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Asda/Walmart Global Food Security

Briefing Paper Annex - Tables of existing corporate-led actions across the value chain

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Background and purpose of this document

This document serves as an annex to the main Briefing Paper for the Asda / Walmart Food Security Project. The details within in this document provide some of the actions being taken by companies across the value chain.

Given the breadth of the markets and geographies involved, the activities described only provide a selection of some of the interventions to address food security. The document is organised as four tables:

Each action is described; this is supplemented with an identification of key potential for further development and some of barriers that need to be considered. We have also provided a number of examples – these are only intended to be illustrative. These actions may inform the discussion at the workshop on developing 'Joint Innovation Projects' – in which two or more businesses agree to join forces and work together[1].

We look forward to getting your feedback on some of the actions described and drawing on them to identify opportunities for multiple businesses to work together. If you have any queries on the content, please contact kate.weinberg@irbaris.com or david.lyon@irbaris.com

[1] Many JIPs are organised to respond to matters of supply chain inefficiency, sustainability challenges over land impacts or water reserves etc. In the last twenty years, JIPS have successes in a number of industries, including oil, for example: www.cosia.ca

TABLE 1: INPUT AND PRODUCTION ACTIONS

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
A. Information, awareness building and education			
1. **Supporting integrated soil fertility management** e.g. agroforestry, no-till farming, including participatory research, extension services etc	• Simple methods are effective e.g. manure, legumes • Low and declining soil fertility is a fundamental problem limiting smallholder agricultural productivity in sub-Sahara Africa • Provides co-benefits e.g. legumes are high protein food source, supplement livestock feed, potential to support water resource management • Opportunities for carbon sequestration.	• Takes a long time to realise benefits • Traditional aid focus has been on water with soil neglected • Seed companies are less focused on legumes as farmers can replant them over seasons • Disaggregated and inappropriate training of farmers	Through more than 1,600 field schools, Cargill teaches affordable and sustainable practices that improve soil quality and raise yields, as well as encouraging rotation of cotton with food crops to improve nutrition.
2. **Extension services** and demonstration plots (i.e. the transfer and exchange of practical information for the farmer to improve his/her outcomes.). This can be enabled by ICT	• Vast majority of farmers are under-served. Huge potential to increase services: e.g. only 1 trainer per 4,000 farmers • Can include participatory approaches and feedback and data from farmers • Input providers increasingly sell effects of products –requiring closer engagement with farmers • Buyers of some outputs are increasingly organizing themselves vertically, noting the need for extension • Need identified to move from generic messages to customized advice and integration of technologies and information	• Original dependency on government provision - structures have disintegrated in many locations • Fragmentation - large numbers of small enterprises are difficult to access, limited incentive to reach remote and marginal farms • Advice may be limited to the product(s) sold or crop specific, especially if extension services provided by buyers of produce • Time and administrative burden on converting the vast amounts of farm extension information to digital and searchable form • Communication challenges (local languages, literacy levels)	Media and ICT can play a key role ; farmers can access services through toll-free numbers; or radio programmes (e.g. KenCall's Farmer's Helpline; Mali Shambani in Kenya; Farmer Voice Radio in Kenya, Reuter's Market Light; FarmForce - Syngenta) In Kenya, Fintrac used the Value Chain + Good Agricultural Practices methodology to encourage the production of African Bird's Eye (ABE) chili by farmers who have quadrupled their income as a result. The processor, facilitated by Fintrac, provides inputs and extension as embedded costs, and trains the smallholders to intercrop with sweet potato and local vegetables. Unilever (Lipton) Farmer Field Schools Project for tea in Kenya engaged smallholders through farmer to farmer transmission, resulted in yields increasing between 5 to 15% in 3 years, farmers then became certified with Rainforest Alliance[1].

