potential uses for this technology include sensing, acquisition, storage, etc. With information and computer technology, small complex devices can improve traceability, identification, and instant communication. The additive value of these alternatives is their tremendous ability to streamline and share information about the operational effectiveness of the supply chain.

These types of technological enhancements in agricultural development help increase the level of per capita consumption resulting from progressive higher per capita production (McLoughlin,

1970). The implication is that a baseline of technological implementation exists for cultivators wishing to increase production. In developing countries, the sentiment towards genetic engineering can range from distrust to credence. Notably, the goal of this science is to increase yield along with insect and disease resistance in the face of limited inputs such as water and fertilizer (Leisinger, 1999). The adoption of new technology or bioengineered inputs by African farmers, however, is dependent on factors that may have little to do with the end effect. These include the farmer's level of technological knowledge and managerial competence, as well as socio-cultural acceptance and availability of the innovation (McLoughlin, 1970, pp. 18-21). Overall, the financial support and realization of new technology into native processes represents additional challenges for developing countries.

2. Economic Factors: Supermarkets and Food Safety

Integration into A level supermarkets (national chains) requires suppliers of fresh cut vegetables and fruit to maintain products to health and safety codes. For food products, quality and source determine the number and type of microorganisms present on the fruit or vegetable (Zhang, 2007). Moreover, the quality from the initial processing to distribution stage impacts the value of exported products. As to be expected, suppliers in developing countries will face a host of issues as they attempt to keep pace with rapid changes in food related technologies. The transition from local to international supplier means abandoning traditional preservation techniques. Practices such as drying simply do not compete with industrialized techniques of canning or freezing. In this respect, improving storage, packaging and food handling in less developed countries is relatively important to the success of the supply chain.

Packaging of fresh cut produce has undergone dramatic advancements and can adequately address problems in the area of preservation. As one author notes, "the type of packaging used

must be appropriate for the product it contains as well as the target market” (Forney, 2007, p. 53). In addition, packing produce in flexible or rigid polymer containers or glass are all acceptable candidates for packaging. With respect to processing sites in developing countries, these types of materials are easily utilized and readily available. However, packaging technology has progressed to include the use of modified atmosphere packaging (MAP) which requires special films to affectively alter the oxygen and other gases content to beneficial levels (Forney, 2007). While multinational food corporations might quickly transition the most advanced materials into their supply chains, the required or standard use of more high tech innovations becomes an issue in developing nations where expense and accessibility play a critical role in their adoption.

Food safety techniques include temperature control, surface disinfectants, low dosage irradiation (ionizing radiation) and bio-control (natural antimicrobial compounds) (Zhao, 2005, pp. 72-75). The disinfectants eliminate hazards and can be simple solutions composed of chlorine bleach. In contrast to the rapid advancements used for livestock contamination, the science for pathogen detection on fresh fruit and vegetables is progressing at a slower pace. Pre-harvest sources of contamination include soil, feces, irrigation, water, dust, fungicides and insects inadequately composted manure, or non-hygienic handling (Zhao, 2005, p. 76). At the farm level in developing countries, this area of knowledge needs vast improvement.

Among the marketed grocery items, whole fresh fruits and vegetables are considered less risky from a microbial disease viewpoint but are risky in terms of pesticide residuals (Mencarelli, Salcini, & Bellincontro, 2005). The detection of unwanted agrochemical components negatively affects an assorted batch of collected foods in numerous ways. On one hand, it raises health concerns. On the other, a bottleneck can occur in a tightly woven supply chain if more effort is

expended to find contaminated items. Hence, risk assessment of pesticides residuals is an area of concern in developing farms where unregulated use can occur and toxicity screening is limited.

Another challenge for indigenous source providers comes from the demand side of the supply chain. While it is common knowledge that the shelf life of fresh fruits and vegetables is four to seven day, most supermarkets want extended lengths from 14 to 21 days (Zhang, 2007). This puts tremendous pressure on producers to deliver at faster speeds, store at ideal temperatures and improve quality through technologically based enhancers. In view of the epidemiology of diseases associated with fresh cut fruits and vegetables, the precautionary methods for cultivators of minimally processed or organic products should include hazard analysis, control point systems and engage global standards for safety and health practices. Thus, improving the management of harvest practices along with an understanding of microbial ecosystems means educating traditional growers about the harmful potential of plant based pathogens (Beuchat, 2007).

C. Need for Infrastructure

Development of trade infrastructure (modernized custom facilities, transport corridors, and information systems) is critical to African regional economic growth. The World Bank estimates African's unmet infrastructure requires approximately \$22 billion a year with an additional \$17 billion needed for maintenance and operation. (United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB) and the World Trade organization (WTO), 2007) In addition, the capital requirements for competitive capacity building systems derived on "export-led development strategies" necessitates improved access to investment from the private sector.

From a regional perspective, West and Central African obstacles are denoted as "high trade costs, weak institutions and fragmented infrastructure (i.e. transportation and utility frameworks" while

Eastern and Southern Africa trade challenges include “trade policy capacity-building, trade facilitation, connectivity infrastructure, and adjustment assistance.” (United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB) and the World Trade organization (WTO), 2007) As will be discussed later, regional development banks are mediums for fulfilling financing gaps in these areas. (United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB) and the World Trade organization (WTO), 2007)

Table 3 Differences in infrastructures in Ghana and Costa Rica

Infrastructure	Ghana	Costa Rica
Area (km ²)	239,460	51,100
Railways (km)	953	950
Asphalted roads (km)	11,665	7,896
Unmetalled road (km)	27,744	27,996
Inland waterways (km)	1,293	730
Ports	2	6
Airports (asphalted runways)	7	30

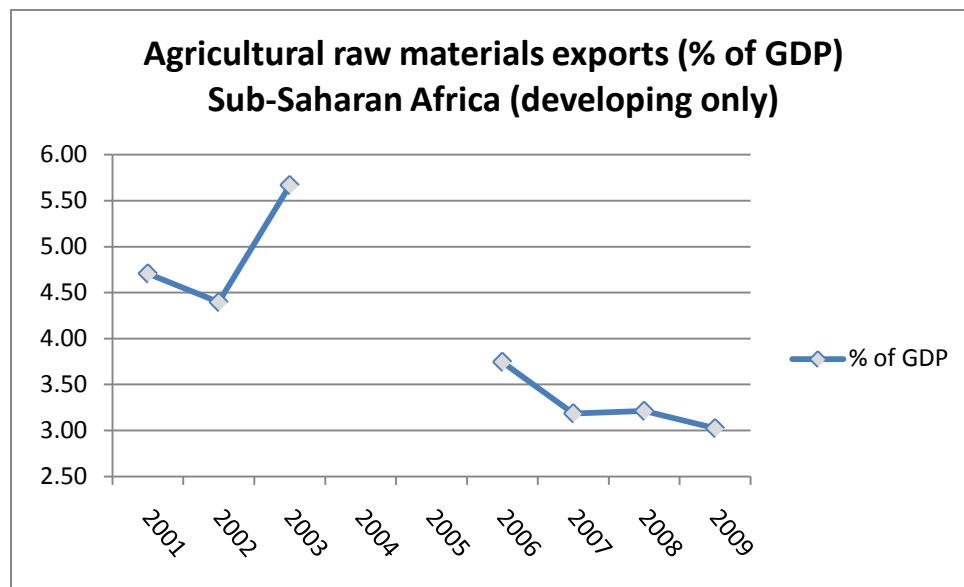
Source: www.theodora.com, Ghana Sustainable horticultural export chain, 2006

On a national level, infrastructure issues can debilitate the supply chain. In some cases, problems shared among most developing regions of the world have a more severe impact on the nations of Africa. Concomitantly, a McKinsey report cites that the “factories in the transition countries are as productive as those in China and India but that the Africans’ overall costs are higher because of poor infrastructure and regulation – problems that the right policy reforms could fix”. (Leke, Lund, Roxburgh, & van Wamelen, 2010). The same correlation applies to the agricultural sector.

Table 3, which displays the differences in infrastructure between Ghana and Costa Rica, illustrates this point. The Caribbean nation is representative of a competitive leader in fruit export. Although there is not much difference in the total length of road between the two countries, the absolute number of asphalted road per square kilometer of land in Costa Rica is three times greater than in Ghana (Agricultural Economic Research Institute (LEI) and Michigan

State University (MSU), 2006). Consequently, the antiquated transport system yields a greater disadvantage to smallholders in Africa even though Costa Rica is not much better off in respect of total paved road.

The impetus for more rapid infrastructure development originates from the financial commitments of Africa's trade partners such as China. So what are the priorities for rural infrastructure development as more investment filters into the continent? Interestingly, the inherent bias of capitalized development initiatives is towards urban development. Thus, the challenge for decision makers allocating funding is to keep preference for urban development balanced with the recognition that more has to be done to bolster rural development. In essence, both areas are important to Africa's future.



Source: WDI and GDF from The World Bank 2010

Chart 1 Agricultural raw material exports (percentage of GDP)

The prior topic is pertinent given the overall decline of agricultural exports from Sub-Saharan Africa over the last decade (see Chart 1) despite the relative successes of existing African agro-

firms. A look back at the development of the agriculture sector reveals priorities skewed towards export to foreign urban markets while internal food need reached crisis level. Notwithstanding a critical view of the past, export trade must persist and future growth in this sector should not continue to neglect domestic demand. History has demonstrated that this formula of disregarding Africa's larger population issues does not work to the benefit of nations seeking to improve economic status as a whole. The challenge is to undo the inequity that shifts resources into one realm while completely excluding another.

1. Economic Factors: Storage and Transport Modalities

Since storage and warehousing can dramatically influence food quality along with shelf life (Zhao, 2005), these factors present particular challenges to farming systems that do not support controlled environments with mechanized temperature and atmospheric regulation. In addition, the highly publicized incidents of deadly food contamination have exacerbated consumers fears about the safety of edible products. Mounting concerns have made governments toughen up their product safety standards and upgrade restrictions on imports. The growing requirements present obstacles to growers in developing countries who have limited resources, skill sets and information to adapt quickly to contamination outbreaks along with safety concerns (van Roekel, Willems, & Boselie, 2002).

Other components critical to supply chain logistics include trucking, airfreight, ships and railways. The condition of these components affects connectivity, speed, volume, etc in real time. Some of the challenges for growth in this area entail extending the role of financing and risk management. An examination of trends in modern retailing indicates that increased global dominance by a dwindling number of supermarket chains will place higher demand for value and coordination on suppliers (Hewett, 2006). Perishable foods such as fruits already rely on

airfreight to move from the grower to supermarket in a two to four day window (Hewett, 2006). Developing countries with limited transport systems face the problem of adding greater functionality to transport modes for perishable goods when speed equates to quality and profitability (Hewett, 2006).

Trucking and land vehicle transport is greatly impacted by road conditions, fuel availability and route access. The lack of infrastructure in Africa is considerable when noting that the entire continent has 800,000 miles of road with only 60,000 paved, while the US has over 6,400,000 miles of mostly paved road (Kumar, Niedan-Olsen, & Peterson, Educating the supply chain logistic for humanitarian efforts in Africa: A case study, 2009). In 2002, a study done by the Comprehensive Africa Agriculture Development Program (CAADP) noted that “improving rural roads to boost market access for smallholder farmers will require an initial investment of \$62 billion over some 10 to 15 years while operation and maintenance of these assets will require an additional \$37 billion” (AGRA, 2011).

A summary of significant problems in logistics include: 1) poor infrastructure; 2) poor quality of the means of transport used; 3) lack of refrigeration; 4) low export volumes; and 5) high freight costs (Agricultural Economic Research Institute (LEI) and Michigan State University (MSU), 2006). As for aircrafts, which are becoming larger with time, the opportunity to utilize more space is potentially limited or lost based on agricultural low output, high costs, limited flight routes and access to airports in Africa. However, the potential for a breakdown of temperature management in the cargo holding areas is also a high concern. Such events result in greater costs to African suppliers delivering smaller quantities. Shipping is a viable alternative for coastal regions. Today, new generations of faster ships exist but substantial concern looms over the growing impact of piracy in African waterways. High-speed rails offer a cost efficient method

for high volume transport but are characteristic of landscapes in industrialized countries. Again, this is another option for greater utilization afforded to most developed competitors but it is not readily available to agricultural suppliers in under-developed African regions.

2. Physical Input Factors: Irrigation and Soil Issues

Other issues for agricultural productivity are soil fertility and irrigation. Only 6% of Africa's cropland is irrigated compared to 40% in Asia (Anan, 2011). Irrigation in arid regions allows new land resources to be cultivated and economizes land use (Andreae, 1980, p. 79). Irrigation can be very expensive and requires certain water conditions. The use of certain equipment becomes limited with the installation of surface irrigation. On another note, the geographic distribution of irrigation systems (surface versus sprinkler) is really a function of their cost structure. Industrial countries frequently use sprinkler irrigation, whereas densely populated developing countries rarely utilize this type of system. Sprinkler irrigation creates maximum effect in a high wage-high capital investment industrial farming, while surface irrigation is favored in a capital scarce and abundant cheap labor environment (Andreae, 1980). High costs bundled with limited technical knowledge of sprinkler maintenance and installation curtails the potential productivity gained by adopting a more efficient type of irrigation. The task of replacing low tech high labor irrigation methods (such as tread wheel or winch delivery of water to an open ditch) with underground sprinkler irrigation systems entails placing greater importance on irrigation methods as developing economies grow (Andreae, 1980, pp. 89-90). Moreover, underground installation combined with sprinklers provides some advantages over surface application (Andreae, 1980, p. 83).

Irrigation and fertilization influence the condition of a major input for agricultural farming - soil. Soil is an organic material open to elements such as chemical contaminants. These substances

can be naturally present or introduced during processing and produce physical hazards. The other challenge for soil is fertility. Soil conditions are improved by production systems that combine optimal levels of irrigation, drainage, improved cultural practices and fertilizers along with the introduction of efficient varieties (DeVries & Toenniessen, 2001, p. 24). Fertilizer consumption has been light in Africa, therefore bringing new land under cultivation is the main method to replace mined soils (drained of nutrients from continual farming) (DeVries & Toenniessen, 2001, p. 24). This point brings the subject of fertilizer use, another considerable issue in developing Africa, into light.

During the 1980s, the removal of subsidies for fertilizers and higher prices directly led to a reduction of inorganic fertilizers uses (DeVries & Toenniessen, 2001, p. 25). In addition, the prices for domestic fertilizer are higher in Africa than in any other part of the world. This results in low fertilizer usage among small-scale African farmers. Soil fertility remains a major obstacle to obtaining high yields and achieving sustainability of African farming systems. Given the constraints, one option is to embrace a more organic approach and avoid the problems associated with increased use of inorganic fertilizers. This approach involves “cycling of nutrients in low-input systems and the use of lower-cost methods of adding nutrients, such as legume rotations, green manures, and improved fallows” (DeVries & Toenniessen, 2001, p. 25).

The test for limited infrastructure production environments is to utilize farming inputs more efficiently and improve management practices to increase output. In view of the African debate over the use of genetically modified organisms (GMOs), the resolution might require choosing the best method to achieve a means rather than the one preferred. As one study suggests, a combination of “low soil fertility and low fertilizer use, combined with a lack of irrigation, very low pesticide use, and low rates of tractor use in Africa, effectively mean that crop genetics and

improved planting material remain as one of the most effective means by which African farmers can be assisted” (DeVries & Toenniessen, 2001).

3. Organization Factors: Political Division and Land Rights

The issue of African corruption is a constant theme with many national achievements overshadowed by politically inspired waste, hunger, conflict, and the vast divide in economic classes. The gluttony for wealth makes it difficult for elites and those in leadership positions to act beyond self-interest when determining resource allocation. The definition of political corruption with regard to the continent is defined as “the transformation of regulated distributions into practices based on the profit return to those in charge of administering programs”. (Cohen & al., 1988, p. 13) Equally, the long-lived collective tendencies of leadership to use discretionary powers to achieve personal goals over national development are a real deterrent to venture building and economic growth.

While the notion of strengthening agricultural supply chains in developing countries is gaining recognition (Hewett, 2006), these modern systems incorporate a growing number of conditions, regulation and apparatus not easily accessible to chain providers. Facing challenges through an integrated approach means introducing untested methods and relationships into indigenous environments. Thus, the results of this approach can be somewhat unpredictable.

Adding to the issue of political complexity and agribusiness development, firms are subject to both formal and informal pressures. The threat of nationalization by governments is of continual concern particularly with growing privatization and outside investment into African ventures. In economic terms, this is deemed as political risk. The opposite side of regulated activities is the informal construct set by traditional by-laws and policies. At the local levels, traditional chiefs who use rules, sacred controls and civic controls “have formal and informal management

structures for natural resources” (Oduol, Ajayi, Matakala, & Akinnifesi, 2008, p. 314). These traditional management systems can be very efficient and a vast source of indigenous knowledge, or a major hindrance. Using the example of South African fruit trees, the tribal rules may clarify who has ownership and user rights of the trees or limit the market supply. While this may cause concern with commercialization, it should be acknowledged as a cultural nuance. In this respect, cross-cultural interactions are always challenging, every effort should be made to communicate and set up a reliable institutional framework with local governments to reduce risk and uncertainty for supply chain traders (Oduol, Ajayi, Matakala, & Akinnifesi, 2008, p. 315).

