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Closing the Potential-Performance Divide in Ugandan Agriculture



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Republic of Uganda

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Closing the Potential-Performance Divide in Ugandan Agriculture





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Executive Summary

1. **Agriculture accounts for 70% of employment, overwhelmingly on small farms; occupies half of all land area, and provides half of all exports and one-quarter of GDP in Uganda. It is considered a leading sector for future economic growth and economic inclusion in the current National Development Plan.** Yet despite having very favorable natural resource and climate conditions for production of a wide variety of crops and livestock, average Total Factor Productivity (TFP) growth--the difference between aggregate output growth and the growth of all inputs and factors of production that produced it--in Ugandan agriculture has been negative for the last two decades. This suggests that on balance the country is now getting less for equal or greater effort. While drought and pest issues likely have played a harmful role, other plausible explanations are a combination of the following: weakening over time of the public institutional base for promoting agricultural productivity at the level of small farms, inefficiencies in agricultural public expenditures, inadequate agricultural regulation and policies, and a lack of collateralizable farm assets. National agricultural output has grown at only 2% per annum over the last five years, compared to agricultural output growth of 3 to 5% in other EAC members and 3.3% per annum growth in Uganda's population over the same period.

2. **Food insecurity, poverty, and nutritional quality remain major challenges in rural areas of Uganda, and the prevalence of national food imports has increased in the last decade.** Underlying issues include continued high rural population growth and youth unemployment rates, despite rapid outmigration to towns, consequent rapid urbanization exceeding absorptive capacity. This has led to increasing rural population density on arable land and continued land and water degradation in the absence of adequate on-farm investments in soil and water management. The latter is due in some part due to the low quality of agricultural inputs available to smallholders. Exposure to climate-related hazards is especially high in Uganda, and the danger to rural resilience is exacerbated by low levels of adaptive capacity of rural communities. This stems from having few assets, few alternatives due to low educational levels, and little access to financial or other safety nets.

*Agriculture accounts for **70%** of employment, overwhelmingly on small farms; occupies half of all land area, and provides half of all exports and one-quarter of GDP in Uganda.*

The key issue

3. **One-shot stimuli to growth in the last decade have helped Ugandan agriculture and promoted significant poverty alleviation, but likely will not be able to provide the same level of continued stimulus for new growth.** Examples are: higher relative food prices for a number of years in the region after 2008, cropland expansion into dwindling forests and wetlands, a peace dividend after the Lord's Resistance Army was pushed back from the North, a new independent trading partner in the form of South Sudan, the opening up of EAC to freer regional agricultural trade, and a change to local procurement and processing of food aid in Uganda by the World Food Program for its operations in South Sudan. Taking longer-term advantage of these time-bound opportunities requires a change in public processes and policies, faster growth in private sector capacity in agriculture in Uganda than at present, and a strengthening of institutions to support smallholder inclusion in market-led agricultural growth.

4. **Under these circumstances, it is reasonable to worry whether agriculture under present trends can continue to drive future overall growth.** Yet Uganda currently has relatively few alternatives at comparable scale to agriculture for providing jobs, widespread growth in domestic consumer incomes capable of stimulating growth in local services and manufactures, and foreign exchange. Fortunately, there is concrete evidence on things that need to be addressed in Ugandan agriculture, and success stories to draw on. The issue is how to achieve scale commensurate with need.



5. **The main report starts by looking at the key structural factors shaping outcomes for Ugandan agriculture.** It then looks at the main sets of actors and institutions in the sector, and how they have evolved in the last two decades. This sets the stage for better understanding the status, constraints, and opportunities for promoting agricultural commercialization along market-led lines, the priority of the Government. The report then looks at agriculture in the broader context of ecological change and especially climate change, which risks having severe consequences down the road if proactive investments and policies are not put into place to promote greater resilience of rural livelihoods and agriculture systems. An examination of public spending trends and policies on agriculture finds a lack of congruence between what is vital to do for growth and resilience, and what is being done.

6. **The report generates multiple explanatory insights and ends with a series of specific recommendations.** These are summarized in Box ES.1 and discussed in the remainder of the Executive Summary in terms of three main themes requiring action: (1) promoting stronger institutions and policies for agriculture transformation; (2) choosing market-led and inclusive commercialization through actions that permit benefiting from growing opportunities in value-addition and trade; and (3) increasing resilience in agroecosystems and rural livelihoods. A detailed listing of priorities and recommendations is given at end of the Executive Summary in Table ES.1, highlighting 10 priorities for action spread over these three areas.

BOX ES.1: THREE PRIORITY AREAS FOR ACTION

There is relatively little in Uganda's economy and society that is not relevant to agricultural outcomes, but this deep dive suggests that three areas are especially critical for taking agricultural growth forward.

1 Strengthening public institutions and policies for agricultural productivity

Uganda needs a rapid turnaround in agricultural productivity growth, where it lags behind other countries in the region despite having a better agricultural resource endowment. This is a necessary precondition of sustainable agricultural growth and arguably of any inclusive economic growth in the country. It is vital to increase both the efficiency and amount of domestic public spending in Uganda going to agricultural research and extension for this purpose, especially with respect to smallholder farmers. The primary means should be through re-purposing of presently extensive public funds spent on procurement of agricultural inputs for redistribution on a free or subsidized basis by agents other than qualified extension personnel. Second, MAAIF, NAADS, and NARO need to be able to work in a more coordinated fashion, and to have the capacity to generate and use policy analyses, monitor programs, and to carry out credible technical evaluations. Without this capacity they will always be at a disadvantage in dealing with domestic and external funding sources, and will find it difficult to lead effectively. Third, regulatory reform is essential to ensuring consistent quality of inputs and outputs without undue compliance burdens.