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
	towards location-based data • Financial planning and business skills is particularly beneficial to women and those of low literacy	• Risk of program design not being appropriate e.g. lessons from top-down Training and Visit programmes in India	
B. Research and development and deployment			
3. **Research into fertilizers and seeds** (e.g. reduction of leaching loss, disease and drought resistant seeds). Tested in country to determine optimum levels of applications, efficacy and cost	• Environmental benefits • Increased productivity • Past performance with major crops and in other continents • Potential to develop multi-stakeholder research hubs with local nodes	• Expense of seed research and time to market is long • Translation into low cost products difficult • R&D success in SSA not comparable to Green Revolution in Asia • Affordability and availability of capacity (personnel, genotyping, phenotyping, infrastructure, bioinformatics systems) • Current low demand for inputs reduces potential economies of scale in procurement • Seed variety varies by geographic region (within 200km) – produced for specific conditions	BecA (Biosciences for eastern and central Africa) supported by Syngenta YARA conducts fertilizer trials with in-country institutions and research centres in Malawi, Tanzania, Mozambique etc All major input providers such as BASF, Bayer, Syngenta, Monsanto, Yara among others have extensive research programmes – though the crops and geography of focus varies considerably.
4. **Research into innovative use of chemical and biological products to support soil quality, crop pest management, diseases**	• Existing global capabilities that can be deployed • Integration of biological and chemical-based technologies can further enhance productivity	• Conservatism: advisors apply chemicals/ fertilisers based on past experience rather than data/ analysis • Site-specific and can require greater network of those working with farmers • Lack of business case for developing new technologies on minor crops or for small holders	Microbial inoculants (such as Agrinios' HYT) with complex ecosystem of soil based microbes. They use nutrition in the soil to increase colony size and enhance fertiliser efficiency (by capturing nutrients into biological form for later retrieval by other microbial species in response to plant root demand). Leads to increased soil organic matter[2] Novozymes and Syngenta working together to commercialize JumpStart technology, a seed-applied biological that increases phosphate solubilization in the soil.
5. Application of innovative irrigation technologies (e.g. drip irrigation)	• Potential for development of simple technologies where use of pump/electricity and no technology is required to employ the system	• Only 4% global total irrigated land is drip irrigated • Technology is complex, requires expertise in agronomics and plastics	Netafim provided training and technical support, and the local government contributed 50% cost for a project of a simple drip irrigation scheme in Tanzania and India. Farmers earned Rs25,000-40,000 instead of Rs500-1000 when relying on monsoon rain. Project is now being scaled up[3].

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
	• Most successful when linked to finance, insurance and extension services • Saves significant water, reduces use of fertiliser, reduces run-off, reduces energy use • Can lead to recycling of water and nutrients • Allows access to new crops and different markets	applications • Recycling must be tailored to different uses and nutrients – difficult • Some technologies only suitable for vegetables or fruit • Availability of longer-term financing for capital • Irrigation only suitable in particular geographies /crops.	KickStart-International designs and mass-marketing simple, human-powered irrigation pumps. These low-cost ($70 and $150) pumps are bought by poor local farmers who use them to irrigate their plots from shallow wells or ponds. The farmers move from rain-fed-subsistence farming to commercial irrigated agriculture. They grow and sell high value crops throughout the year- and on average increase their net annual incomes by over $750. KickStart designs the pumps, establish the supply chains, demonstrate/promote the pumps, and educate the farmers about the benefits and methods of irrigation. To date, more than 150,000 farming families have used their pumps but is looking to scale-up further.
6. **Crop management technology** - computerized control of all aspects of agricultural processes	• Suitable for larger-scale commercial farms • Allows control and management of crops based on valuable, real-time field data through the intelligent integration • Monitors and regulates variables with sensors • Allows forward planning and real time feedback • Frees up farmers' time	• Availability of existing infrastructure to support deployment of technology • Requires expertise and skills to use and maintain • Short-term focus of current investors in agricultural enterprises • Expensive • Not appropriate for smallholder farmers	Phytech provides remote sensing and monitoring of plants for a number of indicators (e.g. soil water, soil temperature etc) Netafim helps farmers control and manage their crops based on valuable, real-time field data through the intelligent integration monitoring and regulation of agricultural variables such as water, fertilizer and micro-nutrient usage using fieldbased sensors which transmit real-time data from any situation in the field. Such systems provide farm managers with extensive knowledge of what is happening in the field.
C. Organisation			
7. **Processing and marketing firms can have closer involvement in direct production and secure supplies**. This can include contract farming[2] or outgrower schemes; hubs	• Can lead to wider participation of smallholders in high-value supply chains • For processors/retailers, leads to improved control over supply; opportunity to explore local	• Contract enforcement difficult • Requires mechanism for consistent dialogue and partnership related to cost and benefit of production choices (e.g. varieties, when to harvest, how to store etc)	SABMiller initiated contract farming in India and South Africa when yields were unsatisfactory ADM sources Cote D'Ivoire cocoa mainly from cooperatives through "graduation" scheme. Once cooperative proved to be reliable for 2/3 years, they become eligible for technical training and extension services from ADM. ADM offers agricultural finance investing in

[2] Contract farming is an arrangement whereby typically, the farmer agrees to provide established quantities of a specific agricultural product, meeting the quality standards and delivery schedule set by the purchaser. In turn, the buyer commits to purchase the product, often at a pre-determined price. In some cases the buyer also commits to support production through, for example, supplying farm inputs, land preparation, providing technical advice and arranging transport of produce to the buyer's premises. Another term often used to refer to contract farming