This also brings to bear the issue of land tenure in African countries and the cultural particularities of Africa’s many regional tribes. In places such as Malawi and Zambia, land primarily belongs to members of households while some forests are communal. In addition, some small lots are borrowed by friends or chiefs (Oduol, Ajayi, Matakala, & Akinnifesi, 2008, p. 315). Use designation and transferability can shift from region or country, and an understanding of common practices (such of using fruit trees for firewood) should be investigated. Studies indicate that economically valuable trees in the developing world can be among the most common and “valuable forms of customary evidence for claiming ownership of land” (Oduol, Ajayi, Matakala, & Akinnifesi, 2008, p. 316). Therefore, ventures seeking fruit trade into African regions must be cognizant of the land rights, supporting formal policy and informal structure managing natural resources. Negotiating these obstacles insures unfettered access to goods and profits.

4. Socio-Psycho-Cultural Factors: Green Revolution and Hunger

During the 1960s, Asian farmers dramatically improved rice yields in humid tropical regions with a new rice ideotype in combination with improved management practices and increased use of inorganic nitrogen fertilizers. The resulting productivity leap was dubbed the “Green

Revolution” (Nyerges, Amsterdam, pp. 201-202). The Green Revolution bypassed Africa when efforts to supplant traditional rice technologies to small-scale farmers failed, and today a continent of mass resources and land remains vulnerable to famine. Even more devastating is that the region is home to 200 million people suffering from chronic hunger; making it one of the only regions in the world where hunger is worsening (World Economic Forum, 2008). The Green Revolution for Africa represents a fundamental theory of change needed to assist the transformation of agricultural development beyond the existing limitations. UN Secretary General Kofi Annan issued a global call for a “Uniquely African Green Revolution for the 21st Century that aims to improve infrastructure and market access, empower women, and dramatically impact food production through increased inputs” (World Economic Forum, 2008).

Theory suggests that cross cultural systems are vulnerable to the distinct condition in their adopted environments so the level of flexibility and nuance assigned to adapting systems must be unbounded (McLoughlin, 1970). Hence, there is no doubt that Africa’s Green Revolution should regard its distinct practices. From this viewpoint, the critical choices needed to improve African food production should also emphasize the relative importance of smallholders in the agricultural economic ladder.

By the 1980s, less than 5% of African food production originated from large farms (Cohen & al., 1988, p. 33). While that number has increased, current figures cite that “50% of hungry worldwide are small-scale subsistence farmers unable to produce enough food for their families” (World Economic Forum, 2008). African governments have favored bimodalism in the East and South and thus tended to regard support for large farms as production policy, and smallholders as income distribution policy (Cohen & al., 1988). As demonstrated by a number of global

initiatives supporting an African Green Revolution, small farmers and rural systems are integral to economic success and product diversification from broader regional development strategies.

Scale shifting necessitates finding balance between large and small farmers, and extending trade sourcing into poor and chronically hungry regions. The social returns for business engagement include “improvements in household income; quantity, quality and accessibility of food supply; nutritional and health status; and capacity strengthening for food production or entrepreneurship” (World Economic Forum, 2008). Facilitating the exchange of goods sourced from Africa’s poor farmers, supporting the infrastructure required for increased output, and promoting the expansion of conducive agricultural practices, are all beneficial to business bottom-lines. The benefits are derived from potential returns which include the following: “1) generating profit; 2) capturing market share; 3) expanding distribution networks and securing new business partners; 4) increasing supply chain efficiency, flexibility and quality; 5) increasing innovation and efficiency to operate effectively in new markets; 6) securing customer loyalty and brand recognition; 7) gaining a positive public reputation; and 7) strengthening regional economic growth and competitiveness” (World Economic Forum, 2008).

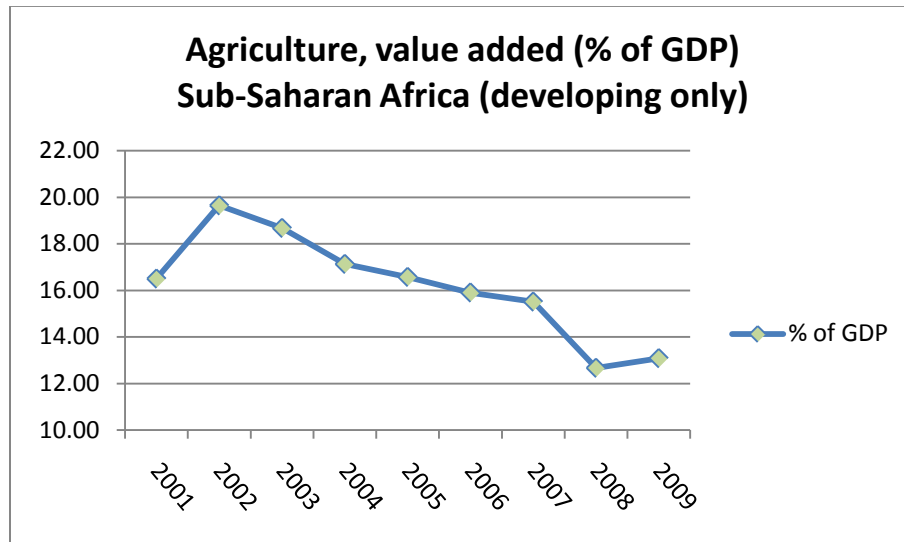
One formidable obstacle has been the passive and formal resistance to Green Revolution techniques and planting of GM crops in African developing nations. While the belief that genetically modified (GM) crops were unsafe for human health and environment spread, African exporters feared they might be denied sales in the European Union markets if they started mass producing GM agricultural commodities because of a similar incident with US exporters over GM corn (Paarlberg, 2006, p. 92). As a result, high anxiety manifested into a high degree of regulatory restraints on GM crop production in developing countries (i.e. it is illegal in some African regions to plant GM seeds) (Paarlberg, 2006, p. 94).

This fear may be unwarranted. The post green revolutionary varieties embody general attributes that for the most part add value and productivity to the spectrum of farm activities. Some features of improved rice are as follows: high yield, short growth duration, multiple disease and insect resistance; improved quality; and tolerance to abiotic stresses (Kang, 2002). Other examples include maize farmers in Kenya suffering 45% loss of crop from stem borers, which could be helped with plant Bt maize, and the cowpea farmers in Cameroon who lose half their crop to pod borers could overcome predation issues with Bt cowpeas (Paarlberg, 2006). The issue of survivability is extremely relevant to developing Africa because of the widespread impact of crop failure due to drought and even pests. A broader understanding of how bioengineered crops can affect the success of African farming is needed to combat social notions of genetic innovation as bad for Africa. The challenge is to discover what degree of GM technology is acceptable to African consumers and policy makers. In the meantime, the poor farmers in these developing countries continue to suffer substantial yield losses due to crop pests, disease, productivity, drought and low fertility soil.

III. Economic Analysis

The rationale for pursuing export diversification from Africa's more stable regions begins with the overall positive valuation of the past decade of economic activity and a promising outlook for continued expansion of regional markets. With a collective GDP valued at \$1.6 trillion in 2008, equivalent to that of BRIC nation's Brazil and Russia, Africa is home to the world's most rapidly expanding economies (Leke, Lund, Roxburgh, & van Wamelen, 2010). The growing trade relationship with China is increasingly relevant in terms of natural resource output and the vast potential to propel the continent's assimilation into global financial markets and supply chain systems. The agriculture sector is one area where Sub-Saharan Africa can develop some competencies that fit the scope of international market demands. As displayed by Chart 2, the

downward trend for this sector can improve given the vast potential for African nations for trade improvement and economic recovery.



Source: WDI and GDF from The World Bank 2010

Chart 2 Agriculture, value added (percentage GDP)

On one level, a number of African nations are dependent on outside resources to stabilize and improve fragile internal structures. Despite the historical reputation of socio-economic imbalance motivated by fractured and dysfunctional political regimes, the gains made by African countries in the last few decades point to the growing influence of market forces driving governments to gain greater control over their economic destinies. According to McKinsey report on African growth, real GDP doubled from the prior decade to an annual growth rate of 4.9% between 2000 and 2008. (Leke, Lund, Roxburgh, & van Wamelen, 2010). Table 4 provides a historical snapshot beginning in the prior decade that shows the degree to which African export has shifted upward for mined products exports, while agricultural products witnessed a 43% decline.

Table 4 Structure of Exports

Africa and other regions, 1990 - 2004	1990 (%)	2000 (%)	2004 (%)
<i>World</i>			
Agricultural products	13.2	9.3	8.8
Mining products	15.4	14.9	14.4
Manufactures	71.4	75.8	76.8
<i>Africa</i>			
Agricultural products	27	17.7	15.3
Mining products	51.1	57	59.1
Manufactures	21.9	25.3	25.6
<i>Latin America</i>			
Agricultural products	28	27	27.5
Mining products	34	35.2	33
Manufactures	38	37.8	39.5
<i>Asia</i>			
Agricultural products	10	6.1	6
Mining products	9.5	7.6	7.5
Manufactures	80.5	86.3	87.5

Source: WTO 2002,2005

Despite the misappropriation of wealth by political governance, lack of infrastructure and unequal resource allocation create formidable challenges for venture building in Africa, the building blocks for large-scale positive change in Africa's regional economies can be created from long-term integration and bilateral trade with China as it evolves into an industrialized global leader. As one author suggests, Africa can be viewed as the "guarantor of China's projected growth and is to be the breadbasket of China". (Katswara, 2008) Thus, seizing the opportunity for improved returns from value chain escalation begins with the identification of industries and products that can be primed for sustainable growth.

1. Growth of Africa: Motivation to change

Within recent years, African governments facilitated economic growth through inflation and debt reduction measures along with the adoption of stimulus policies (Leke, Lund, Roxburgh, & van Wamelen, 2010). Foreign governments are also weighing in by providing assistance. Capacity building and other fundamental objectives for trade have been supported by financial commitments from Monterrey, Gleneagles and Hong Kong as a scaled development initiative agreed upon in the Paris Declaration. (United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB) and the World Trade organization (WTO), 2007). The partnerships utilize long-term contractual arrangements and demonstrate the increasing financial commitment between China and Africa.

These agreements are shifting the balance of African trade patterns from Western Europe to Asia (Leke, Lund, Roxburgh, & van Wamelen, 2010). In addition, there is a growing need for commodity imports as the cultural transformation in the Chinese population drives consumerism and erodes the value of indigenous goods. Moreover, the fastest growing demand is from emerging economies such as Asia and the Middle East (Leke, Lund, Roxburgh, & van Wamelen, 2010). Finally, the micro and macro level exchanges in African agriculture continue to expand on a domestic as well as international front. The doubling of Asia's share of African trade in the last 20 years illustrates this point (Leke, Lund, Roxburgh, & van Wamelen, 2010). Additionally, the beginning of this decade witnessed a geographic shift with the European Union's shrinking share of African exports juxtaposed against regional imports and exports increase of 268% and 260% respectively with Asia. (See Figure 1) The degree of positive impact this trade growth will have on Africa's poorest mass populations remains to be seen. However, improving smallholder economic status dissipates vulnerability to internal food crises in Africa.

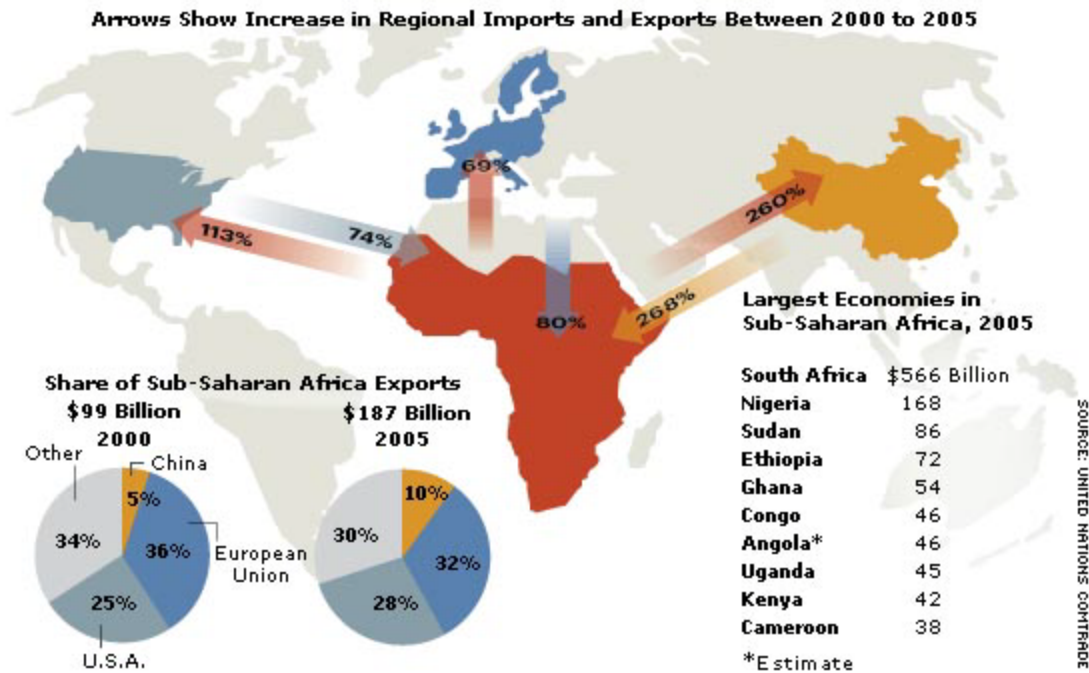


Figure 1 African Regional Imports and Exports

Estimates indicate that 200 million people in Africa alone are undernourished while the goal to halve the global food insecurity by 2015 is projected at a shortfall (Wright, 2009, p. 2).

Agricultural export can fuel economic stability, which in turn provides another means to address hunger. Ultimately, the many nations on the continent must take steps towards the development of infrastructure and access to capital investment to scale up regional, transnational and international food production. If done with the resolve to maximize goods for internal food deficits, the latter point can help combat internal shortage issues while meeting the competitive benchmarks to satisfy external supply and demand.

A closer inspection of hunger in developing nations reveals that famine is not only an indicator of lack of food but also a sign of income deficiency, which stifles the ability to purchase subsistence goods. Economic theory suggests that a positive relationship between labor and land productivity exists. (Kowtal, 1981). The historical data indicates that developing countries experience

relatively higher GDP growth along with higher agricultural output. However, there are some anecdotal lessons where agricultural and economic performance is weakly linked in rural communities (Balisacan & Pernia, 2005). Finding methods to improve income drives consumption, whereas producing more dedicated sources of consumables does not necessarily resolve issues of purchasing ability. As alluded to earlier, consumption is a relatively important contributor to growth in developing and emerging economies.

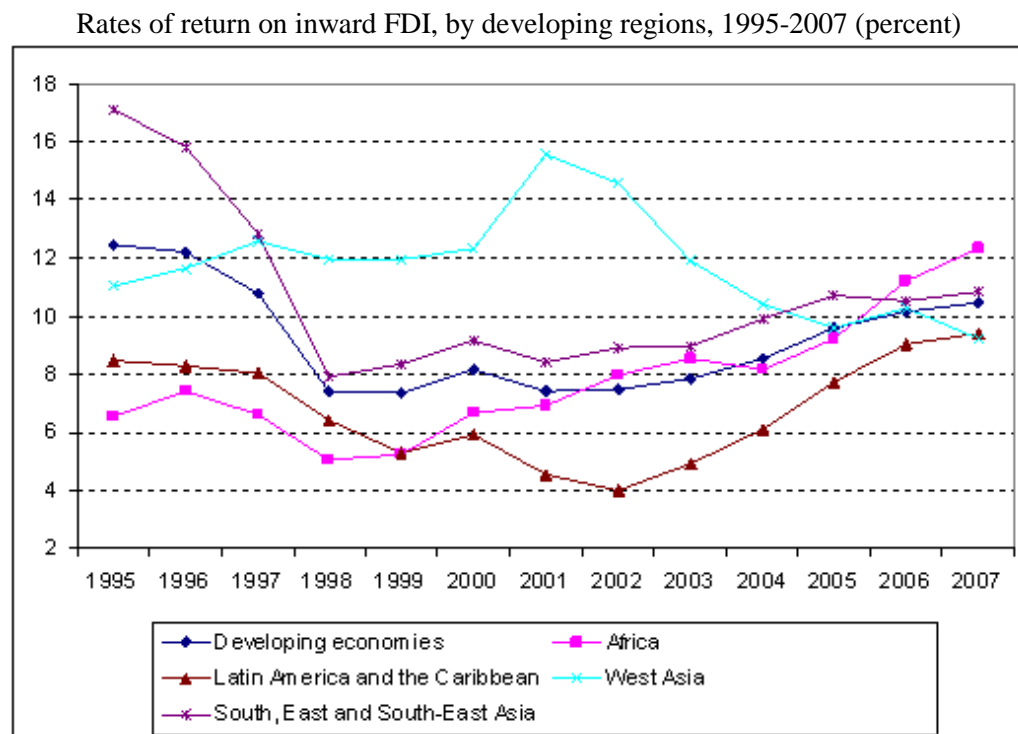
a) ***Contract Enforcement and Investment Returns***

The basic goal of any business venture is to produce goods or services at a profit. The potential to compete successfully is not necessarily preceded by periods of incremental profits but in some cases, uneven progressive financial growth. This point illustrates the importance of evaluating financial returns. The rate of return on foreign investment is higher in Africa than in any other developing region (Leke, Lund, Roxburgh, & van Wamelen, 2010). Africa received a record foreign direct investment (FDI) inflow of \$53 billion and Chart 3 demonstrates an upward trend for returns to FDI's (UNCTAD United Nations Conference on Trade and Development, 2011). Correspondingly, the rate of foreign investment in Africa is higher than any other developing region and the continent's annual private infrastructure investments have tripled since 2000 (Leke, Lund, Roxburgh, & van Wamelen, 2010).