2 Promote commercialization of agriculture through private sector value-addition and trade

Within an improved public framework of research, extension, regulation of input quality, rule of law, infrastructure, and access to regional markets, the private sector is central for taking agriculture forward in a market-led economy, whether through input supply, production in those cases where plantation or other large-scale agriculture makes sense, market development, processing, or export. To date, private sector successes are modest in Ugandan agriculture, except in processing driven by urban and regional demand. There is a need to: (a) improve access to agricultural finance along whole value chains (through land titling and enforcement, warehouse receipt programs, banking reforms, and the rule of law in commercial matters); and (b) improve inclusion and access to market knowledge and skills though expanded and transparent vertical coordination, and through better access to ICT services.

3 Increase resilience in agroecosystems and of rural livelihoods

Average temperatures in Uganda have increased by 1.3°C since 1960, and could rise by up to 2.5° by 2050. Seasonal rainfall has become more variable and less predictable, with consequences for fluctuating yields. Crop and animal pests and diseases linked to climate change have become an increasing problem. While most countries in the same tropical latitudes as Uganda face similar dangers from climate change, Uganda is one of the least adapted agroeconomic systems of all, and thus one of the most vulnerable to what is sure to come. It is vital that the job of increasing the resilience of agroecological systems and of rural livelihoods start as soon as possible. On the one hand, ongoing efforts to foster irrigation from its currently low level should be continued. Yet the breadth and urgency of the low resilience problem requires a much broader multi-stakeholder approach. This should be under the auspices of national leadership, to achieve widespread consensus on the dangers going forward, evolve a workable and coordinated plan of attack for increasing resilience through enhanced early warning mechanisms and better land and water management from the farm to the landscape level.

Stronger institutions and policies

Public spending on agricultural research and extension other than input subsidies

7. **While the record of written agricultural strategies and policies is impressive, there has been a weakening of the institutional base for agriculture in Uganda over the last decade, and also disconnects between policy formulation and actual implementation.** Institutional weaknesses and a lack of coordination among agriculture-related ministries and agencies have been important bottlenecks for translating policy plans into effective action.

Other institutional challenges are inefficiencies in staffing patterns; weak data collection and monitoring of sector trends; as well as poor absorption capacity of public institutions. The public extension agency (NAADS) and the public agricultural research agency (NARO), both nominally under MAAIF but functionally independent, are at critical turning points. NAADS has been largely sidetracked by the free input distribution mandate. NARO has prospered under donor funding, which however is now running out.

Achieving positive total factor productivity growth over a number of years requires better technology from agricultural research, and dissemination of that technology through qualified extension services focused primarily on knowledge transfer.

8. **Agricultural growth in Uganda can only be sustained if productivity is steadily increasing.** The agricultural productivity increases required to sustain overall economic growth need to be based on increased technical or financial efficiency of use of inputs and factors such as fertilizer, labor, and land, or technological progress that allows producing more with less, or all three. Such productivity enhancement is the definition of total factor productivity growth (or TFP), or the residual extra value created by output growing faster than the growth of all inputs and factors going into production combined. The existing data on Uganda—as will be shown—suggest that TFP in Uganda has been negative on average since around 2000, and that this has been getting worse over time. Achieving positive TFP growth over a number of years requires better technology from agricultural research, and dissemination of that technology through qualified extension services focused primarily on knowledge transfer.

9. **While policy documents emphasize the importance of agriculture, de facto budget allocations to the sector have remained modest.** At the same time, inefficiencies in spending are high. Up to half the total agricultural budget has been devoted to purchasing and disseminating subsidized inputs through the military in recent years, rather than to critically needed public goods such as training on when and how to use those inputs, to better roads and communications infrastructure, or to improving the inputs and input distribution systems themselves.

10. **The free distribution of subsidized inputs has undermined quality seed production by agribusinesses and led to the crowding out of the private sector from distribution.** Providing inputs alone without knowledge transfer can further create unintended consequences such as the depletion of soils and biodiversity. More generally, subsidies and other policy distortions tend to alter the output mix of agriculture away from what the free flow of inputs and outputs would have produced at market prices, and thus have the potential for creating allocative inefficiencies that are manifested in lower TFP growth.

Recommendations

The current extension system should move away from the free distribution of sub-standard inputs, and should be rebuilt to increase its efficiency and effectiveness. The Government may want to consider achieving its equity support goals through means other than inputs distribution, for example using social protection linked to climate-smart soil and water management practices.

- **Extension should be supported by adequate staffing, data collection systems and capacities,** and could be amended by non-governmental approaches, investments in radio programs, and farmer field schools.
- **MAAIF, if it is to fulfill its role as the Government's representative to agriculture, needs to be able to coordinate public activities in the sector and stay on top of public spending and funding, including donor funding.** To this end, it will be vital to improve the coordination between MAAIF and subordinate agencies such as NAADS and NARO, as well as between MAAIF, MoFPED and the Presidency. This requires deliberate institutional and human capacity building in MAAIF to play this role effectively, including carrying out activities such as agricultural public expenditure reviews, policy analysis, and policy monitoring.

Regulatory challenges

> *Only three of eight regulatory elements for a strong plant protection framework are in place in Uganda.*

11. **Drought, disease, and pests likely have played a role in producing negative growth for the last two decades in total factor productivity in agriculture, as they have in other countries. Yet Uganda's TFP record is substantially worse than that of other countries in the East African Community (EAC), and the inability to respond to such challenges is partly an institutional one.** Low technology adoption and commercialization levels surely are also explained in part by low quality inputs, poor input distribution and control systems, and inadequate quality-assurance processes. Low-quality seeds and fertilizers being sold or otherwise distributed discourage investment by producers, but also directly harm productivity. Only three of eight regulatory elements for a strong plant protection framework are in place in Uganda. The pre-emption of most of the domestic market for inputs by a public sector distributing often low-quality inputs free of charge to producers hurts targeting of subsidies and discourages Ugandan private sector firms from filling the need of a quality-based and reliable agricultural input system. For agriculture to promote high growth and rapidly alleviate poverty, quality seeds and fertilizers are needed that are aligned with incentives for farmers and traders and backed by adequate extension.