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
Linked with guaranteed input financing, strong extension support and guaranteed output markets	markets • Assured markets and prices - especially for non-traditional crops • Enhanced farmer access to production inputs, mechanization and transport services, and extension advice	• Not easily implemented – can take years to set up • Competition among contractors is necessary • High transaction costs: identifying farmers and organizing and enforcing contracts • High costs for direct production: labour hiring and management, accessing land • Success depends on terms of the contract. (e.g. avoid side-selling, downgrade of produce, renegading on agreed prices).	coops each year with default rate of <1%. Reaches 12,000 smallholders[4]
8. **Support for organization of farmers into cooperatives, collectives** etc. Farms themselves can vertically integrate downstream through collective action (e.g. cooperatives, farmer associations) to overcome asset gaps	• Focus on groups for women and gender specific engagement • Provides economic opportunities e.g. aggregate crops so can sell for export, stronger negotiating position, lower prices for inputs • Provides access to support and services e.g. training, ICT, storage	• Availability of capital to grow - particularly investment in physical assets to add value in processing • Lack of management capacity and governance • Farmer organisation, culture sometimes with limited disposition to work collaboratively • Traditional structures are often bureaucratic and unresponsive	Assisting in the organizational capacity building of smallholder farmers through targeted training and assistance all the way to the formation of cooperatives. In Mali, through the PRECAD project funded by Syngenta Foundation, five farmers' organizations received their official certificate as a cooperative (seed, grain, nursery, plant, and sesame producers). The cooperative was able to sign a contract with wholesalers for more than 25 tons in 2008 In Ethiopia, a cooperative of farmers banded together, and with support and advice constructed wet mill and processed fully washed coffee, earning 50% more than previously. Money was spent on infrastructure[5]
9. **Backward integration (input providers buy product):** To ensure repayment for agro-credit, agro-dealers have developed backward integration models; they provide input to farmers, training and buy the	• Offers guaranteed market to producers, an incentive to re-use agro-inputs for subsequent seasons. • Supports access to high quality, low-cost seeds and fertilisers & inputs	• Lack of infrastructure, difficult to access remote areas • Informal and poorly organised. Often input providers do not have direct access to farmer networks • Poorly managed fertilizer subsidy programmes across Africa fuels	Direct markets: BIDCO Kenya provides market for over 10,000 farmers; East Africa Breweries through East Africa Malting Company Limited provides immediate market for over 10,000 sorghum producers Equipment and storage: Nestle South Africa helped connect electricity and other infrastructure to their suppliers in

operations is 'out-grower schemes", whereby farmers are linked with a large farm or processing plant which supports production planning, input supply, extension advice and transport. Contract farming is used for a wide variety of agricultural products.

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
produce at the end Also **Forward integration (processors move into marketing and distribution)**	• Increased input sales • Pool resources /economies of scale e.g. agronomists of food & beverage as well as from equipment manufacturers • Potential for collaboration between companies	smuggling and ultimately results in higher fertilizer prices for farmers • Inputs sometimes become political commodities with interventions, which destabilize sustainability measures, create inefficient utilization and make the private sector uncompetitive. • Lack of harmonized regional regulations and standards make cross-border trade in fertilizer difficult.	Johannesburg for milk production. In some instances the processing companies also invest in road construction or rehabilitation farmer mobilization. East Africa Malting, BIDCO and Nestle, among others, have agricultural departments that provide production technologies to farmers to increase their productivity Asda/IPL: use a direct procurement model, managing the whole process from consumer-facing decisions to buying from growers directly[6].
D. Risk management (including insurance)			
10. Index insurance • **Meteorological trigger** Weather stations send rainfall data to insurance company, triggering payments based on estimated damage to crops, i.e. pay out if the meteorological value (rainfall or temperature) is not achieved or exceeded. Payout is irrespective of crop loss. Index structured from weather stations network and production statistics. • **Area yield trigger** Payout on shortfall in realised yield of an area relative to average historical yield	• Fast, effective, efficient, easy to administer, fast claims settlement, minimisation of moral hazard • Easy to understand, i.e. payout is a fixed amount, depends on weather or yield • No individual loss adjustment necessary, so lower operational costs • There is enough value added for the farmers – more than standalone insurance provides (as this depends whether there is sufficient demand for the product) • Alternative distribution channels provided by local lenders and through agricultural dealer networks • Incentives to invest in higher quality seeds and fertiliser as poor weather can cause farmer to lose livelihood as well money invested in crops as well • Potential lies at aggregate level	• High development costs (except yield trigger) • Leaves large basis risk with individual farmer • Farmer cannot trace the real mechanism of the cover i.e. smallholders may not know how many mm of rainfall required for decent crop, therefore demand is much lower than expected[8] • Lack of trust in insurers • Requires clearly defined conditions, i.e. thorough understanding by farmer, financial capability to bear basis risk. Actions are scalable where bundled with agricultural inputs and loans • Meteorological trigger is an inadequate estimate of crop damage; limited by distribution density and reliability of weather stations to record data – lack of mobile infrastructure; does not cover all risks • Area yield trigger requires data on	Swiss Re, Vodafone & Syngenta have a “Kilimo Salama” project in Kenya: low-cost mobile microinsurance to maize & bean farmers protecting them if crops damaged by weather. Bundles insurance (for seeds, fertilisers and chemicals when they buy them at 5% premium, and 5% more covered by companies) with loans for fertilisers and other farm-related items. Insurance premium paid as part of loan repayment[9] Allianz Re is developing radar-based remote sensing technology to measure biomass growth and potential yield of agricultural areas