From this perspective, the magnitude of recent Chinese investment often overshadows other international investment in Africa. For example, India is a source of increasing private investment into the continent and expanding a relationship that holds both long and short-term economic ramifications. These types of investment models are a welcomed contrast to China's model of state managed investment and demonstrate viable and alternative methods to access Africa's emerging markets (Teslik, 2007). In examining the levels of business activity for the

African agriculture sector, the investment to small holders is relatively low cost because the primary inputs of labor and land are comparatively cheap in rural agricultural systems.

Referencing economic theory, the increased efficiency of small-scale farmers and low cost system inputs equates to higher productivity for the actual capital investment.

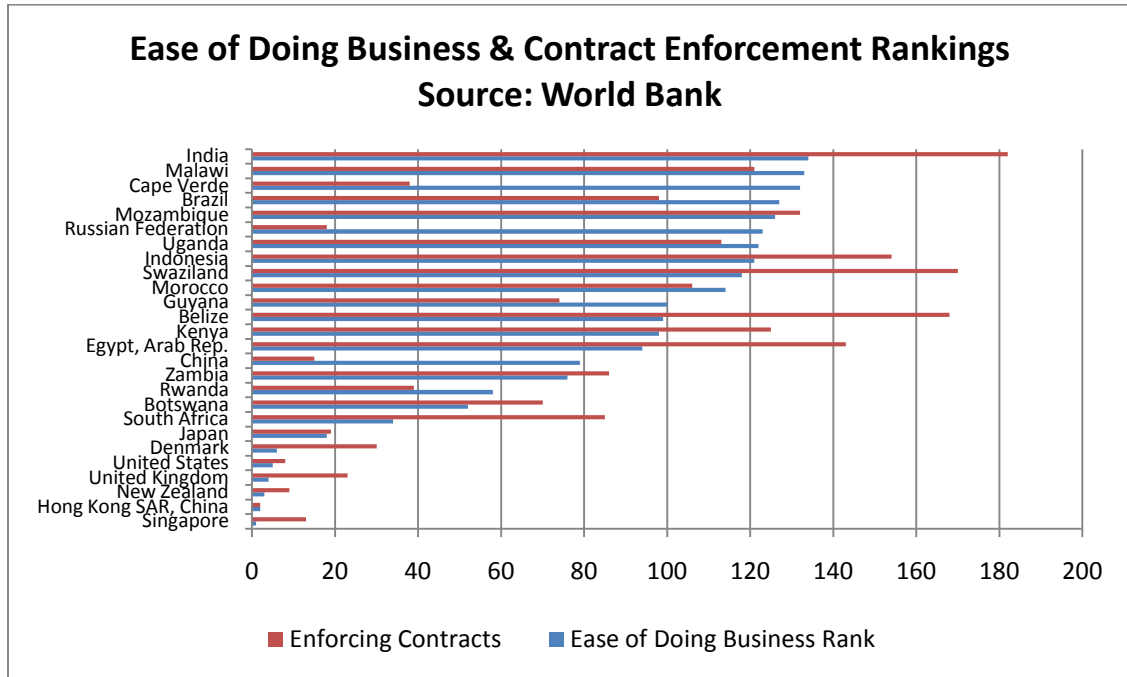


Source: UNCTAD, World Investment Report 2008: Transnational Corporations and the Infrastructure Challenge. <http://www.unctad.org>
 Chart 3 FDI Return on Investment

b) *Doing Business in Africa*

The emerging trade relationships with Africa can help achieve development goals if the policy structure provides some protectionism and other incentives. Inspection of the World Bank rankings for ease of doing a business and starting a business indicate that South Africa, Botswana, Rwanda and Zambia are all ahead of the BRIC nations (World Bank, 2011). (See Chart 4) Contract enforcement is higher for China and Russia, however, a fair number of African

countries ranked higher than BRIC nations of Brazil and India for this category (World Bank, 2011).



Source: World Bank, 2010
Chart 4 Ease of Doing Business & Contract Ratings

a) *Economies of scale and the Law of Diminishing Returns*

The classical farm management theory describes three basic groups for management problems facing the farming sector as follows: “1) those concerned with the selection of the most economical equipment and production materials; 2) those concerned with the use of production equipment and materials so as to obtain the highest possible yields; and 3) those concerned with achieving maximum utilization of products.” (Andreae, 1980, p. 5) The three categories of production factors for farms include land, labor and capital. The theoretical principle that applies to farming is the law of diminishing marginal returns, which states that the increase in gross profit per an additional unit of value invested after a certain point continually diminish. Because the

price cost relationship is changing with profitability diminishing for each additional input, the optimum results are not necessarily at maximum yield. This law applies to labor input as well. This suggests that efficiency and capacity are critical. Therefore, farm systems in developing countries should strive to meet demand because there is an associated cost advantage.

The comparative costs of the input factors determines what proportions are used and can change dramatically based on the course of the nation's economic development (Andreae, 1980, p. 8). Hence, there is a choice between labor productivity and land productivity. The degree of intensity for cultivation depends on whether the optimum use of land or the maximum use of labor and capital is important (Andreae, 1980, p. 8). In situations where land is scarce, utilization is more important and the opposite situation can apply to labor and capital. At the lower level of agricultural development, land has no value because it has not been cultivated, therefore labor and capital investment require the amount of cultivated land provide as high a yield as possible. The opposing interests of the inputs are summarized as follows: "optimum land productivity requires intensive cultivation, while optimum labor and capital productivity require extensive cultivation" (Andreae, 1980, p. 9). A theoretical chart of development indicates that for developing land rich countries, land and labor are cheap whereas as capital goods are expensive (Andreae, 1980, p. 11). Therefore, it is possible to do without high land and labor productivity but it is extremely important to obtain high capital productivity. This scenario applies to Africa's developing agricultural system.

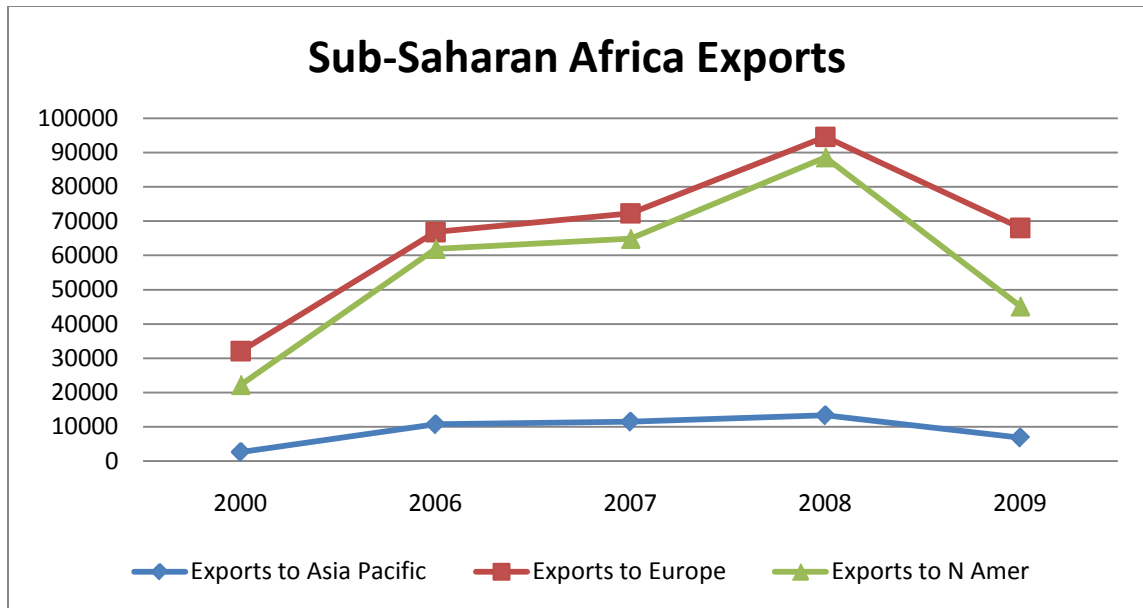
The economies of scale are useful in explaining patterns of trade and focus on the relationship of cost and output with average cost declining while output increases. The historical inspection of African economies of scale suggests favor towards mineral and fossil fuel extraction as a principal output. However, in examining the recent GDP growth across sectors and the

associated expanding capitalization, natural resources are only part of the picture. The rapidly changing horizon of African economies is a good indication that diversification will yield multiple economies of scale and the potential of domestic and foreign consumerism will drive development efforts to differentiate goods' production.

Although there is little data on Africa's farming systems to support whether the presented theoretical assumptions are enacted in real world situations, its certain that input factors in the agricultural sector provide a level of insulation against production stresses encountered in industrial and emerging economies. The labor pool constraints are primarily limited to technical limitations. In general, the abundant labor in developing countries is well suited for low-tech agricultural development. Thus, there is considerable promise for agriculture sector to maximize the value of capital inputs with better utilization of land and labor to reap the reward of competitive advantage at a specific point of output.

2. Growth of China: End User Analysis

In recent years, the massive increase in foreign direct inflows into China suggests the potential market for this global emerging economy is enormous. Although the overall value of trade to North American and Europe is far greater, the percentage increase in Sub-Saharan exports to Asia has also grown in that period. (See Chart 5) A snapshot of export activity from African regions shows that Northern and Eastern Africa exported about \$12 and \$11 billion respectively in food category exports between 2000 and 2009 (UN Comtrade, 2010). The prospect of continued growth is evident. Therefore, learning how to capitalize on China's economic opportunities becomes an even more critical endeavor for Africa.



Source: Comtrade 2009 International Trade Statistics Yearbook

Chart 5 Sub-Saharan Africa Exports

BRIC countries are the main driving force for GDP growth of emerging economies. They are also paving the way for changes in the consumption and production patterns of the world economy (Georgieva, 2006). As a member of the BRICs, China is distinguishable in several ways. (See Table 5) In comparison, it has the greatest population, GDP growth percentage, GDP and GDP per capita than any of the other three nations. China not only has the greatest amount of foreign reserve, foreign direct investment inflows and share of investment in GDP, it also has the lowest average CPI. As for the long-term outlook, China's projected GDP in 2050 will be the highest of emerging and developed economies while surpassing the USA. However, a low GDP per capita estimate reveals that it will not be the richest economy (Georgieva, 2006). The reason for this is the total low compensation of workers compared to output. Although the trend for China has been increasing growth, the continued suppression of wages and currency value to

maintain competitive advantage in global production faces some degree of future unpredictability as US political pressures mount for devaluation of the Yen.

Table 5 Business Rankings by Country

Economy	Ease of Doing Business Rank	Starting a Business	Enforcing Contracts
Singapore	1	4	13
Hong Kong SAR, China	2	6	2
New Zealand	3	1	9
United Kingdom	4	17	23
United States	5	9	8
Denmark	6	27	30
Japan	18	98	19
South Africa	34	75	85
Botswana	52	90	70
Rwanda	58	9	39
Zambia	76	57	86
China	79	151	15
Egypt, Arab Rep.	94	18	143
Kenya	98	125	125
Belize	99	148	168
Guyana	100	90	74
Morocco	114	82	106
Swaziland	118	153	170
Indonesia	121	155	154
Uganda	122	137	113
Russian Federation	123	108	18
Mozambique	126	65	132
Brazil	127	128	98
Cape Verde	132	120	38
Malawi	133	132	121
India	134	165	182
West Bank and Gaza	135	173	93
Algeria	136	150	127
Nigeria	137	110	97

Source: World Bank <http://doingbusiness.org/rankings>

a) *Consumer Profile and Market Entry Strategies*

China's shift into the global economy has enabled the growth of consumerism and increased the consumption of global products. With respect to food, growing consumerism is encouraging Chinese demand for higher quality, modern packaging, freshness, nutrition, food safety, convenience and variety (Cai, 2010). There are several large domestic supermarket chains such as Hualian, Lianhua, and Vanguard (see Table 11) and a number of foreign-invested grocery retailers such as Wal-Mart, Trust-Mart, Makro, Jusco, Carrefour, Tesco, Lotus, Metro, Park'N Shop, 7-Eleven, and Watson which have all rapidly expanded operations in China in order to offer customers more diverse imported food products (Cai, 2010). Chinese consumers have shown interest in imported citrus and fruit juice, (Cai, 2010) and the current high import of soya, represent areas for African exporters to explore.

Review of a BRIC comparative chart (Georgieva, 2006) and Table 5 indicates that China has a fairly good overall ranking for ease of doing business while scoring the highest among BRICs in business environment factors such as starting a business and protecting investors through contract enforcement (World Bank, 2011). These factors provide encouragement for setting up trading partnerships. As with any cross-cultural engagement, there should be an understanding and adherence to rules familiar to the other party. Following are suggested market entry strategies for supply chain partners wishing to transition agribusiness goods into the Chinese food industry:

- Look for small or medium-sized private trading houses with subsidiaries or contacts in Hong Kong who can arrange payment in foreign currency and with a wide distribution network in your target local market. Also, be aware of the fact that there are plenty of Chinese traders that have difficulties opening Lines of Credit (LC) and have a poor understanding of international trading practice.

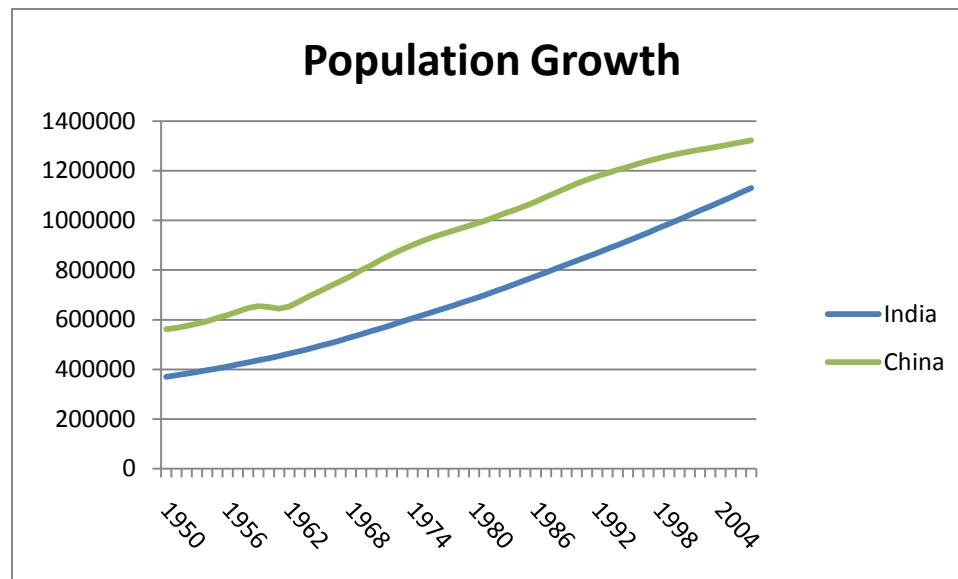
- Do not exclude all the large buyers, particularly those private trading houses who have been importing foods via Hong Kong traders. Some of them have started to buy directly from overseas suppliers and have gained basic experience in foreign trade. As a result, it has become easier to do business with these companies directly.
- Explore existing business linkages; registered businesses in African countries that have linkages with China and are focused on African-China trade opportunities linked to their investment.
- Take full export insurance.

Adapted from Australia's Food & Beverage to China Trend and Opportunities (Cai, 2010)

b) *Potential share of food market import*

As the world's most populated nations, both China and India are important export markets for agricultural exports sourced from Africa and account for approximately 7% of world exports from the region (Felgenhauer & Labella, 2009). (See Chart 6) China ranked number one as the fastest growing export destination with a percentage increase of 34.1% between 2000 and 2006 (Gonzalez-Nunez, 2010). While China's imports have increased significantly, Africa's exports to China have grown by over 1200% and \$25 billion in 2006 (Shaw, Cooper, & Antkiewicz, 2007). The profile for China's imports in 2009 show a high percentage of machinery and transport equipment at 40% with the top import of electronic integrated circuits (UN Comtrade, 2011). Soya beans imports amounted to \$18.8 billion that year placing it in the top 10 imports. In 2009, the trade balance by MDG regions indicates a positive balance of about \$10 billion for Northern Africa and negative balance less than \$10 billion for Sub-Saharan Africa (UN Comtrade, 2011). Total imported goods to Eastern Asia from 2000 to 2009 netted to \$18.1 billion USD. The total imports for food, live animals, beverages & tobacco was \$15.8 billion. Despite the negative trade

balance for all commodities to Eastern Asia for 2008/2009, imports in the food category were positive at \$3.7 for the same period. From 2005 through 2008, imports from the food categories more than doubled from prior year to 2005. (See Table 7) Factors for growth in food consumption include rising economic growth and per capita income along with significant changes in living standards.