Recommendations

- To improve input quality, the regulatory burden should be shifted from controlling registration (such as licensing of traders), to controlling actual operations through random sampling, in addition to regular controls of seed companies.
- Successful quality-certification initiatives such as AgVerify should be supported, and the potential for expanding its procedures from seeds to fertilizer assessed.
- Licensing procedures and import processing for improved inputs and new seed varieties should be enhanced to reduce delays and to foster agribusiness development at the input level.

Commercialization and opportunities for value-addition and trade

Supporting regional trade and value addition

12. **Income growth, urbanization, and dietary shifts into higher value and more processed foods lead to high domestic demand for higher value agriculture and food in Uganda,** and in the aggregate offer substantial income opportunities for farmers and for value addition beyond farm production. Population growth in the 3.3% range adds to further demand increases for basic food staples. Similar trends throughout the East African region scale up the opportunities, but also the potential competition. Uganda needs to continue to promote its areas of comparative advantage and specialization in agriculture. Present trends help indicate where these lie; examples are traditional export commodities such as coffee or tea, and there is even faster growth for non-traditional products such as fish, cocoa, spices, and flowers. Other trends are also encouraging, such as a rapid growth of the confectionary and the baked goods industry for both the domestic and regional export markets.

13. **Reaping the full advantage of these demand shifts will however require strengthening institutional processes and public investments already underway.** Transport and other transfer costs for Ugandan agricultural commodities entering regional and global trade are high relative to EAC norms, and highly variable across locations. Analysis of price incentives identified massive gaps between reasonable and actual transfer costs for agricultural commodities. Farmgate price incentives, for instance for coffee and tea, are often not well correlated with world

market prices. Trade liberalization and reforms since the early 1990s resulted in big gains, increasing Uganda's openness, diversifying products and markets, and increasing foreign direct investment. Yet, while Uganda faces a relatively open market in terms of tariffs for agriculture commodity exports, non-tariff barriers (NTBs) in destination markets continue to pose a big challenge. Short-term expediencies, such as allowing provincial governments to close borders to food exports, can kill long-term national prospects. An example would be Rwanda's continued attempt to be self-sufficient in maize at high cost, following temporary closure by Uganda and Tanzania of maize exports a decade ago.

14. **Agriculture needs to be embedded in national policy dialogue dealing with overall economic issues, such as regional trade, fiscal and taxation policy, and potential unintended incentive impacts of a domestic petroleum boom on agriculture.** This need is also apparent in other areas below. The institutional capacity within MAAIF to do policy analysis, monitoring and evaluation is presently weaker than it was 30 years ago, a time when agriculture was also at the center of structural adjustment concerns and hopes for a re-birth of economic growth from agricultural growth.

Recommendations

- Border closures and other administrative hinderances to agricultural trade, including arbitrary ones imposed at short notice by local officials, urgently need to be contained. Leadership from the top is needed to build mutually beneficial trade relationships with neighbors that can endure weather shocks, local shortages, and electoral cycles.
- Transport and other transfer costs for agricultural commodities entering regional trade need to be assessed through policy review and investment in information systems. Costs for transporters such as expensively taxed fuel and equipment should be reduced with the associated fiscal drag dealt with through measures that do not discourage production of exports. Better market information including agricultural transport flows and costs for producers by radio and cell will help illustrate least-cost pathways and target areas needing attention.
- It will be critical for MAAIF and its attached agencies to regain capability to design and carry out agricultural policy and economics analysis, monitoring, and evaluation, especially under a shifting macroeconomic environment. This has implications for staffing and institutional roles. Development partners should assist with start-up costs.

Land tenure

15. **Property rights over land are central for agriculture development and commercialization in Uganda. Property rights provide the authority to decide on land use and investments, and incentives for sustainable resource management.** The distribution of property rights also affects food security, social cohesion and resilience, providing people with a source of livelihood and fallback options that reduce vulnerability.

> *Currently, about **80%** of land is under customary tenure that is undocumented.*

16. **Yet, alongside land size, limited tenure security and land-related disputes have shown to be critical bottlenecks hampering agribusiness development and commercialization in Uganda.** Currently, about 80% of land is under customary tenure that is undocumented. The guaranteed market for quality maize provided by long-term World Food Program (WFP) procurement, coupled with sudden availability of larger plots of land from peace in the North, has enabled private sector supply in response to the government's liberalization of maize markets. Yet even here, insecurity of use rights has limited this response.



17. **Increasing land values and a growing population aggravate the situation over time.** Increasing land values in principle involve increasing land rents that should be paid to owners, while continuing divisions multiply the number of boundaries. Issuing individual land titles could result in increased landlessness and the exclusion of those with less power and influence, including women. Land tenure is hence a critical area where the public sector must lead. This includes simplifying the procedures for land registration, titling, and administration, as well as to reduce the costs.

Recommendations

- Multiple initiatives are ongoing to foster tenure security through better land demarcation or the delivery of adequate documentation to land owners. These should be further supported and upscaled. Examples include the Systematic Land Adjudication and Certification (SLAAC) program or the GIZ-partnership with the Ministry of Lands, Housing and Urban Development (MLHUD).
- One way to support faster resolution of land disputes would be to support relevant courts. Greater use could be made of GPS-data, and of technologies such as drones to reduce the time and costs for data collection of field boundaries. New technological breakthroughs are already transforming the digitization and securization of land records in neighboring countries.