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
	and not with individual farmers - (though group of smallholder farmers could act as ambassadors and demonstrate benefits[7]) • Insurance can be renewed 4 times a year to protect each crop season • Area yield covers all perils	availability of accurate and long-term historical data on area and yield – often non-existent in Africa	
11. Indemnity-based or Direct loss (fixed sum insured/ variable sum insured) Sum insured based on value of crops and pay-out is yield shortfall below a pre-agreed threshold multiplied by pre-agreed price	• Sum insured eligible within certain limits • Loss adjustment on % loss basis	• Loss adjustment in the field necessary – requires local expertise that does not necessarily exist • High risk inspection, loss adjustment and administration costs • Moral hazard and anti-selection are risks	
E. Development of policies and standards			
12. **Certification based on meeting minimum social, economic and environmental requirements** Can also include progress requirements/continuous improvement e.g. fair trade, BSI, RSPO. Companies required to pay fair price (never below market price)	• Farmers get fair price/better pay, better working conditions, and improved yields • Leads to interventions e.g. increased access to pesticide, fertilizer, training and good agricultural practices • Can lead to premiums on products • Consumer preferences demanding sustainable products and prepared to pay more	• Manufacturers pay premium on top of regular price • Often targets mid or large scale enterprises • Unclear how cooperatives distribute premiums to farmers • No standardised requirements between certification systems • Difficult to form groups to pay for initial investments and maintain required internal control systems • Type of certification will depend on product – bananas can be physically traced, whereas cocoa has to rely on mass balance	IDH Cocoa Improvement Program funded by IDH aligns parties that account for 30% chocolate market. Aims to upscale certification, institutionalise sustainability and disseminate sustainability practices. The Certification Capacity Enhancement (CCE) project aims to increase certification of west African cocoa sector.

TABLE 2: DISTRIBUTION, STORAGE AND PROCESSING ACTIONS

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
A. Information, awareness building and education			
1. Increase farmer knowledge of post-harvest produce handling and storage options and best practice guidance	• Allows farmers to store surplus and sell when market prices are high • Brings a number of benefits to farmers, e.g. increased income, increased food availability, better negotiating position, improved health and hygiene etc • Can use farmer organisations or marketing cooperatives as information channels	• Must be tailored to local conditions, e.g. some storage methods are not appropriate in humid conditions • Must be tailored to specific crops • Takes time for farmers to evaluate and adopt - must be systematic and long-term i.e. 20 year programme, rather than 3 year project	There is potential to learn from examples such as PostCocheca – success with metal silos in Central America hasn't transferred to Africa due to a lack of galvanised sheeting, and prohibitions on fumigation that is necessary etc. New technologies must be designed with local community and practical reality. Codex Alimentarius Commission Code of Practice for the Prevention and Reduction of Mycotoxin Contamination in Cereals
2. **Use of ICT to optimize supply chain management**, delivering efficiency improvements for transportation logistics (e.g. smart logistics, traceability and tracking system, supplier networks and distribution networks)	• Enable information sharing, reducing inefficiencies and gaps in getting information from farmers up the chain and back down • Enables collection of data from remote areas allowing aggregation of real-time data • Installing simple low-cost wireless data devices within storerooms, delivery vehicles and distribution centres enables emerging market farmers and food producers to develop detailed logistics and tracking systems • Further potential to expand ICT in including small-scale farming operations	• Expensive • Relies on wireless that may be intermittent • May be difficult to engage entities in supply chain • Requires new IT systems and level of expertise	Vodafone analysis suggested key potential in Smart Logistics, Traceability and Tracking, and Mobile Management of Supplier Networks[10]. Mobile phone platform (Nompilo) for community care workers in South Africa could be extended to farmers. Caregivers are collecting information about patients through mobile phones, accessing patients' health records and uploading new information on treatments or request referrals. The technology behind Nompilo could easily be adapted for agricultural field workers visiting farms to keep records about farmers and their crop yields[11].
B. Research and development and deployment			
3. **R&D for post-harvest technologies at different**	• Can keep food longer, away from insects, and therefore increase availability of food throughout the	• May not be adopted because they are financially unsustainable	In Malawi, the Programme for Africa's Seed system has discovered a common bean land