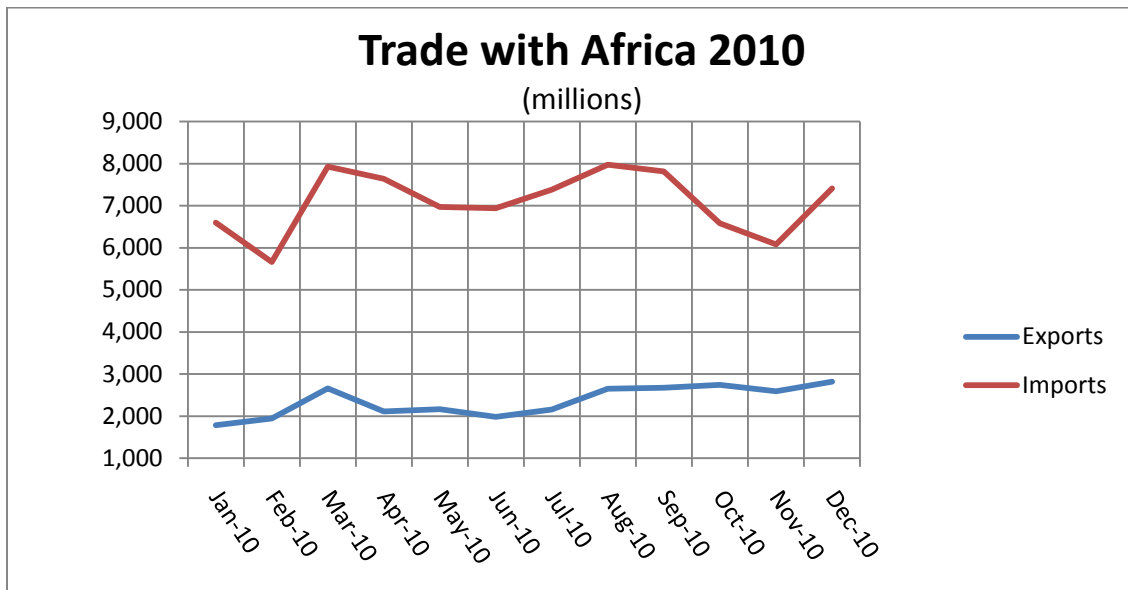
Source: WRDS Penn Tables 6.3

Chart 6 Population Growth China and India

China is Asia’s second largest food and beverage market after Japan (Cai, 2010) and Australia is a major food supplier. The Australian export value to China totaled \$928 million in 2008, representing a 40% increase from just one year prior (Cai, 2010). From a Chinese consumer viewpoint, Australia represents a clean green environment with good quality food thus giving the country’s exporters a competitive edge and incentive to supply to this value chain (Cai, 2010). Notably, China does maintain food import restrictions and quality control standards so eligibility of products and processing systems has to be confirmed before the commencement of any trade

venture (Cai, 2010). Although GM soybeans are widely consumed in China, government implementation of trade restriction regulation on biotechnology presents a significant challenge for US food exporters who view the policy as protectionism (Devlin, Estevadeordal, & Rodriguez-Clare, 2006, p. 107). As the population continues to grow along with consumer demand, Chinese restrictions on GM food import may present an upside for low-tech agricultural products sourced from Africa. These factors combined with the plans of increased investment from all foreign-funded supermarkets in China means that the food import market will continue to expand. These considerations suggest that Africa has an opportunity to capture a significant portion of present and future Chinese demand.

B. Impact Analysis



Source: World Bank, 2010

Chart 7 Trade with Africa

As referenced earlier, agriculture contributed to 12%, or \$28 billion, of the change in GDP between 2002 and 2007. A snapshot of current trade balance in Africa in 2010, Figure 5 shows a

current account deficit due to the high import volume and a slow upward trend for all commodity export activity. A look back at the structure of exports indicates a decline in African agricultural exports during the early half of the decade. This trend largely mimicked the patterns demonstrated in Asian and over all world regions. However, there is marked dissimilarity in the trend for agricultural export from Latin America. This region warrants a comparative analysis because Latin American is a significant party in global agricultural exchange. Thus, comprehending the impact of agricultural export in these emerging as well as developed economies provides relative benchmarks of the potential upside for African agricultural exports.

The potential to advance African agribusiness and food export into multinational corporate supply chains is dependent upon a number of variables. However, one path to improvement dictates that the incremental steps in the value chain must increase as well as the diversification of export products. (United Nations Economic Commission for Africa (UNECA), the African Development Bank (AfDB) and the World Trade organization (WTO), 2007). From this vantage point, growth and diversity correlate positively to one another. The quantitative results for developed export and agricultural sector highlight these factors. Since this supply chain model proposes to enhance international trade and integrate smallholders into the global exchange matrix, two national markets are targeted as ideal environments for this supply chain model. South Africa and Ghana represent examples of countries with profitable and fastest growing economies. Thus, they are distinguished as prime markets for agribusinesses.

As previously noted, export chains are improved through overall diversification. South Africa provides an excellent example of the potential gain of diversified trade. While a great deal of business development and capital infusion have focused on the BRIC nations (Brazil, Russia, India and China), South Africa has continued to perform well in a number of different economic

indicators and at an index rating ahead of the India, Brazil and Russia BRIC nations. By 2008, South Africa ranked 59th in the World Economic Forum's first Global enabling Trade report which measured the free flow of goods over borders and analyzed critical areas of market access, border administration, transport and communications infrastructure and business environment (South Africa The Good News, 2008).

The country's main strengths were in transport and communication infrastructure and services. It also fared well in term of ease of doing business with high marks in detailed categories such as "ability and ease of tracking (18), quality of air transport infrastructure (19), trans-shipment connectivity (22) and ease and affordability of shipment (22)" (South Africa The Good News, 2008). This country also has one of the highest national GDPs per capita and exports per capita for the continent. Figure 5 visually demonstrates the general correlation of exports, economic diversification and GDP. South Africa has the second highest economic diversity of all of the African countries. The combined factors set precedence for the entire continent. However, further analysis is needed to determine how the competitive strategies employed in the overall export patterns of South Africa can support expanded agricultural export.

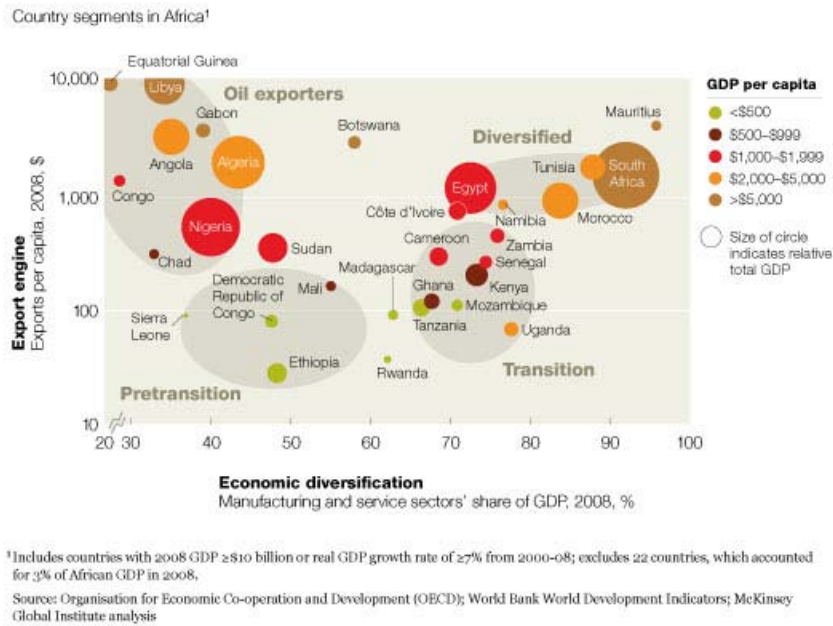


Figure 2 African Export, economic diversification and GDP per capita

The South African economy is distinct because of its high level of economic diversity and industrialization. In 2009, the country recorded a trade surplus of \$5.4 billion with Sub-Saharan Africa. The categories of manufactured goods chiefly classified as crude materials, machinery and transport equipment dominate nation's exports. These Standard International Trade Classification (SITC) categories, shown in Table 6, represent 68.5% or \$38,860 billion of the total exports. Although South Africa is distinguishable by its industrialized export, the country remains a good target for agribusiness because of its developed infrastructure and economic framework.

Table 6 South Africa Exports by SITC sections

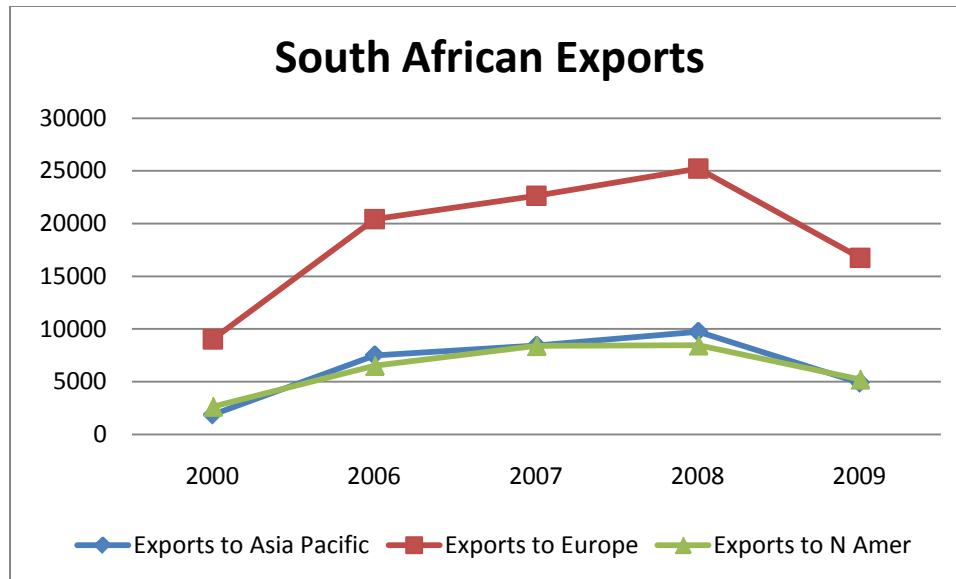
Value in million US\$ growth and shares
%

SITC	2009	Avg. Growth Rates (%) 2009		2009 share	SITC Categories Key
		2005-2009	2008-2009		
Total	53863.9	3.5	-27.2	100.0	0 - Food and live animals
0+1	5265.8	7.6	1.2	9.8	1 - Beverages and tobacco
2+4	8538.0	18.6	-20.5	15.9	2 - Crude materials, inedible, except fuels
3	6022.7	5.5	-15.4	11.2	3 - Mineral fuels, lubricants and related materials
5	4100.2	0.9	-28.4	7.6	4 - Animal and vegetable oils, fats and waxes
6	17535.4	-1.2	-34.9	32.6	5 - Chemicals and related products, n.e.s.
7	10786.6	3.0	-33.5	20.0	6 - Manufactured goods classified chiefly by material
8	1408.1	-3.2	-3.2	2.6	7 - Machinery and transport equipment
9	207.2	-11.9	-11.9	0.4	8 - Miscellaneous manufactured articles
					9 - Commodities and transactions not classified

Source: UN Comtrade 2010

The agrarian to industrial shift has worked so well for countries like South Africa that the potential to exploit existing trade frameworks with major trading partners should not be underestimated. South Africa clearly has achieved marked gains in trade with China, one of its major export markets (UN Comtrade, 2010). As demonstrated in Table 7, the Eastern Asian¹ imports by SITC agricultural sections increase steadily until 2008. Notwithstanding that South African exports to Europe remain substantial (see Chart 7), the magnitude of the relationship with Asia is demonstrated by the following facts for 2009: South Africa recorded a deficit with Western Asia of \$3.1 billion and South-eastern Asia of \$2.2 billion USD; and nearly two-thirds, or 66.3%, of exports to China were in SITC sections 2+4. In review, these countries have built an economic bridge that supports exploration of more opportunities in the agricultural sector.

¹ The UN sub-region of Eastern Asia and other common definitions of East Asia contain the entirety of the People's Republic of China (including all SARs and autonomous regions), Republic of China (commonly known as "Taiwan"), Japan, North Korea, South Korea, and Mongolia. (East Asia, 2011)



Source: Comtrade 2009 Intl Trade Statistics Yearbook

Chart 8 South African Exports

1. Quantifying Impact

South Africa not only serves as a good example of benefits from industrial growth but also the downside to heavy reliance on material exchange. As depicted in Chart 8, South Africa experienced of 27% decline in both exports and imports in 2009. This percentage represents a \$53.9 billion drop in exports, with the majority of the shortfall in SITC categories 6 and 7 of 34.9% and 33.5% respectively accounting for 32.6% and 20% of total exports. From 2008 to 2009, Table 11 shows South African agricultural sector growth at 1.2% representing 9.8% or \$5,266 billion of total export value. During the same period, food imports to China grew 5.1%, amounting to \$16,778 billion in import value (UN Comtrade, 2011). Hypothetically, capturing approximately 30% of China's agricultural import growth would have doubled the trade value for the South African agricultural sectors. Achieving gains in the agricultural sector of trade with China could possibly offset shortfalls in the industrial materials exchange. While this broad

analysis serves as a generalization, a comprehensive evaluation of exchange gains warrants more analysis of output and capacity in the agricultural sector.

It is noteworthy that South African agricultural food chains are marginally competitive internationally (Mosoma, 2004) but do possess some relative advantages. As one of only a few African nations with a sizeable number of agribusinesses, South Africa maintains the largest number of these firms as well as the continent's premiere food supplier (Felgenhauer & Labella, 2009).

Table 7 Growth of world exports and imports by provenance and destination in per cent

		Exports from:			Imports to:			
Exports from: All commodities	ORIGIN	Northern Africa	Sub-Saharan Africa	Eastern Asia	South -			
					Eastern Asia	Southern Asia	Eastern Asia	Western Asia
	2000/2009	11.3	11.0	11.7	11.7	18.1	7.8	12.5
	2005/2006	17.9	18.9	20.5	19.0	24.7	14.6	17.4
	2006/2007	15.2	10.5	18.8	16.4	22.5	13.4	19.6
	2007/2008	37.0	34.7	13.3	19.8	23.2	17.8	25.0
	2008/2009	-30.5	-30.1	-15.4	-13.3	-7.7	-17.8	-20.5
Food, live animals, beverages & tobacco	ORIGIN BY CATEGORY	Northern Africa	Sub-Saharan Africa	Eastern Asia	Imports to: South -			
					Eastern Asia	Southern Asia	Eastern Asia	Western Asia
	2000/2009	12.0	10.9	9.0	9.6	15.8	11.6	11.6
	2005/2006	-0.1	13.0	10.6	8.2	34.5	14.1	14.5
	2006/2007	25.7	8.7	18.4	20.1	17.3	29.1	27.8
	2007/2008	47.9	14.3	10.4	20.3	37.4	26.8	34.3
	2008/2009	-12.3	18.8	0.7	3.7	6.6	-3.7	-11.7

Source: UN Comtrade 2009 (Table E)