Access to finance

18. **Access to finance is critical along all parts of value chains from inputs to final retail.** The right way to encourage expansion of activity depends on how the producers and market agents in question are presently participating in the market and what constrains them. In Uganda, much of the non- agricultural economy is run along private sector lines with a policy environment to match. However, curiously, the policy and regulatory environment for agricultural inputs, production, and marketing from the farm level, and the effects of agricultural public spending policies, tend to be discouraging to private sector investment. This by itself makes access to finance in agriculture more difficult than in most other sectors.

19. **Furthermore, finance is critical for smallholders to invest in better farming equipment and practices, but also to improve their livelihoods more generally. Yet, financial inclusion of smallholders has remained limited.** Key challenges for financial institutions to serve Uganda's agriculture sector include a lack of usable collateral; high transaction costs due to the remoteness of a dispersed set of clients; small size of farms and of individual transactions; weak communication and transportation infrastructure, high covariant risks due to variable rainfalls and price risks; and the physical absence of banking facilities in rural areas.

Recommendations

- Mobile money transfers, value-chain financing, digitizing land titles, and warehouse receipt systems (WRS) are promising approaches to de-risk the sector, to overcome the lack of collateralizable land titles for loans, and to increase farmers' access to finance.
- The 5000+ Savings and Credit Cooperatives (SACCOs) currently registered in Uganda could be better supported through the inclusion in legal banking frameworks, governance, and supervision mechanisms.

Vertical Coordination

20. **Capitalizing on demand-driven opportunities for Ugandan food and agriculture will require good connectivity between suppliers and integrators for passing market and technical information in both directions in near real time, as well as for building trust amongst different supply chain actors.** Branding is the preferred market tool for quality assurance, aligning incentives along supply chains, and for helping producers be remunerated for extra efforts resulting in quality. Uganda, however, is confronted with a multitude of diverse smallholders as primary suppliers. Branding of smallholder products in Uganda requires vertical coordination with aggregating processors or other industrial entities that can vouch for the quality of the final product and be held accountable by consumers when they fall short. Several private business models along different agriculture value chains in Uganda are shown to successfully link smallholders to growing domestic and international market opportunities for value-added products, to improve their incomes, capacities, and productivity; and to foster their resilience to climate and market-related fluctuations and shocks.

Branding is the preferred market tool for quality assurance, aligning incentives along supply chains, and for helping producers be remunerated for extra efforts resulting in quality.

Recommendations

- **The public sector should seek to improve vertical coordination outcomes for both smallholders and aggregating firms though a three-pronged approach.** The first is an informational one consisting of creating a knowledge platform for recording and diffusing good practice in agricultural vertical coordination arrangements that are multiplying rapidly. The second is clarification of the legal status of vertical coordination agreements and obligations such as under contract farming. The third is identification and empowerment of a public authority with primary responsibility and the tools for oversight of a level playing field in vertical coordination of agriculture (between farmer groups and aggregators, and across firms), and assistance in enforcement of contracts. All three prongs can help with the recruitment to Uganda of the sorts of multi-national investors in agriculture that are willing and able to foster inclusive growth.

- Policies limiting the development of farmer cooperatives as economic actors should be reviewed and revised. The development of rural cooperatives has been limited to date as a matter of policy seeking to avoid economic groups straying into politics, but the economic role of cooperatives needs to be further supported. Independent rural coops can be essential parts of strengthening the bargaining power of smallholders under vertical coordination. They also spread the costs and simplify the governance of ownership and maintenance of technical equipment that is too expensive for individual smallholders, such as electronic soil scanners.

Role of ICT

21. **ICT technologies are critical to cutting the costs of uncertainty, asymmetries of information, and securization of information on transactions amongst large numbers of small, widely dispersed players.** Relatively cheap and easy to use devices such as smartphones and tablets can connect a wide mass of "low tech" enterprises to a few very "high tech" solutions such as specialized big databases and software capable of sending customized responses back to individual devices at low cost. Such networks also greatly reduce the unit cost of diffusing market and technical information. This has direct benefits for enhanced productivity and resilience, market access, and financial inclusion of smallholders, as well as for data collection and monitoring. Having the ICT infrastructure in place for a public-led program also encourages the development of private communications that promote the development of agricultural commerce.

Recommendations

- The definition and implementation of a set of investments and policies specific to rural ICT with agricultural uses is critical. There is a need to build and sustain a modern infrastructure that can support emerging technologies and services.Suggested measures include the optimization of the connectivity of rural users to the potential made available by international undersea fiber optic cables arriving in the interior of East Africa; encouraging participation of the private sector in ICT infrastructure development; and hastening enforcement and awareness of ICT related (property) laws.
- Public databases on key household level data and agricultural variables such as market prices are further critical for boosting national competitiveness, food security, and for decision makers to steer policies in a pragmatic and evidence-based way. There is a need for high-level consideration of what data pertaining to food and agriculture are most relevant, how they can be collected cost-effectively, and analyzed in near real time. MAAIF should provide leadership in data collection (e.g. about inputs used, yields, post-harvest losses, soil quality etc.), management, and use to be accessed by a range of stakeholders.

Promoting Resilience and Climate-Smart Agriculture

22. **Uganda is among the world's most vulnerable and simultaneously least adapted countries to climate change.** Increasingly frequent climatic shocks pose a heavy toll on rural livelihoods and the economy. Limited access to financial resources, to social safety, and to meteorological and disaster risk-related information are among the main challenges to smallholders.