Table 2 – Distribution, Storage and Processing

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
stages of production and processing. This includes use of varieties/ inputs, on-farm storage, drying and threshing techniques, pest control etc. Includes metal silos, different types of bag/sack etc	year, and increase amount of food available that can be sold • Reduce post harvest losses, leading to lower prices and improved food security • Postharvest activities such as processing and marketing can create local employment	• Lack cultural acceptability (e.g., introduction of silos where local populations prefer to keep stocks in their homes) • Often an assumption that facilitating change can occur over a short period of time, yet takes a long time	race that is not damaged by weevils or beetles. Some varieties of bean ripen at lower pods and then successively up the stalk, modern varieties ripen altogether
C. Organisation			
4. **Establishing aggregation and marketing centres** in selected countries to facilitate markets and reduce post-harvest losses. This can include shared warehousing facilities.	• Can support the development of local markets and regionalized systems for distribution • Can result in closer links between retailers and smallholders (and fit in with use of contract farming, co-operatives etc • Can enable approach through seed capital in form of credit to local small-scale buying agents •	• Could reduce resilience (e.g. extreme weather events etc) • Requires start-up capital for facilities, infrastructure etc and training to link farmers with centres • Requires incentive structures for the beneficiary and wider community • SMEs excluded from mainstream market channels as retailers look for cheaper products through high volume purchases	Development of some schemes of integrated models of grain handling. Contains an agribusiness centre providing drying, handling and storage, which is linked to farmer organizations, banks and other service providers and input suppliers. Farmers deliver harvest, and the centre processes, stores and markets products
5. Integrate producers and processors	• Additional benefits e.g. job creation, infrastructure • Increases access to market • Local farmers are integrated with their own local processing facilities. • Allows producers to increase the value-add of their products • Reduces food waste across the value chain as products due to potential logistics efficiencies and reduction in transport prior to processing	• Significant capital investment in processing facilities • Lack of infrastructure • Ability of producers to meet quality and other standards • Geographical distribution of small-holders and limits to scale of processing facilities	Olam has worked to close the loop between farmers and processors by integrating the cashew supply chain. It involves technology and innovation investment in mechanical cashew processing, 3,000 jobs created at the new processing facilities, direct market access linking farmers to the three processing facilities, and farm productivity investment – training 100,000 farmers; 100,000 improved tree varieties distributed; training. Woolworths and Technoserve working together to get smallholder tomato producers access to a local supplier, who picks up food from the smallholders and takes it its facility and packages products to supply Woolworths.

Table 2 – Distribution, Storage and Processing

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
D. Risk management (including insurance)			
6. **Direct loss (fixed sum insured).** Sum insured based on value of infrastructure	• Sum insured eligible within certain limits	• High risk inspection, loss adjustment and administration costs • Moral hazard and anti-selection are risks	**Cross-refer to Table 1 (Inputs and Production)**
E. Development of policies and standards			
7. **Adapting to international food standards** for processors and distribution firms, setting internal standards	• Allows access to export markets where producers are able to comply with international food safety requirements (e.g. FAO/WHO Codex)	• Expensive • New standards and processes must be used and require learning	**Cross refer to Table 3 (Nutrition and Access)**

TABLE 3: NUTRITION AND ACCESS TO FOOD ACTIONS

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
A. Information, awareness building and education			
1. Improve knowledge of nutritional requirements across value chain; shape consumer demand	• Ability to integrate with health systems (e.g. infant/ child nutrient programmes) and through community-based programmes • Ability to use communication and social mobilization at all levels, from communities to mass media	• Low literacy levels • Lack of access to information • Fragmentation of users and ability to target specific groups	Actions to incentivize or encourage consumers to diversify their diets. This includes actions to develop, publish and/or educate consumers on nutritional standards. Examples include providing dietary guidelines and providing tools or metrics that measure nutrition on a regular basis, and education programmes targeted at mothers and children In South Africa, *Kellogg's Corn Flakes®* nutrition education campaign trained nearly 600 health care professionals with the aim of improving knowledge of healthy eating among patients at primary health care clinics
2. **Increasing dietary diversification** Product diversification, e.g. dairy, livestock, home gardening, aquaculture. Can include varietal trials and taste testing with farmers and children	• Provides other products for selling therefore increases income • Diversification increases resilience of livelihoods • Improved diet and associated health benefits	• Difficult for rural farmers who depend on few staple crops for majority of their energy needs • Need to encourage farmer uptake • Difficult to stimulate demand among consumers • Requires extension services to encourage cultivation of underutilised crops	The introduction of beta carotene–rich orange sweet potato in rural Mozambique and Uganda (by HarvestPlus) could improve Vitamin A status among children. Farmers started cultivating them instead of traditional white potatoes[12]. PepsiCo initiative (Enterprise EthioPEA) in Ethiopia to boost production of chickpeas (22% protein content). It helps develop local businesses that use the chickpeas -- and, at the same time, secures a supply of chickpeas for Sabra hummus. PepsiCo will also develop a chickpea-based food supplement to target malnourished children in Ethiopia[13]