Table 8 Comparison of Regional Exports & Imports

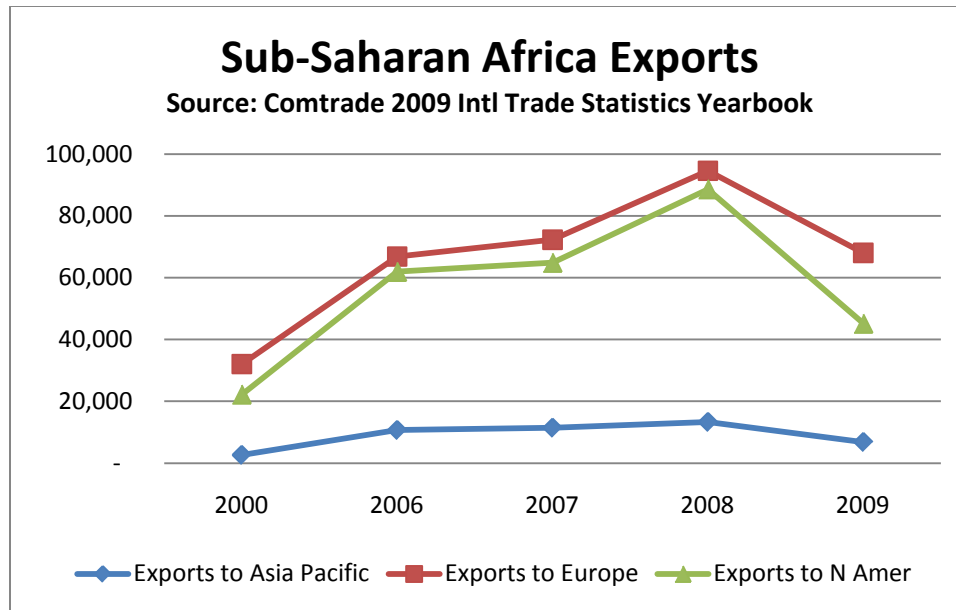
2008	Top Commodity Exports						Top Commodity Imports		
	Ghana			South Africa			China		
Rank	Commodity	Quant. (tons)	Value (1000 \$)	Commodity	Quant. (tons)	Value (1000 \$)	Commodity	Quant. (tons)	Value (1000 \$)
1	Cocoa beans	474706	979098	Wine	432789	758991	Soybeans	39531000	22980480
2	Sugar Refined	255000	131500	Maize	1078970	531521	Palm oil	5392563	5342208
3	Cashew nuts, with shell	70032	111890	Oranges	970799	434848	Rubber Nat Dry	1498355	4070853
4	Palm oil	100000	75000	Grapes	261519	315309	Cotton lint	2249339	3716695
5	Cocoa Butter	6105	45149	Apples	358119	242726	Soybean oil	2610387	3367750
6	Karite Nuts (Sheanuts)	42424	41778	Fruit Prp Nes	155829	172364	Hides Wet Salted Cattle	806932	1616232
7	Rubber Nat Dry	6565	16163	Food Prep Nes	67195	154768	Wool, greasy	234776	1537213
8	Infant Food	2449	11551	Wool, greasy	32724	138899	Chicken meat	969965	1281074
9	Yams	14666	10682	Wheat	154137	129693	Maize	4230611	1164811
10	Cottonseed	5965	9736	Sugar Raw Centrifugal	462330	126907	Bever. Dist. Alc	73066	1001874
11	Cocoa Paste	2400	9254	Pears	165673	112182	Food Prep Nes	183970	887891
12	Milk Whole Evp	2888	7331	Sugar Refined	222606	94137	Rapeseed	1303261	754514
13	Natural rubber	1215	6373	Sunflower oil	56978	85535	Tobacco, unmanufactured	112426	741792
14	Pineapples	17819	6260	Grapefruit (inc. pomelos)	184235	82459	Offals of Pigs, Edible	631751	729688
15	Cocoapowder& Cake	9019	5988	Lemons and limes Tangerine	241185	77314	Pork	385106	543630
16	Food Prep Nes	6119	5816	S, mandarins, clem.	111954	70196	Infant Food	55819	508337
17	Cocoahusks; Shell	8741	5659	Bever. Dist. Alc	34432	69846	Barley	1134383	506012
18	Eggplants (aubergines)	1948	3671	Beverage Non-Alc	104031	65663	Wine	181268	486498
19	Cotton lint	4492	3424	Cigarettes	7829	63403	Wheat	1008764	478516
20	Oil of vegetable origin, nes	2331	3177	Sunflower seed	80563	60164	Cigarettes	28301	445380

Source: FAOSTAT (Food and Agriculture Organization of the United Nations) 2008

Table 8 provides a summary of top exports for both Ghana and South Africa and top imports for China. Using this information, the potential products for trade include cross-listed items such as palm oil, maize, wheat, wool, wine and cigarettes. In addition, African export of fruit crops has

increased to feed demand in Europe but the potential for fruit product distribution to China appears limited. The prospects for South African export to China consist of raw foods for citrus or organic fruit for baby foods and value added items such as wine.

Overall, Sub-Saharan agricultural exports to Asia were flat over the prior decade from the perspective of value and percentage added to GDP. (See Chart 9) This trend, however, is not directly applicable to Ghana, which witnessed an overall export increase of 13.3%, or \$4 billion, in 2008. This nation's exports were dominated by gold, which increased 24.4% to \$1.8 billion, and cocoa beans which increased by 15% to account for 25.6% of exported goods. Export was chiefly to the Netherlands and India (UN Comtrade, 2010). As a transitioning economy (see Figure 5), Ghana's exports are in a primary stage while economic diversification is mid-range. Even with a few well-established export chains connecting smallholders into international supply chains in the Netherlands and Europe, its relatively small export sector has limited diversity and capacity. Nonetheless, Ghana serves as a good test state for fair-trade development, and demonstrates the need to mitigate risks and excess cost associated with agribusiness development. Following is a brief discussion of comparative and competitive advantage to provide the basic framework for improving supply chains relative to the environmental constraints.



Source: UN Comtrade 2009 (Table D)

Chart 9 Sub-Saharan Africa Exports

In general, the concepts of comparative and competitive advantage are critical factors to comprehending international trade in agriculture. “Comparative advantage refers to the ability of one nation to produce a commodity at a lower opportunity cost of other products forgone than another nation, while competitive advantage indicates whether a firm can successfully compete in the trade of the commodity in the international market given existing policies and economic structure” (Mosoma, 2004). An analysis of export of agricultural products versus the sector’s share in the economy’s total export is an indication of export value and economic diversification, as well as a generalized evaluation of export competitiveness². Ghana’s 474,706 tons of cocoa, at a value of \$979,098 million, comes in second to the world’s largest exporter Cote d’Ivoire with 782,868 tons at a value of \$1,767,960 billion (Nations, 2011). In view of Ghana’s cocoa share of

² This analysis is derived from conventional trade theory of The Balassa Method which compares a country’s share of the global market relative to its share of all traded goods. The issue with this and other computed indices is that observed patterns of comparative advantage may be distorted by government policies and interventions aimed at maintaining market share irrelevant of cost (Mosoma, 2004).

total export (25.6%), and fruit agribusiness, there is potential for a comparative advantage that provides a basis for more product diversification and increased capacity growth in the agricultural sector.

Table 9 Ghana Exports by SITC sections

Value in mill US\$, growth & shares in percentage

SITC	2009	Avg. Growth Rates (%) 2009		2009 share	SITC Categories Key
		2005-2009	2008- 2009		
Total	4032.9	13.3	14.1	100.0	0 - Food and live animals
0+1	1345.1	1.7	9.6	33.4	1 - Beverages and tobacco
2+4	376.5	29.2	6.7	9.3	2 - Crude materials, inedible, except fuels
3	53.6	-0.8	99.9	1.3	3 - Mineral fuels, lubricants and related materials
5	48.1	9.1	-37.7	1.2	4 - Animal and vegetable oils, fats and waxes
6	250.1	23.1	-1.2	6.2	5 - Chemicals and related products, n.e.s.
7	103.1	28.0	50.1	2.6	6 - Manufactured goods classified chiefly by material
8	39.2	18.8	-40.3	1.0	7 - Machinery and transport equipment
9	1817.2	22.6	24.3	45.1	8 - Miscellaneous manufactured articles
					9 - Commodities and transactions not classified elsewhere

Source: UN Comtrade 2010

C. Growing Appeal of Fruit Products

In the US alone, the fresh-cut produce is a rapidly expanding segment of the fresh produce industry with sales of fresh-cut products at approximately \$11 billion in 2000 (Ben-Yehoshua, 2005, p. 150). Similarly, the trend in Europe is driving import diversification, higher standards from source suppliers, and multinational partnerships with Africa's developing countries. (See Table 5) On the other end of the spectrum, the ability to expand this industry into emerging economic markets focuses on China as a primary target. With China as the home to a population of 1.3 billion and rising per capita income, the emerging second tier markets and coastal cities beyond the big metropolitan cities of Beijing, Shanghai and Guangzhou are opening up more opportunities in Asia-Pacific's second largest food and beverage market (Cai, 2010).

Despite the fact that the Asian market for agricultural imports is one-tenth the size of Europe (see Table 7), the possibilities for food demand growth is demonstrated by Australia's 40% increase in food exports to China in the space of one year. This demand factor coupled with growing Chinese consumerism indicates shifting consumption habits in China (Cai, 2010). Both urban income and consumption soared in the 1990s, and gave way to massive consumer spending in household, entertainment, and electronic goods as well as increased spending on food and leisure activities (Latham, 2006, p. 1). Comparatively, the European market exemplifies that the growing consumer demand for safe and quality exotic fresh fruit products is indicative of the level of urbanization in developed countries. Urban markets are where convenience, nutrition and freshness are the driving forces for demand and rapid development of the fresh-cut fruit industry (Ben-Yehoshua, 2005, pp. 150-151).

There are as many as eight regional culinary systems in China (Klein, 2006). As the Chinese economy continues to strengthen, varied consumer tastes will continue to increase food demand. This demand creates more opportunities for agricultural trade between Sub-Saharan Africa and China, which includes the introduction of new products. The economic potential of the export market for fresh cut and organic fruit is exemplified by Europe and the United States, which have adopted many exotic fruits into the high value dimension of the nutritional paradigm.

1. Potential Areas for Unexpected Growth

In parallel, the potential buildup of systems based on low input farming might ignite an entirely novel farming infrastructure that does not involve the massive replacement costs or risks developed nations would incur if they shifted entirely away from the environmentally damaging inputs associated with large-scale crop cultivation. From this perspective, agribusiness development in Africa can provide many unexpected results. This is significant given the

developing world's rising economic influence, the increasing scarcity of resources, and the spread of "green" technologies. All these elements can combine to affect the market for export in a positive manner.

For instance, there is enormous potential to create farming apparatus and systems that utilize renewable energy resources such as wind and solar. Thus, Africa could potentially lead the way for green technology mechanized farming as well as cohesive large organic farming systems. The lack of a highly industrialized framework in much of rural Africa means agricultural development is not entrenched in the pre-existing forms of widespread production. African nations investing in agriculture have the unique opportunity to build platforms based on a renewable energy structure. These types of systems would be a good fit given the environmental constraints and ultimately would be less damaging than systems requiring fossil fuels. Finally, the potential for Africa to promote systems with the mark of modernity would distinguish these developing nations as leaders in alternative energy based farming systems, and ultimately improve the consumer valuation of goods produced from those systems.

Although there is debate about the benefits of agricultural trade for countries struggling with hunger issues, agribusiness development does have the potential to address the regional needs for food. This result can be achieved since smallholder food exports are generally surplus crops while cash crop cultivation from small to large-scale farms provides monetary input to individuals and communities. From the other vantage point, the growth of multinational food corporations establishing businesses on the continent also leaves an economic footprint. Many international food and beverage companies are adopting business models particular to Africa thus engaging contract farming with the small-scale providers and directly linking smallholders into their supply chains. For example, SabMiller utilizes 10,000 subsistence farmers and creates

378,000 jobs throughout its supply chain network (Felgenhauer & Labella, 2009). Therefore, focusing agribusiness development on export can add value to all sides of the economic spectrum.

D. Expansion of global sourcing from African countries

The significance of having global food supply chains sourced from Africa centers on the potential for these nations to become dominant participants in future food exchange. The example set by successful African agricultural firms indicates that these companies increasingly seek partnerships with non-African companies as they enter the expansion phase of the business life cycle (Felgenhauer & Labella, 2009). Foreign companies see the sector's potential as their business investments yield increasingly higher returns. The growing collaborations as well as the increase of foreign direct investment in agribusiness indicate that indigenous companies are progressing toward internationalization (Felgenhauer & Labella, 2009). As mentioned, there are future factors of labor and arable land that provide an extensive foundation for agricultural development. In contrast, these same resources are dwindling for much of the populated developed world. Despite the obstacles that make positioning Africa as a global breadbasket attainable, these developing nations are being primed to meet those challenges.

In evaluating the potential of particular foods sourced from Africa to China, the value for import fruits is derived from current trade volumes for food. In general, the volume of food export to Asia is low relative to North America and Europe. (See Table 10) However, this overview does not take into account the shifting consumer tastes tied to increased income or the impact of improved marketing of familiar import fruits. This paper's model focuses on developing fruit export for two main reasons. First, the numerous profit possibilities for differentiated products have yet to be achieved in the Asian markets. Next, there is wide potential to develop comparative then competitive advantage through the development of best practices from

increased experience with Europe plus the derived lessons from fruit export nations of the Caribbean and Latin America. This point is presented in view of the summary in Table 10, which indicates that Latin America and Caribbean food exports increased to 14% while Sub-Saharan Africa exports in the same category increased only 3%. In addition, the path of migration to export dominance entails a comparative cost analysis of fruit export from a developing nation, such as Ghana, to competitive leading nations, such as the Ivory Coast or Costa Rica, (Agricultural Economic Research Institute (LEI) and Michigan State University (MSU), 2006). Assessing these many factors will determine the true potential of particular foods sourced from Africa to China.

Table 10 Structure of world exports by provenance and destination in percent

		Exports from:			Imports to:			
Exports from: All commodities	ORIGIN	Northern Africa	Sub-Saharan Africa	Latin Amer Caribbean	Asia Pacific	Europe	N Amer	Total Developed
		2000	0.8	1.5	5.6	6.5	10.2	22.3
	2006	1.0	1.9	5.6	5.8	40.2	17.9	63.9
	2007	1.0	1.9	5.6	5.7	40.5	16.4	62.7
	2008	1.2	2.2	5.5	5.3	39.8	15.2	60.3
	2009	1.1	2.0	5.6	5.1	38.6	14.6	58.3
		Exports from:			Imports to:			
Food, live animals, beverages & tobacco	ORIGIN BY CATEGORY	Northern Africa	Sub-Saharan Africa	Latin Amer Caribbean	Asia Pacific	Europe	N Amer	Total Developed
		2000	0.6	2.7	12.2	10.5	45.2	14.3
	2006	0.6	2.7	13.1	7.1	48.2	13.4	68.7
	2007	0.6	2.4	13.0	6.4	48.3	12.3	67.0
	2008	0.8	2.4	13.2	6.2	46.7	11.3	64.2
	2009	0.7	3.1	13.9	6.2	45.9	11.7	63.8

Source: UN Comtrade 2009 (Table F)

Finally, the formation of well-managed African supply chains can ease the transition of more diversified imports into Asia. However, the results of each successful chain should be perceived as a template for redesign when targeting a new area or new product. This focus on fruit export should not be considered a dismissal of supply chain development for commodity foods (i.e. grains, vegetables, meats, cocoa, etc) since these products are equally vital to food export from Africa. The point of focusing on agribusiness development for export, regardless of the commodity, is that trade is a catalyst to advance the economic path of Africa. That potential can only be realized when importers abandon conventional thinking about goods from Africa, and African producers adopt a market mentality more aligned with global exchange. Specifically, source suppliers must abandon the “you buy what we produce” into “we produce what you can sell” philosophy, so that sales can improve (Agricultural Economic Research Institute (LEI) and Michigan State University (MSU), 2006). As demonstrated with the Blue Skies and Fairtrade premiums, there are ways to incentivize efficient output. Ideally, the goal is to create a more balanced structure of trade that filters down to all segments of developing nations, and regard exported goods (other than minded minerals) beyond negligible importance.

1. “A” Market Penetration

An earlier section described the rationale for maintaining African products sourced from smallholder collectives. The list details how support of fair-trade organic produce can achieve a profitable outcome. The presented model takes the strategic approach that supply chain systems have to be cohesive in order to stabilize product flow and integrate the neediest portion of farming communities. This is done not only to the benefit of social responsibility objectives, but also to add value to the supply chain at higher returns to investment. The aim of the export chain is to venture beyond the local markets and towards an international frontier with greater profit potential. Globalization brings value to resources but those items must be obtainable and put

within a distribution system that appropriately earmarks their worth to the buying public. Thus, the strategic approach taken by this supply chain model for African fruit export has to follow the trend of the international food industry and place supplied goods into multi-national supermarket chains. Table 11 below presents a list of major supermarket chains.