23. **Continued unsustainable mining of soil and biomass, coupled with rapid population growth in rural areas and low adaptive capacity to climate variability, will prevent the transformation of Ugandan agriculture for shared prosperity under present trends.** Unsustainable land use drives soil erosion, the loss of soil nutrients and hence of biological, productive, and soil water retention capacity. This lowers the resilience to climatic shocks, and leads to carbon emissions which foster climate change Unsustainable land use comes at high economic costs as well. Uganda is thought to be losing on the order of 4 to 12% of GDP annually due to soil erosion, compaction and nutrient loss.

24. **To enhance productivity, while limiting emissions from land or livestock management and enhancing climate resilience at the same time,** climate-smart agriculture (CSA) practices – from the farm to the landscape or watershed level – are critical. Promising examples in Uganda at the field level might include silage production, rotational grazing, more timely transplanting of rice, and integrated soil fertility management for maize. At the landscape level, themes might include contour bunding on slopes and reforestation or conservation of trees on ridge lines. Successful adoption of CSA requires an enabling environment characterized by functional institutions, regulations and coordination, as well as financial and other incentives. Besides, physical (e.g. land, human resources, infrastructure) and non-physical (e.g. skills, policies) barriers need to be overcome.

25. **Improved water management and storage is central to building the resilience of Uganda's agriculture.** The country is far behind its neighbors in this regard. The new National Irrigation Policy (NIP) promulgated at the end of 2017 (GoU /MAAIF-MWE 2017) is a start, but will face many issues in implementation. Public-Private partnerships for funding new, large-scale irrigation schemes can foster productivity in commercialized farming enterprises for higher value outputs. NIP's call to expand smallholder systems will also be more difficult in view of existing cost levels. Rehabilitation and improved management and operation of existing schemes will need to be prioritized, and likely a broader definition of improved water management will be called for in many cases, including small- scale water catchments, selective reforestation, and small-scale drip irrigation for high value crops. Setup or reinforcement of local-level irrigation management institutions will be key. NIP laudably calls for deeper inter-ministerial cooperation in planning, more rigorously enforcing existing land and water use regulations, and better cost recovery in irrigation infrastructure development and management, all of which are critically needed.

Recommendations

- Increased collaboration is needed between climate and agriculture-related ministries, research institutes, civil society and farmers' groups, development partners, private sector actors, for instance through the setup of a multi-stakeholder platform. This can help to identify and prioritize the most cost-efficient CSA practices for a given agroecological zone and local context, and to improve coordination across actors. CSA implementation likely requires dealing with market failures and thus will need novel financial instruments such as climate and value-chain finance or climate-smart certification schemes. These can help foster agricultural technology adoption, and should be harnessed to deliver CSA benefits to smallholders.
- The government is advised to develop implementation pathways for the New National Irrigation Plan in broad consultation with stakeholders; to build the capacity of water user groups, and to adapt planning to economic feedback from users and value-chain participants upstream and downstream.
- Extension services should disseminate gender-sensitive and climate-smart technologies and practices aligned with farmers' needs. Communication with farmers could further be improved through radio broadcasts about good agriculture practices, technologies, and disease outbreaks. School teachers should be engaged in outreach efforts.
- Smallholders across all gender and age groups need adequate and timely access to credible meteorological, price or disease-related information and early warning information. Here, it will be critical to coordinate the provision of user-friendly messages across government authorities, private sector entities such as telecommunication companies, academia and civil society; and to support vulnerable communities in developing local-level emergency response mechanisms that are aligned with national-level institutions. In this regard, it will be necessary to better align technical and financial capacities across national and local governments.
- The government is further advised to relaunch the search for viable financial instruments to underpin whole landscape (watershed) restoration plans foreseen in the 2010 national Strategic Framework for Sustainable Land Management.

26. **These recommendations are summarized in Table ES.1** along with subjective judgements by the report authors as to the likely impact of each recommendation on closing the performance-potential gap for agriculture, the timeframe required, and the cost of action.

TABLE ES.1: CLOSING THE POTENTIAL-PERFORMANCE DIVIDE IN UGANDAN AGRICULTURE—10 PRIORITIES OVER 3 AREAS

	PRIORITIES AND MEASURES:	Impact on narrowing the gap	Timeframe	Cost
		Low Medium High	Short Medium Long	Low Moderate High
REFORM OF INSTITUTIONS AND POLICIES	**AREA I: REFORM OF INSTITUTIONS AND POLICIES**			
	PRIORITY 1: Renew the public institutional base for supporting agriculture			
	i) Reform the agricultural extension system			
	• Review the NAADS Act and the role of NAADS in input distribution	Medium	Medium	Low
	• Support the new agricultural extension strategy and budget to provide sufficient technical personnel	High	Short	High
	• Reduce % of public expenditure used for input procurement for subsidized distribution	High	Short	Low
	• Replace targeted subsidies with targeted e-vouchers usable for purchase of certified inputs from private dealers	Medium	Medium	Moderate
	PRIORITY 2: Improve agricultural regulation			
	ii) Reduce disincentives to private sector agricultural input businesses			
	• Streamline licewnsing procedures and import processing for inputs and improved seeds	High	Short	Low
	• Finalize, approve, and implement the National Seed Policy	Medium	Short	Low
	iii) Implement measures to improve quality of agricultural inputs			
	• Shift implementation of regulation from licensing traders to random sampling of actual transactions and regular inspections of seed companies	Medium	Medium	Moderate
	• Successful quality-certification initiatives such as AgVerify should be scaled-up and extended from seeds to other inputs on a trial basis	High	Medium	Moderate
	PRIORITY 3: Improve MAAIF's capacity to manage itself and promote good agricultural policies			
	i) Assist MAAIF to create a first-class Policy Analysis, Monitoring, and Evaluation Unit			
	• Create staffing and mandate to carry out regular expenditure reviews, analyses, and evaluations	High	Medium	Moderate
	• Ensure access to top level staff and regular interaction on analytical/briefing needs	High	Short	Low
	AREA II: PROMOTE COMMERCIALIZATION AND VALUE-ADDITION			
	PRIORITY 4: Promote regional trade and value-addition			
	i) Rebuild trust in market availability of regional food staples	High	Long	Moderate
	• High-level cross border political engagement to ban export bans for cereals credibly and transparently			
	ii) Seek market-led ways to lower spatial transfer costs for agricultural commodities in peak seasons	Medium	Medium	Moderate
	• Assess price formation in key value chains to derive options for transfer cost-cutting			
	PRIORITY 5: Expand farm access to finance			
	i) Land titling	High	Long	High
	• Expand present efforts to clarify legal status of rural customary land and issue collateralizable rural land titles (most currently are urban)			
	ii) Include Uganda's 5,000 SACCOs in formal banking system frameworks, including governance and supervision			
	iii) Enhancing access to finance through warehouse receipt systems	Medium	Long	High
	iv) De-risk formal lending to agribusiness firms to leverage private finance	High	Medium	Moderate
	• Promote use of partial credit guarantees by formal agribusiness where justified	Medium	Medium	Moderate