Table 3 – Nutrition and Access to Food

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
B. Research and development and deployment			
3. **Biofortification of staple food crops** Development and marketing of biofortified crops targeted at low-income market, either by genetic modification, or by agronomic practices, or conventional plant breeding	• Long-term, lasting impact as crop can be used each year – compared with supplements • Cost-effective and realistic for rural farmers given their dependence on staples • Particular focus on women of reproductive age, pregnant women, new mothers and children • Could be done with fertilisers as described in action 4.4 below, so have dual impact	• This depends on an effective distribution strategy, implemented by local health-care providers • May require food regulation, labelling, quality assurance and monitoring • Little evidence of farmers' acceptance or adoption rates • Variety must be adapted to crop and soil management practices • Soil and plant factors can limit capacity of crop to absorb enough micronutrients • Can be a long-term process, requires a variety of breeding efforts and significant resources	Flour is commonly fortified with iron, zinc and B vitamins; cooking oil is fortified with vitamin A, rice with iron, maize with protein etc BASF has a Food Fortification initiative (Strategic Alliance for the Fortification of Oil and other Foods), focusing on vitamin A products to fortify staple foods (milk, sugar, oil and flour) and providing technical advice to local producers
4. **Micronutrient-enriched fertilizers** Applied to crops and increase their growth and the nutrients in the crop	• Good short-term action, that can complement the biofortified crops • Can have a co-benefit in terms of seedling vigour and crop yield	• Does not address root cause of micronutrient deficiency • Not sustainable or feasible long-term • Uptake by farmers can be low if they do not see direct benefits	Selenium has been added to fertilizers in Finland since 1985 with significant success Enrichment of cereal grains through application of zinc fertilizers in Thailand[14] Bayer's initiative in Bangladesh on Affordable Nutritious Foods for Women aims to enhance nutrition through micronutrient-enhanced agricultural practices and inputs in rice as well as vegetables and legumes
5. **Research into pre- and postharvest effects on nutrient quality**, or the adoption of productivity-enhancing inputs and cold-chain technology	• Increases protection and storage and access to food outside production cycles • Potential co-benefits such as reduction in food waste • Integrate actions with local dietary requirements and training for women	• Expensive • Direct benefits to farmers not always apparent (ability to communicate nutritional benefits and farmer business case)	Beans in Uganda are rich in micronutrients, yet nutritional benefits lost due to pre/post harvest handling – late harvest exposes beans to fungus, damage during threshing, insect infestation among beans. Analyses identified best practice on processing methods (e.g. soaking, dehulling and sprouting) to maximize retention and bioavailability of nutrients[15].

Table 3 – Nutrition and Access to Food

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
C. Organisation			
6. Build **stronger links with the health sector as well as consumer/ producer alliances**	• Efforts in health sector to identify low-cost approaches to address nutritional issues • Direct access to consumers through health case system	• Difficulty of communicating underlying performance of alternative producer actions • Indirect benefits to producers	Nestle Nutrition Institute Africa - The Nestlé Nutrition Institute shares leading science-based information and education with health professionals, scientists and nutrition communities and stakeholders, in an interactive way
D. Financial incentives and access to capital			
7. **Identify potential changes in costs to increase nutritional content in food** Provide financial incentives, and investments (e.g. technology and infrastructure) to address food quality and nutritional content	• Use of assessment tools to assist in project assessment (e.g. GAIN) • Increasing focus by donor community on investments in this area • Research focused into whether consumers are willing to pay more for safe food and if this can be used as an incentive for producers and processors to produce safer foods	• Benefits are indirect, business case can be difficult to articulate	
E. Risk management (including insurance)			
8. **Use of product liability insurance** and other risk management processes for food safety management	• For some products and locations, this is well established and mature	• Expensive for farmers • High costs for risk inspection, loss adjustment and administration • Moral hazard	
F. Development of policies and standards			
9. **Development and implementation of food-safety standards** e.g. BSI/PAS standards) or Good Agricultural Practices, the adoption of food-quality standards by supermarkets, and changes in policies on procurement and pricing	• Can lead to improved practices, better health • Use of voluntary policies in companies for inclusion of micronutrient supplements in food items, such as vitamin A or animal or vegetal iron and development of products including essential amino acids	• Can be difficult for farmer to meet the standards and require cash and technical skills • Hindered by consumer health policies, fragmented institutional systems, effective food law and enforcement, food producers and caterers working under unsanitary and unhygienic environments and • Staff have minimal education • Consumers may not make the link between ill health and unsafe food.	A food safety management systems approach, for example hazard analysis and critical control point (HACCP) and as part of this Good Agricultural Practice and Good Manufacturing Practice In the 1960s, Sub Saharan Africa was responsible for 90% of global groundnut exports but today it is <5% due to strict import regulations on levels of aflatoxin in food (a carcinogen caused by a mould). Groundnuts not just cash crop, but source

Table 3 – Nutrition and Access to Food

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
		• Enforcement of food standards is difficult - limited resources for inspection, enforcement, and access to accredited laboratories that provide reliable food safety information. • Sensitisation of consumers and food handlers about food safety is important.	of nutrition and protein. Costs Africa $750mn in export losses to the EU per year, consumption of contaminated food leaves 4.5 billion people exposed to aflatoxin, contributing to immune disorders, stunting and 28% of liver cancers globally.
10. Use of certified products	• Rise of the supermarkets in Southern Africa provides opportunity for certification and sustainably sourced products	• Products sold at a premium	Woolworths South Africa stocks sustainably sources and certified food in its own brand products