Table 11 Major Supermarket Chains

South Africa (food goods primarily self-supplied and distributed):
Shoprite Checkers (down market) http://www.shoprite.co.za/
Pick N' Pay http://www.picknpay.co.za/picknpay/content/en/home
Woolworths (environment sensitive/mini-markets in gas stations) http://www.woolworths.co.za/
Spar Group (Israeli good suppliers/most kosher products) http://www.spar.co.za/HomePage1.aspx
England (food goods imported and self-supplied):
Tesco's
Waitrose
Marks & Spencer
Sainsbury
China (food goods imported and self-supplied):
Lotus Supercenter Chinese name: 易初蓮花 (yì chū lián huā)
Century Mart Chinese name: 世紀聯華 (shì jì lián huá)
Wu-Mart Chinese name: 物美超市 (wù měi chāo shì)
Vanguard Chinese name: 華潤萬家 (huá rùn wàn jiā)
Merry Mart Chinese Name: 美廉美 (měi lián měi)
Tiankelong Supermarket
Jian Hypermarket Co.
Jingkelong Supermarket

From the global lens, the task is to penetrate “A” market segment distribution and position African sourced edible goods from the developing continent’s agribusinesses to international food retailers. Without undermining the nature of business – profitability – this goal is accomplished by comparing costs, logistics, frameworks, products, etc. In the case of the Ghana Sustainable Horticulture Export Chain project, an initiative conceived by international food retailer AHOLD, executives sought to answer the question of why the world’s largest supermarket chains on four continents did not have business operations in Africa. The research revealed, “transport by sea could bring about a savings of almost 25% on the number of transport kilometers” (Agricultural Economic Research Institute (LEI) and Michigan State University (MSU), 2006). (See Table 12)

Table 12 Distance information for Ghana & Costa Rica (Route Distance in kilometers)

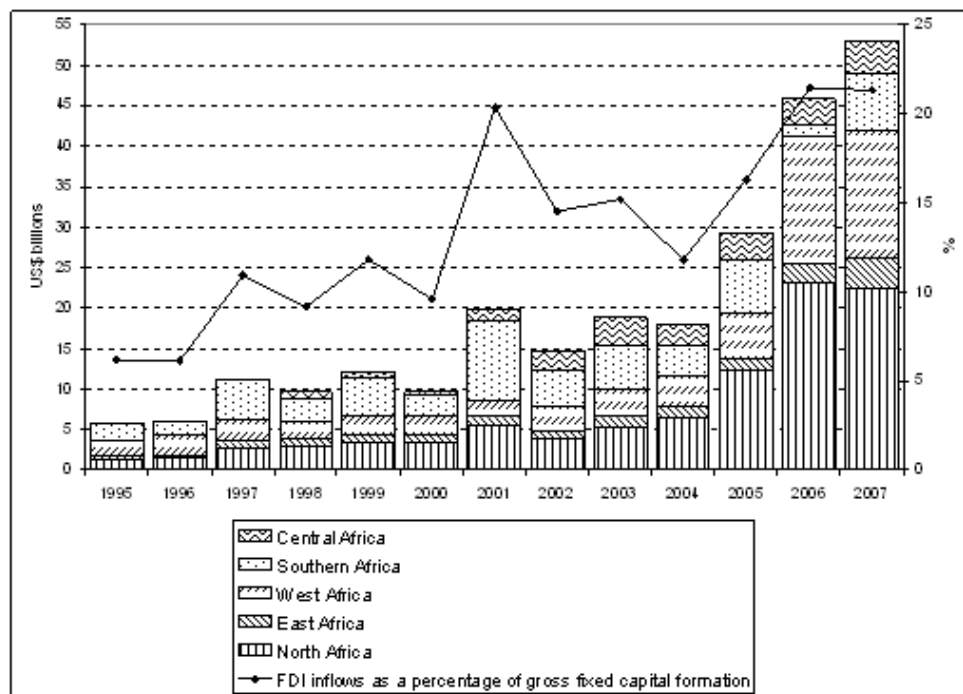
Amsterdam-Accra (aero plane)	5,214
Amsterdam-San Jose (aero plane)	9,252
Antwerp-Ghana (boat)	7,210
Antwerp-Costa Rica (boat)	9,400
Average distance by road in Ghana	400
Average distance by road in Costa Rica	100

Source: Ghana Sustainable horticultural export chain, 2006

E. Private Equity and Risk Outlook

Although it is still difficult for most African small businesses to raise money through commercial channels, the outlook for investment into the continent is positive. An overview of capital market activity through 2007 indicates that private equity investment in Africa and the Middle East rose to \$5 billion (Dickinson, 2009). This arm of financing is relatively significant because it represents the intermediary between self and traditional financing. Notably, these capital markets

tend to focus less on raw and mined commodities associated with international trade and more on production of goods for local urbanized consumers (Dickinson, 2009). Nonetheless, the growth of investment and privatization for domestic business development (see Chart 10), particularly in Sub-Saharan Africa, is transformative and major step towards accessing outside funds and expertise.



Source: UNCTAD, World Investment Report 2008: Transnational Corporations and the Infrastructure Challenge <http://www.unctad.org>

Chart 10 Africa: FDI inflows in value and as a percentage of gross fixed capital formation, 1995-2007

As one report indicates, strong private-equity investment in Africa rose approximately 200% in 2006 bringing the “sub-Saharan Africa share of global private-equity funds to 7%, well behind Asia (58%), but comparable to other emerging regions (Latin America: 8%; Middle East / North Africa: 8%; Central & Eastern Europe / Russia: 10%)” (Dickinson, 2009). By international standards, the continent based equity funds are relatively small but growth in this sector has been

significant. The examples of the South African private-equity firm's (Pamodzi) \$1.3 billion Pan-African fund in 2007 equated to the continent's largest fund to date, and Citigroup's launch of a \$200 million fund the same year suggests that global investors are projecting positive returns (Dickinson, 2009).

As to be expected, South Africa is the continent's leader with a 409% increase in managed funds as well as the largest private equity industry at 1.7% of its GDP. That figure stands close to those of developed markets (Dickinson, 2009) and signifies South Africa's predominance as a diversified thriving African economy. The source of the private equity funds in 2006 is primarily from the US (50% of total funds for African investment) and includes capital raised from foreign pension funds for the first time (Dickinson, 2009). These facts demonstrate a progression of monetary backing from foreign entities. Financing activity can continue to improve with the help of African leaders who condition their domestic investment environments to be more conducive to international inflows. The trend for national government activity is also positive with 40 countries adopting more market friendly policies. The palette of introduced measures aimed to attract foreign investment include 1) ease of registration for foreign direct investment (FDI) ventures; 2) tax restraints; and 3) removal of restrictions on foreign ownership (Dickinson, 2009).

The transition of businesses and capital to African homelands means that investors are predicting positive shifts in risk as well as profit. Confirmation of these factors comes from the 2008 Emerging Markets Private Association LP Survey that ranked Africa fifth out of ten regions and countries in attractiveness for investors. The report also indicated a 26% increase in private-equity investment strategies for Africa, and cited over 50% of private-equity investors included Africa in their medium-term (three to five years) investment strategies (Dickinson, 2009). These types of favorable changes are based on the market's assessment of expected returns from

investments in Africa. Notably, the perceived risk premium for the continent decreased sharply from 8.9% in 2006 to 6.7% in 2007. In addition, South Africa's risk premium is only slightly higher than BRIC nation's India and China (Dickinson, 2009).

1. Development Finance Institutions (DFI)

Not all regionally based African firms, such as agribusinesses, fit within the financing framework for market-derived capital. The intermediate organizations that fill the financing gap between public and private sectors are usually in the form of Development Finance Institutions (DFI). Distinct from aid agencies, the DFIs are regional, bilateral or multilateral government backed agencies that utilize public funds to foster private sector activity with a focus on profitable investment and operations according to market rules (Dickinson, 2009). (See Table 13) These organizations account for as much as \$845 million since 2004 (Dickinson, 2009). They fulfill small to medium funding requests, and provide financial services such as loans and guarantees to investors, equity participation in companies and financing for public infrastructure projects. DFIs also play a role in supply chain and agribusiness development because they allocate funds to the agricultural sector, and maintain a higher risk tolerance along with longer investment horizon (Dickinson, 2009).

Table 13 Development Finance Institutions:

Bilateral		Regional	
CDC	United Kingdom	ADB	Asian Development Bank
PROPARCO	France	IADB	Inter-American Development Bank
FMO	Netherlands	AfDB	African Development Bank
DEG	Germany	EIB	European Investment Bank
OPIC	United States	EBRD	European Bank for Reconstruction
Multilateral			
IFC	International Finance Corporation		
MIGA	Multilateral Investment Guarantee Agency (World Bank)		

Source: (Dickinson, 2009) Development Finance Institutions: Profitability Promoting Development, 2009

F. Sustainability

In order to recognize the potential of any system, there has to be a discussion about sustainability. Defining sustainability is difficult because the word carries many meanings even within the same context. In determining an appropriate use of the word for developing countries, the idea that agricultural sustainability should focus on crop output is most relevant (Morse, McNamara, Acholo, & Okwoli, 2000, p. 6). Food, the output of agriculture, along with inputs used to maintain balanced productive systems (land, labor, energy, soils and pests) is central to the relationship between people and their environments. Therefore, the strategic model presented assumes that agricultural systems are in fact sustainable if they can continue to produce crops. In addition, the management systems in the supply chain must move products from subsistence farming to agri-business, and be flexible enough to reap benefits from pre-existing indigenous farming practices. These include small-scale farmers, organic agriculture, multi-cropping systems, and low input sustainable agriculture.

1. Relevant factors for developing sustainable ventures

The predictors and challenges of sustainability for Sub-Saharan African agro-ecosystems are presented in Table 14 and Table 15. A better understanding and management of the components in the supply chain helps strengthen the partnerships in the global trade and maintain sustainable development during the course of market interactions.

Table 14 Sustainability Indicators proposed for Sub-Saharan African agro-ecosystems

Products	Cropping System	Scales Farm	Village
Main Products	ratio of annual yield to potential and/or target yield	profit of farm production	economic efficiency
		ratio of profit to farmer's target income	social welfare
By-products	soil pH, acidity and exchangeable aluminum content	ratio of aggrading to degrading land area	
	soil loss and compaction	nutritional status of household	nutritional status of community
	ratio of soil microbial biomass to total organic matter		stream turbidity, nutrient concentration and acidity
	abundance of key pests and weeds		human diseases and vectors
Amenities		drinking water quality	biodiversity and complexity
		source and availability of fuel	drinking water availability

Source: Table 1.2 Visions of Sustainability by Stephen Morse et. al. (2000)

Table 15 Summary of a scheme based on the quantification of constraints to sustainability

Agro-ecosystem element	Constraint	Trend for unsustainability
Profitability	farm income	-
	dependence on credit	+
Productivity	yields	-
Soil quality	erosion rates	+ or high rates
	organic matter content	-
	cat ion exchange capacity	-
	salinization of soils	+
	alkalization of soils	+
	infiltration	-
	water holding capacity	-
	earthworm activity	-
Water quality	nitrate leaching	+ or high rates
	pesticide leaching	+ or high rates
	nitrates and toxic organics in drinking water	+ or high rates
	chemical loading into surface streams	+ or high rates
	biological oxygen demand in surface streams	+
	coliform counts in surface streams	+
	eutrophication of water bodies	+
Air quality	soil erosion by wind	+ or high rates
	fine particulates	+
	odor intensity	+
Energy efficiency	fossil fuel use	+ or high dependence
	output/input energy ratio	-
Wildlife habitats	lake and pond sedimentation	+
	wildlife populations	-
	adequacy of wildlife habitat	-
Quality of life	undesirable chemicals in agricultural products	+ or high rates
	standard of living in agricultural communities	-
	income level	-
Social acceptance	complaints about food safety	+
	complaints about quality of drinking water	+
	concern regarding long-term adequacy of food supply	+
	complaints about health threats from agriculture	+
		+

Source: Table 1.4 Visions of Sustainability by Stephen Morse et. al. (2000)

IV. Solution: Agribusiness Model Detailed with Defined Scenarios & Project Objective

The opportunities for trade to provide income to supply chain suppliers in developing countries become greater with increased levels of organization, resources and communication. The model will illustrate the challenges and adaptive changes necessary to increase profitability and

sustainability. Prior to creating the supply chain, a number of preliminary tasks must be executed. The first step is to analyze markets and activities, along with methods to improve systems. Source producers who have acted as regional or transnational suppliers must realign their orientation from internal “product oriented enterprises” to external “market oriented enterprises” (van Roekel, Willems, & Boselie, 2002). (See Table 16) The market’s driving forces of market segmentation, consumer demand, and low cost strategy, pressure chain partners in developing countries to be cognizant of how transaction costs effect profitability, the flow of goods and information, along with capital efficiency and technological proclivity (van Roekel, Willems, & Boselie, 2002).

Table 16 Product-oriented versus market-oriented enterprises

Product-Oriented Enterprises	Market-Oriented Enterprises
Focus on product	Focus on product-market combinations
Strive is towards production maximization	Strive is to maximize added value
Planning is operational	Planning is strategic
Information exchange is limited	Information is shared along the supply chain

Source: Agri-supply Chain Management, van Roekel et al.

The next task is to evaluate number of interconnected industry components for the supply chain. For developing countries, the challenge is to formulate a chain that can unite the various demands of cross-cultural businesses, governmental policies and social cultures. The supply chain should be based on existing trade networks and include a SWOT analysis (see Table 17) and critical evaluation of product flow, exchange levels, external forces affecting the operation of the chain, etc (van Roekel, Willems, & Boselie, 2002).

Table 17 Sample SWOT analysis of the logistics of Ghanaian pineapple sector

<p>STRENGTHS</p> <ul style="list-style-type: none"> - There is an existing sales channel to Europe for sliced pineapple - SPEG (Sea Freight Pineapple Exporters Association) is already trying to represent its members from the strongest possible position. This role can also be extended even further. - The collaboration between the SPEG and the exporters will be examined - The small-scale farmers are very flexible - A great many projects in the Netherlands are subsidized by the PSOM and the EU in order to encourage the commercial activities of various sectors in Ghana - Research is continuing into ways of strengthening the domestic chain in Ghana, for example through the World Bank. 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> - Relatively small export volumes - Unstructured supply - Uncontrolled, steered by production volume, growth in the pineapple sector - Financial limitations, high interest rate (up to 50% on short-term loans!) - Little knowledge of the wishes of consumers - Lack of market information systems - Lack of management capacity. Only practical management available - Own capacity overestimated - No unity. Great competition between growers producing for the same customers - No Ghanaian agent in Europe - No laboratory available for testing quality and certification - Limited knowledge of organic cultivation - The local market is small - Poorly developed local market, particularly with respect to cushioning the effects of overproduction or lack of exports - Major cultural differences between Ghana and Europe - Little trust between Ghanaian suppliers and importers or European purchasers
<p>OPPORTUNITIES</p> <ul style="list-style-type: none"> - Short distance to the European market - Relatively low prices due to devaluation of the local currency - The creation of a national quality mark through a joint effort by the five largest growers - High potential of domestic and regional market - A great deal of help is offered in the field of knowledge transfer, certification etc. - More could be done with the by-products of processed pineapple - When the Tema Fruit Terminal is complete, this could provide an enormous boost to exports of pineapples. A precondition for this is that quality control arrangements are in good order in the preparation phase - There are many alternatives alongside whole pineapples, such as tinned pineapple, pineapple juice and fruit salads 	<p>THREATS</p> <ul style="list-style-type: none"> - Competition from the world market (including Costa Rica) and a global surplus of supply - Competition from new varieties of pineapple (MD2) - The Ghanaian growers are at a disadvantage in terms of information, in contrast with European customers. They do not have all the information, whereas the European customers are generally well informed - Quality systems to be implemented are becoming ever more complex and thereof

Source: Ghana Sustainable horticultural export chain, 2006

Figure 3 is a supply chain model for the export market. It is based on an amalgamation of existing African supply chains in Ghana, South Africa and Tanzania. For this model, achieving international trade of raw fruit products represents the first phase of the venture. This model's second phase benchmark is value added processing. It includes the construction of plants for processing and roads to enhance product transport. In addition, the strategy is to advance the supply chain with the adoption of technologies. As noted earlier, these innovations enable faster communication and efficient production.

A. Agri-Supply Chain Model

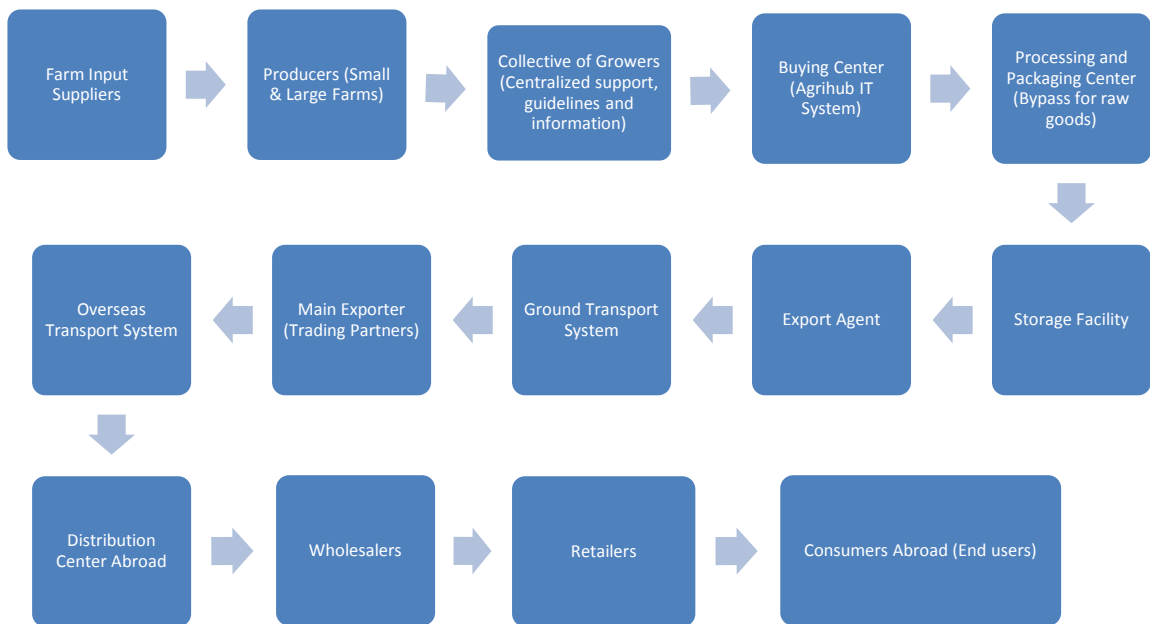


Figure 3 Agribusiness Supply Chain Model

1. Breakdown of the Supply Chain System

Building an international supply chain requires the integration of the developing country's agricultural businesses with the foreign nation's food industry. (See Table 18) The performance measures for each activity/group should include efficiency, flexibility, innovation, responsiveness, etc (van Roekel, Willems, & Boselie, 2002). Of the four levels of markets for agricultural (local village, regional, national, and export), this model focuses on the export market for cash crops which have a very limited domestic market as well as surplus crops from smallholders. The latter is included because the goal is to connect the lowest scale producer of the chain to the foreign food industry. Following is a breakdown of the supply chain components.