PROMOTE COMMERCIALIZATION AND VALUE-ADDITION	**PRIORITY 6: Expanding farm access to markets through vertical coordination**			
	i) Add transparency to contracts and make details on good practice easy to access • Create and maintain knowledge platform/database on commercial aggregation arrangements with smallholders	Medium	Medium	Moderate
	ii) Clarify legal status of contracting arrangements, obligations, and recourse available • Hold consultations with stakeholders on all sides (domestic & intl firms, coops, farmers, govt)	Low	Medium	Low
	• Promulgate law covering formal aggregation arrangements with smallholders	Medium	Medium	Low
	PRIORITY 7: Expanding farm access to ICT for increased productivity			
	i) Boost performance of data networks in rural areas	High	Medium	Moderate
	• Formalize ICT property and governance laws, also addressing privacy, data protection, security from cybercrime	Medium	Medium	Low
	• Engage private sector investors, internet service providers	Low	Medium	Low
	• Create mechanism for quality assurance in ICT infrastructure development	High	Medium	Low
	• Elaborate de-risking plan for private investors in consultation with stakeholders	Medium	Medium	Moderate
	• Build infrastructure and connect to undersea cable from South Africa	High	Long	High
	ii) Boost farmer and policy-maker returns to connectivity			
	• Develop school curriculum on ICT use	Medium	Medium	Moderate
	• Develop incentive plan for expanding national postal infrastructure related to ICT	High	Medium	Low
	• Construct and maintain public database on agricultural input and output prices, inputs, suppliers, and buyers	Medium	Low	Low
	• Add pages for extension advice	High	Medium	Moderate
PROMOTE RESILIENCE AND CLIMATE-SMART AGRICULTURE	**AREA III: PROMOTE RESILIENCE AND CLIMATE-SMART AGRICULTURE**			
	PRIORITY 8: Provide policy and institutional support to the promotion of Climate-Smart Agriculture (CSA)			
	i) Improve the institutional environment through creation of a multi-stakeholder platform to identify and promote cost-effective CSA interventions and pathways for implementation in Uganda. Steps include: • Chair selected by MAAIF, representation from other relevant ministries such as environment and entities tasked with food security monitoring and rural communications • Provide for representation of research organizations, farmer groups, CSOs, private sector development partners • Identify technologies, technical themes, and implementation pathways • Commission and review reports on design of cost-effective financial incentives for adoption • Provide better coordination of activities and promote synergies • Make recommendations to Government	High	Medium	Moderate
	PRIORITY 9: Improve access to agricultural water			
	i) Develop detailed implementation pathways for the new National Irrigation Policy under deeper inter- ministerial cooperation in planning and with private sector involvement.	High	Medium	Low
	ii) Develop farmer water user groups and irrigation management institutions; Include the private sector with user groups in consultations on input supply, extension needs, and post-harvest handling.	High	Medium	Moderate
	PRIORITY 10: Address ongoing soil degradation			
	i) Relaunch the search for viable financial instruments to underpin whole landscape (watershed) restoration objectives of the 2010 national Strategic Framework for Sustainable Land Management	High	Medium	Moderate



I.

Introduction

- Agriculture is mentioned in Ugandan strategic documents as the key growth opportunity for driving economic transformation. But can it realistically do this under present policies, investment levels and its present structure?
- Or will agriculture in Uganda gradually retreat into a not very dynamic holding action occupying a large sector of the population under increasingly low relative returns?
- Addressing these questions can be done by examining how the structural context of agriculture is evolving in Uganda, the main actors, and the changing opportunities and constraints they face.
- Key themes include how best to leverage private sector investment with public funding and policy, and how to make agricultural development more inclusive of the mass of smallholder farmers.

A core question for agriculture in Uganda

*"Agriculture generates roughly one-quarter of GDP, employs **70%** of the labor force, and accounts for about half of national land area.*

27. **Uganda's Vision 2040 and National Development Plan (NDP) II and the new Agriculture Sector Strategic Investment Plan (ASSP) prioritize agriculture as a growth opportunity that will spur socio- economic transformation into a middle-income country by 2040.** This view is based on the predominance of the sector in the economy, examples of good past performance, and a view that the Government will be central to promoting achievement of the underlying potential of the sector at broader scale. It is intended to be advanced through the Government of Uganda's (GoU) strategic investments in agriculture that: (i) increase on-farm productivity to at least 50% of the yields at research stations; (ii) transform subsistence farmers into enterprise farmers, and smallholder farmers into commercial farmers; (iii) increase food security and food availability in all parts of the country; (iv) increase agriculture exports; and (v) increase efficiency and effectiveness of agricultural services such as research, extension and regulatory bodies. In addition, the Government of Uganda aims to increase the resilience of rural livelihoods and national income to climate change impacts.