TABLE 4: FINANCE ACTIONS

ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
1. Finance each stage of value chain – integrated The flows of funds to and among the various links within a value chain, for example, inputs can be provided to farmers and repaid directly from the sale of the product without having to go through a traditional loans process[16]	• Offers an opportunity to reduce cost and risk in financing, and reach out to smallholder farmers. For financial institutions, value chain finance creates the impetus to look beyond the direct recipient of finance to better understand the competitiveness and risks in the sector as a whole and to craft products that best fit the needs of the businesses in the chain • The bank locks up the financing of the whole chain and has intimate knowledge of the chain – production factors, equipment suppliers, and buyers • Traders use finance as a procurement facility while input suppliers often employ it as part of a sales incentive strategy. For financial institutions, it offers an approach to lower risk and cost in providing financial services • Bank can directly debit their accounts for loan payments (as farmers deposit within same bank) • Increased access to finance for those without sufficient collateral but with predictable flows of goods	• Only applicable in few and selected markets. This includes integrated value chains such as sugar, tea, rice and dairy • Management of risks by banks • Requires information and 'insider knowledge' • Must be a competitive industry • Success depends on up-front support in organisation, training and confidence building for ensuring strong linkages and commitment among the actors range of supporting services	Rabobank finances the needs of flower producers in Mexico for working capital, equipment and technology. Closely aligned with this, Rabobank also finances the equipment distributor who provides needed technology to the farmers. The bank finances the farmers because the bank knows them and understands their marketing system. In fact, the farmers send their products to an auction market in Holland, and Rabobank finances the auction market and many of the buyers in the market. In this way, the bank has locked up the financing of the whole chain and has intimate knowledge of the chain – production factors, equipment suppliers, and buyers. The bank also knows that the farmers receive their money as it is deposited in a Rabobank account, so that the bank can directly debit their accounts for loan payments. A typical case of external value chain finance is exemplified in Kenya where small fruit and vegetable growers are able to access bank finance for agro-chemicals thanks to their export contract. The exporter pays the farmers through the bank, which deducts the scheduled loan payments before releasing the net proceeds to the farmer group[17] Cargill offers pre-planting loans to farmers so they can purchase seed and plant their crops with the fertilization necessary for a successful harvest. Cargill financing has helped 94,000

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			smallholder farmers in Zambia, nearly 29,000 smallholder farmers in Zimbabwe, and 1,200 in Romania and Hungary.
2. **Warehouse receipt systems** (combined with commodity exchange, guarantee funds and crop insurance). Can be private, public or farmer-focused	• Increases the depth of local capital markets • Creates liquidity and eases access to credit • Reduce uncertainty and increase efficiency • Smoothes the supply and prices in the market, improves grower incomes, and reduces food losses • Depositor can wait until such time as market conditions are conducive to sell the stored commodity • Through warehouse product assessment /grading and issuing Goods Received Notes, farmers can get up to 70% of value of loan quickly • Can overcome a range of constraints, e.g. long marketing chains, lack of trade finance, weak bargaining position of producers, lack of adequate market information, a slow and costly bulking process, lack of quality premiums at the farm gate) • Enforcement of commodity grades can help traders access more lucrative international and regional markets	• Better in countries where financial markets are developed • For grain supply chains in Africa, it has little involvement with farmers and small traders because of the large fixed cost that is required • Depositor has to pay storage and, where applicable, collateral management fees • Market information has to be available	Since 1989, the NGO TechnoServe has worked closely with the Department of Co-operatives and the Agricultural Development Bank (ADB) in Ghana in encouraging small-scale farmers to form cooperatives and use warehouse receipts to store their crops for sale in the lean season. ADB provides loans against the members' grain, at 75-80% of current market price, and the grain is stored in co-operatively owned warehouses. The scheme is concentrated in the Brong-Ahafo 'maize triangle' of Ghana – the major area of agricultural surplus, where annual price fluctuations are high. From 1992 to 1996, participating farmers in this region were able to increase their profits on grain sales by an average of 94% per year, even despite the high interest rate of 42% charged on the short-term loans used. By 1997/98, more than 130 farmers groups were being assisted and for over 8 years, the loan repayments have been a 100%[18].
3. Offtake guarantees for small-holders Under such an agreement, an investor typically agrees to provide some upfront investment to the farmer in return for a share of the harvest.	• Can significantly shorten the supply chain, leading to a better income for the farmer and cheaper credit • A shortened supply chain can lead to a fairer price for the producer, whilst at the same time the company benefits through increased production and	• Provision of excess production • Requires quality management • Too difficult to deal with numerous individual smallholders – requires a single entity/cooperative • Not suitable for all crops. In particular, the fear of side-selling means that	AgDevCo, an agricultural investment company, works through large commercial farms (Tanzania, Mozambique, Zambia and Ghana) to boost the capabilities of smallholders. It negotiates an off-take agreement with a large commercial farm, which then sources produce from a number of smallholders. Commercial