Table 18 Relevant Industries Strengthening Food Value Chains

	Agricultural Production	Storage and Transport	Processing and Packaging	Selling and Trading	Retail Distribution
Relevant Industries	<ul style="list-style-type: none"> - Fertilizer, seed and equipment manufacturers - Banks - Retailers and agro-dealers 	<ul style="list-style-type: none"> - Transportation services - Warehousing and logistics companies - Construction companies 	<ul style="list-style-type: none"> - IT and telecoms - Banks and insurance - Wholesalers - Food manufacturers, processors and retailers 	<ul style="list-style-type: none"> - Food and beverage manufacturers - Packaging firms - Biofuel processors - Millers 	<ul style="list-style-type: none"> - Retailers - Transportation services and infrastructure - Banks - IT and telecom firms

Source: WEF_FB_BAACH Green Revolution Africa Report 2008

Farm Input Suppliers: The primary inputs for agricultural farms are seeds. There is an on-going debate about the use and restrictions placed on GM seeds in the developing countries of Africa. While the issue is worth serious review, the underlying fact remains that seed variety improves nutritional content, along with disease and pest resistance, and environmental tolerance. Some low input and breeding strategies exist. However, the essence of competitive exchange in the international market demands technological intervention and large-scale farming practices to increase productivity. Although the development of this supply industry is slowly progressing

with the push from international initiatives, it is still in its infancy. An example of how far Africa lags behind in this area is illustrated by AGRA's Program for Africa Seed Systems (PASS) (AGRA's Programme for Africa's Seeds Systems (PASS), 2011). In the West African countries of Nigeria, Ghana, Mali and Benin, only eleven seed companies were identified prior to the creation of AGRA's PASS program. Because of this deficiency, an awareness of consumer demands for less bioengineering must be carefully weighed with the dire need to create new varieties and secure methods of production as well as distribution of improved seeds. Thus, this model does not view naturally derived seeds as preferable over genetically modified seed inputs. A critical balance has to be maintained so that farming efforts are sustainable as well as productive. Solutions to address public concerns while fulfilling the need for a robust seed system in Africa should include some support of conventional crop breeding systems as well as bioengineered inputs.

Upstream Producers: Local growers cultivate the food. The majority of small-scale agricultural producers consume much of their production within their household (Eskola, 2005) and use low-tech traditional farming methods. The small-scale farmers within the supply chain are usually the least organized with the largest capital constraints while larger farms have greater access to inputs with more capital flexibility. However, size and limitations do not negatively correlate to profitability and productivity if the elements of organization and low cost resources are added. An example from AGRA's Market Access program clearly demonstrates this point. "In 2009, 86 widowed women farmers in Kenya sold \$86,000 of maize to the World Food Program (WFP)" (AGRA, 2011). Notably, 70% to 90% of farms in Africa are smallholder operations involving less than two hectares of land, and account for the bulk of staple food production on the continent (AGRA, 2011). Enabling market access to small-scale farmers generates broader growth in these developing nations because they are efficient producers and small gains will have the greatest

economic impact at this level. Since these small-scale farmers produce the bulk of food for the continent, one estimate suggests that 3% growth of productivity among smallholders is equivalent to 60% growth in productivity for large-scale farms (Cohen & al., 1988). From the model's perspective, the value chain is not complete until it is connected to the smallholder through organized partnerships.

Collectives: As discussed earlier, the Blue Skies Organic Collective Association (BSOC) is based in the Central Region of Ghana. This area also happens to be one of the four most deprived regions in the country. The group itself is comprised of local farmers and serves as a functional example for this supply chain model. The collectives, organized under Blue Skies Organic Collective Association in 1998, supply organic Sugar Loaf pineapples to their major trading partner Blue Skies Products Limited. "BSOC members' farms have a total of 112 ha (280 acres) given over to organic pineapples. They produce a total of 45 tons of pineapples a week of which 15 tons (33%) are supplied to Blue Skies. The remainder is bought by women traders from Accra who sell them to local markets. The members depend on pineapples for 85% of their cash income. Total exports were 780 tons in 2003 and 1,560 tons in 2004. The average farm is around three hectares in size with 2 hectares under pineapples producing around 30 tons a year. About 0.75 ha are used to grow maize and cassava for sale at the local market; vegetables for home consumption are grown on the remaining 0.25 ha." (Producers: Blue Skies Organic Collective Association (BSOC), Pineapple Growers, Ghana, 2008)

Support System for Collective Members: This model implements support programs to farmers through the collective. The primary focus of the support network is to increase productivity and compliance. The programs will help small farmers overcome the financial and information limitations, and enable them to participate in the supply chain through assistance with issues such as quality certification. For instance, Blue Skies covers participants' costs for key activities such

as consultancy fees, registration costs, training costs, and subscription (van Roekel, Willems, & Boselie, 2002). In addition, farmers can borrow money interest free from Blue Skies for growing related capital investments. These low cost investments provide returns beyond the loan repayment. Since the issues of capital constraint can severely limit business expansion by agricultural producers and facilities in the supply chain, providing interest free working capital to chain participants creates options that can facilitate production and capacity expansion. In addition, the trade partners can represent collective members and their communities while helping to facilitate the building of large-scale projects. An example would be a collaborative effort between trade partners, collectives and government agencies to formalize deals for infrastructure development such as irrigation, road or communication systems. The economic impact provides residual value within and beyond the chain activities. Blue Skies is an example of a company that works closely with all its suppliers and provides free agronomic support and certification to allow small-scale growers to access international markets. These are activities that the model supports, however there are other initiatives outside of the scope of the model worth noting. In the case of Blue Skies, the company not only provides benefits to the collective members, but also is the primary source of income for many communities. With the launch of its foundation, Blue Skies extended activities to the non-profit sector. Collaborating with Waitrose (UK) and Albert Heijn (Holland), the foundation works to secure more money to fund community projects such as boreholes, schools and clinics (Organic Coconut comes a close second in Tesco Innovation Award, 2011).

Integration with large-scale suppliers: Large-scale producers have traditionally been a vital component of export trade from Africa. A reference can be made to Tanzanian products, such as cashews and coffee, because these foods are solely produced for export by large-scale farmers. Similar to the national market, the export trade is dominated by large-scale producers. Notably,

the majority of small-scale agricultural producers consume much of their production within their household (Eskola, 2005). This observation is supported by the estimate that about 50% of hungry people in the world are small-scale subsistence farmers who are unable to produce enough food for their families (World Economic Forum, 2008). While the majority of these farmers remain outside of the scope of this model, the AGRA and BSOC cases illustrate how productive small-scale farming can add surplus and resources to a local community and individual households. Once those farmers are able to sustain their household and community, they can easily segue into a farm collective and begin to increase the value of their output. This supply chain model seeks to expand the integration of individual and small-scale farmers.

Buying Center: Raw goods are delivered to a buying center from rural farmers who participate in farm collectives. The buying center, similar to a primary cooperative, is a collection center for crops (Eskola, 2005). In recent years, a new generation of cooperatives has evolved to strengthen the position of farmers and vertical strategic alliances in the supply chain (van Roekel, Willems, & Boselie, 2002). While supplier strength is not generally well regarded, in the case of developing countries, enabling producers helps increase efficiency, quality, volume, and safety. With regard to the supply chain, the main issues for consumers are food hazards and meeting demand in a timely manner. A number of supply chain management tools have been developed to address these concerns and include efficient consumer response (ECR), which increases consumer orientation and cost effectiveness of supply chains (van Roekel, Willems, & Boselie, 2002). In addition, IT applications are utilized to improve logistics, communications and quality. Many multinational supermarkets and retailers have also established their own food standards that require tracking systems to certify the quality of goods throughout the supply chain. This model incorporates tracing systems and conduct standards such as EUREP-GAP and BRC in order to create the transparency needed for quality assurance.

Agrihub: Other issues such as communication and lack of knowhow for indigenous producers are resolved in this supply chain model through the buying center or “Agrihub”. Information about quality and logistics has to be accessible to partners throughout the supply chain. Hence, this model seeks to utilize an “Agrihub” information system similar to one used by three fruit chains in South Africa (van Roekel, Willems, & Boselie, 2002). The information system will collect data for all associated supply chains at the buying center. This information enables producers to meet standards, adapt harvest activities and increase standardization at the farmer level, improve cooperative and exporter quality control practices, and disseminate information and ideas to all chain participants.

Processing Facility: Value added processing at the source could dramatically improve food value chains. As mentioned, poor farmers can reap substantial financial benefits, and medium to large ventures can gain profitable returns from investments in commercial-scale processing. Value added activities such as food processing benefit the local economic level through job creation and increase foreign export earnings (van Roekel, Willems, & Boselie, 2002). This model supports expansion from the distribution of whole fruits to domestic processing as a method to add value, and sets aside conventional beliefs that small-scale farmers are unable to meet the rigorous quality standards put forth by EUREP-GAP.

An evaluation of Ghana and South Africa’s fruit supply chains yields a number of solutions to challenges faced in developing cold chains and processing components for export. A good illustration of value-added processing comes from the Ghanaian farming cooperative called Canaan, which grows organic coconut. To ensure optimum ripeness and flavor, the coconut is harvested when it has fallen from the tree then prepared by hand by Blue Skies at their factory near the town of Nsawam. The facility employs 1,500 people and injects about \$1.5 million or

£2.5 million into the local economy every year through salaries (Organic Coconut comes a close second in Tesco Innovation Award, 2011).

Small-scale farmers have limited resources and seemingly are at a disadvantage to meet food safety requirements. However, their integration with large-scale producers into the supply chain requires systems that enable smallholders to meet quality standards. Notably, Blue Skies follows “triple E” business principles of ethics, ecology and economy which implement a code of conduct conducive to environmental protection and good agricultural practice (van Roekel, Willems, & Boselie, 2002).

Following the Ghanaian example, the first step in the decision to improve the value chain meant moving Blue Skies UK processing plant closer to the growing area. Utilizing about 30 small-scale farmers along with large-scale producers to supply fresh fruit inputs to the processing facility, the company was able to implement EUREP-GAP code of practice by all chain partners within 24 months (van Roekel, Willems, & Boselie, 2002). The processing factory workers were trained to prepare food goods by HACCP principles, and smallholders have demonstrated a high level of commitment to serve the needs of export clients (van Roekel, Willems, & Boselie, 2002). Therefore, this model assumes that compliance is achievable and seeks to expand the participation of small-scale suppliers and processing factories in the supply chain’s quality and conduct certification programs.

Export Agent and Main Exporter (Trading Partner) Roles: From the buying center, foreign buyers utilizing export agents collect large quantities of goods and transport them to the main exporter’s transport depot (i.e. harbor or airport). It is from these locations that collected goods are shipped out of the country. Most exporters often use agents who negotiate the final price with the cooperatives and place orders at primary cooperatives located at the village level. Following

examples provided from Tanzania, the supply chain can facilitate the export of mainly unprocessed agricultural products (i.e. cashews) with little value added from retail and wholesale services or processing within the country. However, this model promotes the expansion of African processing that increases the value added activities in the developing country, and therefore, a strategic goal must be set early on to increase capabilities.

Transportation: Processed and whole food goods must be placed in a storage facility until transport. From the storage facility, the main exporter has agents transport the goods via trucks from the cooperatives to the harbor. At the port, the main exporter claims the goods and transports them onwards to customers abroad. Smaller ports may lack the infrastructure for loading but this model does not promote the use of remote harbors. It is important to note that if appropriate storage facilities are unavailable, reliable fast transportation and transport networks are the alternative method for preserving the quality of perishable goods. Given the numerous references to poor transport infrastructure in developing countries discussed earlier, the issue of vehicle transport can be a major impediment in the agri-supply chain development and operation.

Although the paved roads between the major cities may be sufficient, they are scarce in number. (See Table 3) A number of perils in transporting goods on the continent can be improved by negotiating through soft governments that control territorial boundaries in the informal networks that govern local trade. An analysis of this supply chain issue references the case study in Tanzania. The author cites research that indicates transport infrastructure investment generates substantial direct savings in terms of lower vehicle operating costs (Eskola, 2005). It is equally important to note the issue of increased fuel cost for more remote locations. Although the agri-supply chain model does not directly solve these problems, the planning stage in the first steps

should identify such issues and “Agrihub” information system can communicate valuable data to assess the impact of transportation issues on the supply chain.

Export to Downstream Consumers: When raw goods are shipped to a foreign processor/distributor, logistical concerns can arise at the port. Local custom officials have to release cargo at the destination port, and the consignee is notified via email (Kumar, Niedan-Olsen, & Peterson, Educating the supply chain logistics for humanitarian efforts in Africa: A case study, 2009). Once on land, the products are delivered to a facility that uses equipment to refine the raw product into finished processed goods. The next stage involves distribution to the retailer. This is the final outlet to consumers of the goods abroad.

Shipment to Chinese ports has its own set of infrastructure issues. “Almost 70% of economic, trade and investment activity is focused in a small group of provinces along the east coast, yet China’s domestic infrastructure is very inefficient” (Ganster, 2008/2009). Moreover, the supply chain’s logistical problems are exacerbated by shortages in railway and river transport capacity along with astronomically high toll rate, slow freight movers and handlers (Ganster, 2008/2009). While these impediments may add to transport costs, there are a number of different attributes needed for ventures to overcome these and other obstacles. Trading partners in the supply chain need to maintain a common strategic alignment and a level of transparency (Ganster, 2008/2009). On another note, general knowledge about successful supply chains and practices in the targeted region provide valuable information. Specific strategies are summarized in the prior section Growth of China: Consumer Profile and Market Entry Strategies. Additionally, the knowledge gained from understanding other agricultural supply chains, such as Australia, Argentina or Costa Rica, is critical to developing competitive benchmarks and enhancing logistical efficiency.

2. Trading Partnerships

Trading partnerships represent the most critical alliance in the supply chain system. The intermediary distributor, such as Blue Skies Company, plays a significant role in linking producers on one side of the globe to retailers on the other. This task requires the company to navigate the cultural and political boundaries to meet the growing demands of European Consumers, while adhering to local guidelines to address the needs of Africa's indigenous farmers. An examination of how farm contract deals are structured with suppliers is provided by the BSOC collective and Blue Skies Company. The export product is pineapple and the freshly cut fruit is shipped nightly to the Netherlands by air. Each year, the Blue Skies Company and the BSOC negotiate and agree upon a farm gate price for BSOC members. This price exceeds the minimum set by Fairtrade, and all pineapples are purchased at the agreed price before they are cut and packaged for Europe. Notably, the BSOC does not label all of its products Fairtrade. However, products designated as Fairtrade receive the negotiated payment from Blue Skies Company plus the Fairtrade premium. The premium is paid by the retailer and placed into a fund managed by the BSOC members. As mentioned, two boreholes have been constructed utilizing funds raised by the Fairtrade premium along with additional investment by Blue Skies and the Dutch retailer Albert Heijn. Notably, the economic incentive of higher prices and premiums has encouraged suppliers to increase crop production and the quality (Blue Skies - Quality Fresh Cut Fruit, 2011). The trading partnership is uniting farmers from relatively destitute rural villages in one of the most deprived regions in Ghana with major retailer. In addition, the collaboration between BSOC and Blue Skies makes a significant impact on the living conditions in these communities and is being used to solve the acute water supply problems within the four communities (Blue Skies - Quality Fresh Cut Fruit, 2011).

B. Export Diversification

Other countries heavily engaged in international export are focused on agriculture products for which they have developed competencies. The accumulated experience in their supply chains creates a formidable learning curve for developing countries seeking to enter foreign food industries with competing products. Given this perspective, the fruit exporters from Africa could employ differentiation rather than low cost strategies. However, this approach does not ensure competitive advantage. Thus, the idea of marketing products unique to Africa may provide opportunities for competitive advantage gains in the international exchange of fruit since competitors would have to establish new frameworks for duplicate products. This model embraces the conceptual approach of diversification and seeks to introduce two native foods mentioned earlier into the export trade.