28. **Agriculture is indeed still a leading economic sector in Uganda, and until now has served as the main engine of sustainable and inclusive growth.** It generates roughly one-quarter of GDP, employs 70% of the labor force, and accounts for about half of national land area (UBOS 2016—data through 2015). There is also little doubt about the existence of future potential. Growth in agriculture, particularly export agriculture, still has a

relatively high multiplier effect on growth in the rest of the economy (Diao et al. 2007; Deloitte 2016). Land and water resources for agriculture in in Uganda are amongst the best in Africa, due to its diverse agro-ecological zones, rich volcanic soils, and two rainy seasons in most of the country (CCAFS 2017). At the same time, Uganda is one of the ten most biodiverse countries globally. Biodiversity is recovering in areas devastated by conflict in the 1970s and 1980s (Pomeroy et al. 2017). For example, Uganda is host to 18,783 recorded species of fauna and flora (NEMA 2016), and produces crops as diverse in their growing profiles as mountain tea and dryland millet.

29. **Despite high natural potential for agriculture, average agricultural growth in Ugandan agriculture has been below potential, and erratic across years and locations.** National agricultural output has grown at only 2% per annum over the last five years (UBOS 2017a). This can be compared to agricultural output growth of 3 to 5% in other EAC members (World Bank World Development Indicators). In addition, low rates of commercialization, and a lack of adaptation capacity with respect to climate-related hazards are major ongoing threats. Food security and nutrition also remain major issues in Uganda, and the prevalence of food imports has increased. The outlook for agricultural growth is further overshadowed by rapid urbanization, continued high rural population growth rates, high rural unemployment among educated young people, increasing climate variability, and continued land and water degradation.

> *National agricultural output has grown at only **2% per annum** over the last five years.*

30. **Under these present trends, it is reasonable to worry whether agriculture can continue to drive future overall growth,** or whether it will gradually retreat into a not very dynamic holding action occupying a large sector of the population under increasingly low relative returns. Under that view, the real business of development would necessarily be sought elsewhere. Public investments and policies would then presumably try to minimize overall public expenditures on agriculture, emphasize immediate transfers over long-term capital accumulation, and spread funds widely to do just enough to maintain peace in the countryside and provide a minimum of staple foods for growing urban areas. Alternatively, if some or all parts of Ugandan agriculture can stimulate widespread and significant value addition in both agriculture and non-agriculture, the strategic issues would then focus on how to promote growth, inclusion in growth, and scaling-up of success. This would require a quite different policy and investment stance to close the potential-performance divide. Thus, the stakes are high in assessing the prospects for agricultural growth, and not just for rural areas. Uganda presently has relatively few alternatives at comparable scale to agriculture for providing foreign exchange, jobs, widespread growth in domestic consumer incomes, and domestic capital accumulation. Whether or not agriculture can evolve in the ways needed to meet the above challenges is a core but open question.

Exploring a theory of change for agriculture in Uganda

31. **The present study approaches the core question by starting from a closer examination of the structural context of agriculture in the country.** This context is determined by many factors, but demographic and historical trends, agrarian structures that are creaking under population pressure in many parts of the country, widespread rural poverty, low technology uptake rooted in the previous factors, vulnerability of rural populations to climate shocks, and a rapidly evolving set of opportunities and challenges for agricultural trade based on Uganda's location and resource endowment are all key aspects of context for present purposes.

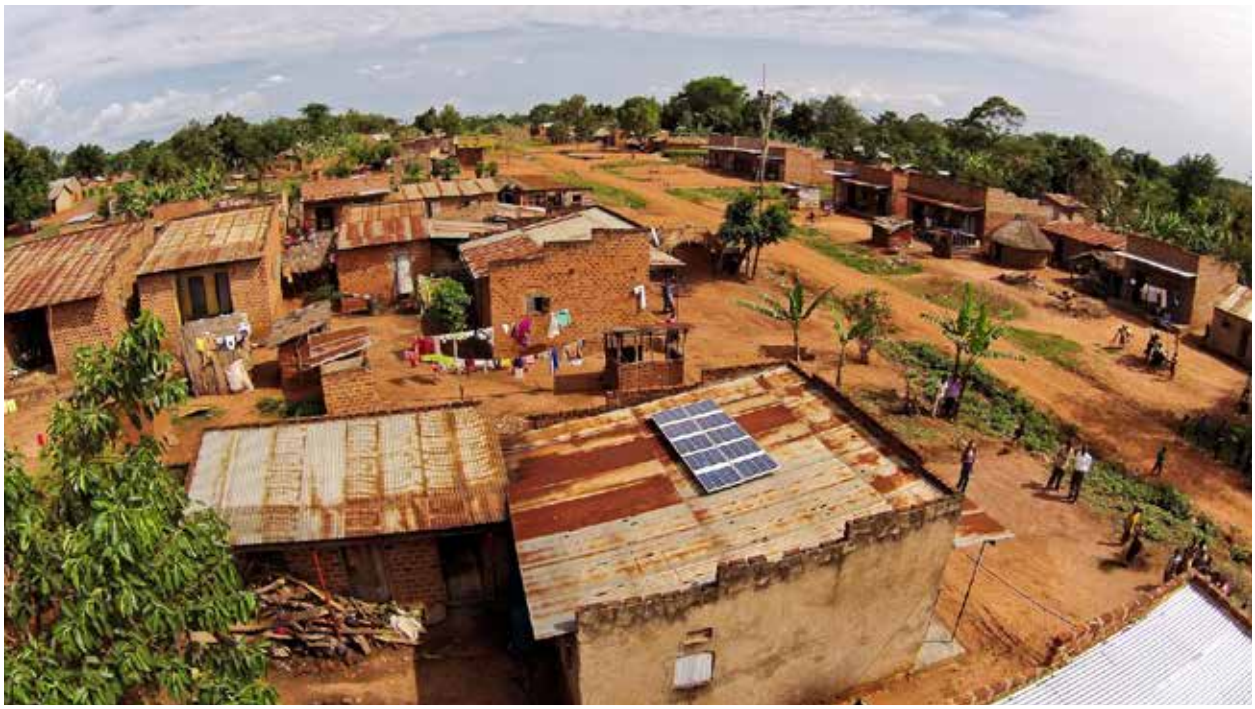
32. **Within these contextual elements, it is vital to understand the main groups of actors and institutions shaping agricultural outcomes in Uganda.** There has been considerable evolution of the public sector institutional base for supporting agriculture over recent decades. New actors on the civil society and private sector side have emerged in response to new opportunities and challenges. Development partners and events in neighboring countries have also played important roles in shaping agricultural outcomes in the country. Not all of these forces have pulled in the same direction, and not all have been positive for growth. Understanding the state of play is important for finding solutions for increased growth.