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	better traceability of products. • Allows smallholders to manage volatility of commodities / price shocks • Most popular crops include: horticulture for processing or export, tea, tobacco, cotton, seed, dairy, poultry, rubber, palm oil and cocoa • Easier to get finance as large agri-processors or retailers guarantee crop	buyers tend to stay away from mass-produced staple crops, such as maize, which can be brought to market fairly easily • Requires trust – farmers must respect contractual clauses and steer clear of side-selling. Farmers should be committed for the long-term, and be willing to share regular information	farms can also increase local productivity by providing technical know-how and access to better inputs Large companies negotiating off-taker agreements include SABMiller, Walmart, Tesco, British American Tobacco, Ahold, Olam, Tongaat Hulett and Archer Daniels Midland Company, is particularly active in the cocoa industry of Ghana and the Ivory Coast[19]
4. **Microfinance** - the provision of a broad range of financial services such as deposits, loans, payment services, money transfers, and insurance to poor and low-income households and their microenterprises.	• Microfinance organisations can work closely with farmers and have a greater understanding of their capacity and needs • Ability to serve the hard-to-reach and often unbankable farmers • Potentially lower transaction costs than other forms of finance for farmers • Low-default rates • Can include formal and informal group structures to provide savings • Allows for capitalization of earnings • Group structures can be useful for improving access to inputs and technical support	• Higher loan servicing costs due to limited volumes and high information costs • Farmers struggle with cost of loan due to length of time until repayment. • Lack of collateral or adequate security • Risk correlation when lending to farms: all borrowers are affected by the same risk, such as low market prices and reduced yield due to weather • High transaction and supervisory costs (e.g. it requires pre-harvest financing to buy inputs that can only be repaid after harvest resulting in more uneven cash flows than urban borrowers) • No branches or limited network in rural areas, thus difficult to reach farms • Underdeveloped communication and transportation infrastructure	Standard Bank partnership with AGRA. The bank provided funding and removed the collateral requirement and got large companies to commit to buy at a set price. AGRA provides default guarantee, invests in local seed companies and trains farmers, introducing index insurance and reducing transaction costs by setting up cooperatives and investing in storage facilities[20].
5. Mobile financial payments using mobile money transfer scheme	• Bank accounts often unaffordable, or unattainable. Mobile banking is designed to enable users to complete basic banking transactions • No risk of account closure for inactivity • Saves time for long distance travel to get to a bank	• Permissiveness of anonymous banking, which opens it up to abuse • Requires some learning and education – people have to understand abstract concepts about invisible and virtual money	M-Pesa is a very developed mobile payment system for Safaricom and Vodacom. M-Pesa allows users with a national ID card or passport to deposit, withdraw, and transfer money easily with a mobile device.

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ACTIONS	POTENTIAL	CHALLENGES	EXAMPLES
	• Flexibility		
6. Develop the futures/forwards market	• This will enable clients to hedge effectively over long tenures • Allow farmers to hedge an existing market exposure, i.e. to reduce cash flow uncertainty from the exposure, e.g. farmer can lock in a price now for a crop to be sold in the future • Reduces risk for farmers	• Lack of liquidity can make hedging expensive • Complexity of markets may discourage some producers • Costs of transactions	
7. Develop local debt capital markets	• Reduces reliance on foreign currency borrowings • A key source of risk finance, particularly as foreign capital inflows became less because of the ongoing global financial crises • Facilitate the Management of Capital Flows, diversifying financial systems and shock absorbing capacities • Provides an alternative to that status quo in the MFI sector where players tend to borrow in foreign currency and then lend on local currency without often hedging. This frequently leads to foreign exchange losses. • Can be supported by developments in credit scoring tools.	• Can mean higher interest rates • Local technical knowledge (e.g. knowledge to develop and monitor schemes and to evaluate the risks.) • Availability of collateral and acceptability of collateral substitute. • Limited distribution channels to increase access to transaction banking	A joint IMF-World Bank initiative has recently been launched to help low-income countries, including in sub-Saharan Africa, develop and implement their Medium-Term Debt Strategy for debt issuance and debt management
4.6 **Venture capital fund** industry development to support local initiatives	• Funds could support local R&D, technology transfer, local farm insurance, SME • Could improve local genetics to commercial grade seed • Potentially plays a role in seeding SMEs and local technology firms	• Fund industry is dominated by private equity and there venture capital is currently limited • Requires know-how and market information and technical expertise	Africa Agriculture Capital (AAC) was capitalised in 2005 to take advantage of these opportunities with funding from Gatsby, Rockefeller and Volksvermogen of Belgium. By April 2009, AAC had invested its initial capital of $8m in a portfolio of 16 businesses across East Africa. Investees cover the whole value chain, from seed sellers to service companies whose certification schemes increase the value of other agribusinesses. A recent case study of AAC's

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			impact, profiling in depth five investments that comprised 30% of the portfolio, showed these businesses had provided improved seed to 860,000 farmers, bought produce from 5,000; and provide jobs for over 700 employees[21].
Other types of actions that could be listed (among others): • Credit score cards (including other practical tools to assess risk in agricultural lending.) • Structured trade and commodity finance • Transactional services to agricultural businesses			

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