The first product is Miracle berry, which is a familiar product to Asian consumers. In contrast, the baobab fruit is virtually unknown outside of its indigenous growing areas. With a vitamin C value higher than any citrus, the baobab fruit is candidate to compete in the citrus trade. In order to appeal to consumers abroad, both products will require marketing. Although these shrubs and trees are not unique to Africa, both plants have a long history of traditional use and cultivation within their communities. From a production standpoint, consumers can easily make geographic reference with exotic fruits. The imagery of miracle fruit or baobab with Africa would be similar Açaí with Brazil. Since these plants are extremely versatile, the option to improve the value chain by scaling up to source processing is tremendous.

Another path for distinguishing African sourced produce is the organic route. Organic farming is a production system that largely avoids or excludes synthetically derived agricultural inputs to aid in the cultivation of crops. The compounds include fertilizers, pesticides, growth regulators and

livestock feed additives. These systems rely on crop rotation, crop residuals, animal manures, legumes, green manures, off-farm organic wastes, mechanical cultivation, mineral-bearing rocks, and biological pest control for soil maintenance and productivity, plant nutrients and pest and weed control (Fageria, 1992, p. 15). Considering the prior examples of Blue Skies organic exports and the limited systems already employed by many indigenous farmers, organic farming fits well into the framework of differentiated exports improving the value chain. Furthermore, low input farming maximizes efficiency of scarce resources by planting species more tolerant to existing conditions. Although yields are not maximized, the amounts of inputs such fertilizers and growth stimulants are reduced (Fageria, 1992, p. 15).

In general, food variability is a key trait of African agriculture that should be further explored for its commercial potential. Africa is home to the world's oldest grasslands dating back to the last 14 million years with a fair amount of grains and other plant based foods that remain virtually unknown to the greater world (National Research Council (U.S.) Board on Science and Technology for International Development, 1996). In addition to the 60 species of gathered wild grass grains used for foods, there are many under-utilized plants species producing fruit and nuts. While Westerners may view fruits as delicacies, they are somewhat undervalued in developing nations where some regard them as children's or snack foods, or purely cash crops (Food and Agriculture Organization of the United Nations, 1988, p. 37). From this perspective, it is possible to see that regional thinking may not value fruit on the same level as the outside world. As African nations start to look beyond the economic assurances provided by mined resources, there may be greater effort to research and calculate the potential of many other indigenous fruits.

1. Miracle Fruit

In this model, Miracle fruit is a candidate for export diversification of whole fruit and processed foods because Chinese consumers are already familiar with this product. Miracle Fruit or Miracle Berry (*Synsepalum dulcificum*) is native to the hot, wet tropical lowlands of West Africa and produced from a slow growing evergreen bush or small tree. The fruit is a small bright red, ellipsoid berry containing a single seed and relatively tasteless. Although the fruit itself is not sweet, when eaten the fleshy pulp coats the taste buds of the tongue and inside of the mouth to produce an extraordinary effect. If a lemon is eaten, the Miracle Berry almost completely covers the sourness and creates a sweet aroma and taste to citrus that remains for some 30 minutes or more (Miracle Fruit, 1996).

The fruit was discovered by the west in 18th century when local tribesmen were observed eating it before consuming bland flavored foods. The taste altering effect is caused by a glycoprotein called miraculin, which binds with the taste buds and acts as a sweetness inducer when it comes in contact with acids (Farrell & Bracken, 2008). Basically, acidic foods become sweet with the berry. The taste-changing phenomenon applies only to acidic and bitter foods like citrus wedges, cheeses, Brussels sprouts, mustard, vinegars, pickles, dark beers and strawberries. (*Synsepalum Dulcificum*, 2010).

Miracle Fruit is produced throughout the year and hundreds of berries can be harvested from a single plant. The miracle fruit is both cultivated and grown freely throughout West Africa. In its native range, Africans sometimes use the fruits to improve the taste of stale food (Miracle Fruit , 2011). The miracle fruit is a remarkable natural sweetener that is virtually unknown around much of the globe (Miracle Fruit , 2011), however, it does have a market in Asia. The berry can be eaten fresh and has a surprising number of modern applications which include use for weight loss,

flavor enhancement (for children and adults), natural sweetener, diabetics (glucose control), chemotherapy patients (weight gain addressing chemosensory dysfunction), heart health and entertainment. Interestingly, an early survey of Miracle Fruit lollipops among US children revealed they preferred the Miracle berry lollipop without any trace of sugar to a standard sugar filled version (*Synsepalum dulcificum* or Miracle Fruit / Miracle Berry, 2009).

(See Figure 4)



Source: BBC News, “The Miracle Berry” (The miracle berry , 2008)

Figure 4 Miracle Berry Advertisement

The fruit is completely safe and once it wears off, normal taste resumes. Although, it is still not approved by FDA and European Food Safety Authority, it is already approved by Japan Health Ministry and the fruit is served in many of Japan's cafes (Synsepalum Dulcificum, 2010). The product has existing sources in Ghana and is distributed in Asia as diet tablets, gum, candy, tea as well as a fresh fruit delicacy. Miracle fruit is currently sourced and processed in Africa but a number of other product spin offs are being marketed by companies outside of the continent. One rival processor noted that Miracle Fruit tablets sourced from Ghana were "risky" versus those processed in Taiwan. (See Figure 5) Hence, this fruit also demonstrates the importance of building African country brands.



Source: <http://www.miraclefruit.co.nz/faq.htm>

Figure 5 Miracle Fruit tablets

2. Baobab

The baobab fruit can compete or complement products in the citrus export supply chain. Baobab (*Adansonia digitata* L.) originates from Sudan and is an example of a fruit-producing tree. The tree is cultivated at subsistence level by small-scale growers and indigenous to the arid zone of tropical Africa. Its' geographic range spans from Northern Transvaal and Namibia to Ethiopia,

Sudan and the Sothern fringes of the Sahara (Food and Agriculture Organization of the United Nations, 1988, p. 63). In its native environment, the tree produces a multitude of items (similar to Açaí and hemp) from food, shelter, water storage, clothing and medicine to hunting, fumigant, and fishing material (Gebauer, El-Siddig, & Ebert, 2002). All parts of the tree are edible including tubers, twigs, fruits, seeds, leaves and flowers.

The food value is particularly high with the fruit pulp yielding 2500 mg kg⁻¹ of vitamin C (about ten times the amount in oranges) (Gebauer, El-Siddig, & Ebert, 2002). From a nutritional perspective, this pectin rich fruit contains sugars by no starch and is a good source of assimilable calcium and thiamine (Food and Agriculture Organization of the United Nations, 1988). The time required to yield fruit varies from eight to 23 years but rapid growth is possible. In contrast to cultivated crops, edible wild plants generally yield the highest vitamin and mineral concentrations in semi-arid and arid regions. There is limited information on local tree husbandry practices, however, it is common knowledge that cultivated trees are planted near villages. Referencing Table 19, the degree of domestication for is wild and semi-wild. Currently, there is no known plantation level farming of the baobab.

Table 19 Degree of Domestication

Cultivated	propagated with in farming systems
Wild	naturally occurring, self-propagating
Semi-wild	protected by farmers where found growing

Source: Traditional Food Plants from Food and Agriculture Organization of the United Nations

For many fruits, storage is a concern because atmospheric conditions affect the nutritional value over time. Due to the moisture content, fruits are particularly vulnerable to decay compared to grains. In industrialized countries, fruits generally undergo freezing or canning processing (Food and Agriculture Organization of the United Nations, 1988). Traditional preservation techniques

in developing countries mean sun drying to a low moisture level to store at ambient temperatures. This can be done with or without blanching. With blanching, the hot water stops destructive enzymes. However, as Table 20 illustrates, the procedure reduces nutritional value by destroying Vitamin C and much of the folic acid.

Table 20 Environmental factors affecting the stability of specific vitamins in food

Vitamin	Water soluble	Subject to oxidation	Heat labile	Light sensitivity
Vitamin A	no	yes	no	slight
Riboflavin	yes	no	no	yes
Thiamin	yes	no	yes	no
Vitamin C	yes	yes	no	slight

Source: Traditional Food Plants from Food and Agriculture Organization of the United Nations

High vitamin C fruits, such as lemons and oranges, can be stored for lengthy periods. However, the vitamin C levels begin to decline over longer storage periods and higher temperatures. The baobab tree’s fruit is unique in that it is one of the only known exceptions to the general rule of Vitamin C loss under storage. The intensity of Vitamin C in the baobab’s fruit pulp is denser than any known citrus when harvested and actually **increases** with storage. Hence, education about the substantial nutritional value and multifunctional usage of the baobab could stimulate trade of the baobab powder and large-scale cultivation of genetic varieties (Gebauer, El-Siddig, & Ebert, 2002).

3. Marketing New Products

As other countries focus on agriculture goods they have already developed, African producers have to be mindful of the myriad of products that can be derived from their own landscapes and used to diversify their export fruit chains. The examples of international commercial foods that

illustrate the possibilities include Brazil and açai, New Zealand and kiwi, and the Middle East and pomegranate. Miracle berry is a product recognizable to Chinese consumers while baobab could be aligned with the citrus imports for China. The ability for consumers to adopt new products is largely contingent on the best methods to market their appeal. This requires an analysis of Chinese consumers and their tastes. Thus, developing an understanding of the food industry and consumer perceptions is critical in evaluating the potential success of a new food products.

In addition, it is relatively important to compare African nations' supply chains to countries such as Australia. A nation such as South Africa enjoys the same counter-seasonal growing advantage as South America and Australia. Additionally, certain items that can be produced in South Africa (i.e. wheat) are net importable goods in China (Feng, 1993). Comparatively, Australia maintains a well-integrated agri-supply chain with China and is even referred to as the "supermarket to Asia" (van Roekel, Willems, & Boselie, 2002). Since continued Chinese growth can create financial windfalls for any country capable of effectively meeting its demand and competing with the existing Australian supply, a strategic approach to overcoming the issues affecting global supply chain development can yield a bountiful economic resource. Therefore, this model supports African supply chain readiness as a necessary tool to drive competitive advantage in the international exchange of agricultural goods to China's enormous consumer base.

In order to react to customer demands, the supply chain's management has to be consumer-oriented and aimed at the coordination of production processes (van Roekel, Willems, & Boselie, 2002). This means the supply chain must address end user desires for quality and safety while navigating around the obstacles created by the lack of infrastructure (roads, storage facilities, processing plants, communication systems, etc), technology, experience, capital, financial institutions, policy incentives and market information. Despite the challenges, agribusiness

suppliers can succeed with some rather practical steps to help ready supply chains and improve agri-business profitability. These actions include the following³:

Get to know the market: Visit the market, establish a price range for products, understand the sales and distribution channels, and know customers' preferences.

Proper due diligence: Due to an increased incidence of scams in China, ventures should investigate inquiries from China and consult with trade agencies or business contacts for assistance and referrals to professionals specializing in China due diligence checks and investigations.

Find a local partner or agent: Choose slowly and carefully, look for a partner with a proven record, and ensure that the partner is able to handle import formalities.

Test the market: Be aware that everything is different in China between each of the cities and provinces.

Find your market segment and focus on it: Identify and develop a niche market. Try not to cater for the entire market by diversifying too early.

Adapt your product to the local market: Adapt product to local tastes, and make small adjustments to the product if necessary.

Invest wisely in market promotion: Participate in industry specific trade shows, and make frequent visits to China.

With respect to modern marketing, the rapid growth of Internet use and penetration in China should not be overlooked. This is particularly the case for major urban centers where e-

³ Adapted from Stella Cai's "Food and Beverage to China"

commerce is seen to offer considerable potential in China. Still in its niche stage, online trading is gradually expanding in China and there are a number of e-commerce sites and developers. Those sites in China provide a platform for business information exchange but physical transactions are primarily undertaken offline due to China's undeveloped online payment system, and difficulties in establishing the business credentials of some companies in China (Cai, 2010). Online transactions are usually most popular among companies with products already circulating in the Chinese market (i.e. available in China) and goods are dispatched from a Chinese warehouse point to the buyer (Cai, 2010).

Identifying the pathways to suit the needs of a growing chain means enabling communication and technology while becoming a more efficient producer and marketer. There are cases in Africa where expanding core competencies have overshadowed the numerous obstacles faced by export producers in developing countries. For example, an analysis of South Africa indicates it has moved up the value chain with the highest value exports in sugar, wine, citrus fruit and grapes (Mosoma, 2004). Notably, the tomato and maize chains are respectively marginally and highly competitive internationally. Since strategic partnerships with upstream suppliers and downstream distributors can increase the level of effectiveness and efficiency, supply chain management is crucial in the areas of responsiveness to consumer demands, reduction of transaction costs and improvement of margins. With so many activities involved, supply chain partnerships have to be based on interdependence, trust, open communication and mutual benefits.

V. Conclusion

Ideally, building sustainable ventures that generate returns, employ people, revitalize communities, and integrate African economic systems into the global arena are the key methods to secure Africa's future as a self-reliant continent with minimal dependence on international

foreign aid. This point does not disregard the value of foreign aid. In fact, the volume of unilateral transfers into the continent has saved many lives but those contributions have not been tied to creating solutions to stop the recurring tragedies that afflict Africa. From this perspective, the consequences of funneling humanitarian food aid are deemed short term.

Agribusiness development and international trade in the agricultural sector provide measures to address such concerns with long-term outcomes. This remark is based on the point that capitalism and free market competition demand accountability and profitability. However, economic progress in Africa requires high degrees of flexibility along with controls. All this must be done while remaining mindful of the historical precedence set by an overwhelming dependence on natural resources and ensuing clashes. The lesson learned is that control over a predominant export in high demand has been the impetus for many internal conflicts and corrupt political hoarding of wealth, as well as the fundamental impediment to financial, social and cultural progress in many African societies.

The positive outcomes for this supply chain model provide benefits to all participants. This includes the consumers eager to support green initiatives, organic and unique products, staple and/or high nutritional value foods sourced from Africa. The modern world's consumption of food has grown increasingly focused on meat products along with a limited variety of grains, fruits and vegetables. Consumers demand more food choices but there are a declining number of places left for mass cultivation of the endless assortment of nature's bounty.

The marketed appeal of this model is that it not only introduces a wide variety of nutritious foods to the public, it also brings smallholders on-board and affects their living conditions. As demonstrated, agribusiness for export embraces the most vulnerable population in the supply chain, the smallholders and subsistence farmers, and gives them access to benefits beyond

community and regional markets. This is critical for farm development efforts in Africa as there are many impoverished women and families who participate in small household subsistence farming.

Moreover, this model shows how supply chain partners can integrate output from a collective of individuals. They disseminate information, assist with services and fund infrastructure to improve the value chain. Each step is towards an objective to achieve greater production capacity and output. This effort requires technology and coordination of the system's components in a manner that maximizes efficiency. The presented model also leapfrogs current agricultural ideologies regarding all or nothing attitudes towards genetic bioengineering. Food security in Africa means augmentation of output. Technologically enhanced inputs are one of the only ways to achieve this internal goal. Hence, technology adoption is critical for Africa farming systems to thrive. Equally, resource science can draw valuable lessons and practices from long-lived systems developed throughout the centuries of indigenous cultivation.

This model embraces many ideas that should work to the betterment of African society. Since the continent's agribusiness is still in its beginning stages, the industry is not constrained by the same factors faced in developed markets. Agriculture in developing countries has the option to adopt more green and clean technology out of necessity or desire. On the financing side, the export chain engages international partnerships that open doors to more abundant sources of investment capital. The allure of successful firms draws the attention of multinational corporations that can entice the best and brightest talent back to the continent. Within the supply chain, trading partners introduce products from the poorest segment of the agricultural community to the wealthiest international retail chains.

The motive for taking on the challenge of African agribusiness in its infancy is not simply to create more goods for the world but to develop a significant competitive advantage. That task entails exploring both old and new forms of production and seeking to understand the value of low input organic and alternative farming to create valuable food staples or differentiated products. The pursuit of free market increases the breadth of regional economies and enables opportunity for trade expansion. In essence, trade demands cooperation and fueling a diversified trade means opening boundaries, aspiring to higher levels of accountability, providing infrastructure and financial means across class based production systems to integrate resources into supply chains while developing comparative and relative leads into competitive advantage.

The African Green Revolution movement proposed by Kofi Annan recognizes that traditional crop cultivation supports important socioeconomic and nutritional needs. Moreover, propagation serves many functions that include maximizing food production for land by mixed cropping, productive use of marginal land; source of income; filling the hungry season/famine; providing by-products and dual-purpose crops; and/or improving production of major staples and cash crops (Food and Agriculture Organization of the United Nations, 1988). Although it is clear that the African Green Revolution meet the domestic needs of the continent as a priority in food security initiatives, there has to be real recognition of the value of globalization to developing and emerging countries. The balance of economic growth from food systems must embrace export diversification in order to provide greater subsidies for agri-business expansion. In conclusion, the strategic path for agricultural development in Africa has to include the rational view that agri-business advancement and diversification of supply chains will ultimately provide much of the market driven resources for infrastructure development, regional economic growth, financial support, workforce knowledge and technological systems necessary for internal and external prosperity.

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