33. **Going forward, the Government of Uganda has been clear that it wishes to promote the commercialization of the agricultural sector, and that it sees the private sector as being key to this outcome.** A look at rapidly evolving demand opportunities for Ugandan agriculture, some of them perhaps unexpected, most involving value-added products, provides strong support for this view. The rapid rise in absolute and relative importance of regional agricultural trade and in the domestic market for processed foods are cases in point. The study will illustrate these trends, and assess significant constraints that must be overcome to allow a market-led development strategy to work better.

34. **Foremost among these are solving the puzzle of agricultural finance under Ugandan conditions, improving the regulatory system to build trust, and reduce high transaction costs.** Finance is an issue at all levels of agricultural value chains. As shown in Box 1, The Maximizing Finance for Development (MFD) approach in these cases focuses on what private actors are currently doing, what they are not doing, understanding why, and addressing the policy distortions or lack of conducive environment that hinder private sector responses (World Bank 2018c). The present study will highlight regulatory issues and public investment changes that will encourage private investment at different levels of agricultural value chains through recommendations consistent with the MFD approach of Box 1.

35. **A particular issue in Uganda stems from the need to extend viable pathways and technologies to more small farmers for them to participate fully in rapidly growing market opportunities, primarily in association with private aggregators.** The report will illustrate significant case studies of success in Uganda for different products. The study will draw the link to the need for an expanded role for improved information and communication technologies and the advantages of Big Data for cutting the overhead cost of having so many small farms. The main problem of small farms wishing to borrow from or sell into growing high value markets are the high unit costs for firms that transact with them: costs of search, evaluation, quality control, monitoring, enforcement and so forth. ICT is evolving to help meet these challenges.

36. **Yet the encouraging trends and possible means of better availing of opportunities suggested in the previous section are overshadowed by the looming threat to all agricultural producers in Uganda posed by climate change.** No other industry or set of livelihoods in Uganda—and perhaps anywhere—is more sensitive to climate outcomes than are densely settled smallholder farmers in tropical areas. Whatever solutions are adopted for promoting growth of agriculture will also need to address resilience of the livelihoods of rural people in Uganda to climate change. Fortunately, the knowledge base on how to do this is growing and implementable solutions that help can be defined.



BOX 1: MAXIMIZING FINANCE FOR DEVELOPMENT IN AGRICULTURAL VALUE CHAINS

Is the private sector doing it?

Yes: Spectrum of potential actions to promote responsible food & agriculture investments

- Strengthen country capacity to assess and mitigate/regulate environmental and social risks
- Promote private sector alignment with the principles of responsible investment
- Support inclusive business models to improve linkages among smallholders and firms of all sizes

No?

Is this because of limited space for private sector activity?

Yes: Spectrum of potential actions to increase space for private sector investments

- Support competition and associated policy reform, including of state owned enterprises
- Strengthen investment policy and dialogue to open space for global investment
- Reduce government intervention in agricultural financial markets to open space for private financial service providers

No?

Is this because of policy and regulatory gaps or weaknesses?

Yes: Spectrum of potential actions to improve the policy and regulatory environment for private sector investments and to reduce the distortionary effects of public spending

- Reduce distortionary effects of public spending policies
- Improve incentives and reduce transaction costs
- Reduce private sector investment risk

No?

Can public investment help crowd-in private investment?

Yes: Spectrum of potential public investments to reduce private sector transaction costs and risk

- Improve incentives and reduce transaction costs (e.g. quality assurance, vertical coordination)
- Reduce private sector investment risk (e.g. warehouse receipts, risk insurance).

No?

Pursue purely public financing where there is no viable private sector return.

Use public resources to invest in public or quasi-public goods and services

- Invest agricultural public spending in public goods and services (e.g. agricultural research)
- Support complementary public investment in other sectors (e.g. rural roads).

Source: World Bank (2018c)

37. **Public investments and policies cannot solve all these issues on their own, but their efficiency in promoting solutions at scale is critical to success under Ugandan conditions.** The study will examine the congruence of stated agricultural policies with actual practice, including through the implementation of public expenditures in agriculture. It will also look at the net impacts of policies on agricultural incentives, which in some notable cases are likely to be discouraging to growth that would otherwise be beneficial for the country.

38. **A big picture with respect to the core question emerges from these seemingly separate—but in fact inter-acting—elements.** On the positive side, agricultural growth over past decades has been critical to poverty alleviation. Yet despite having all the elements for a booming agriculture, overall agricultural productivity in Uganda has lagged, far more so than in neighboring states. Turmoil in the public sector institutional base for agriculture and on occasion unfortunate policies are likely a big part of the story. The good news is that effective actions can be identified to address the main needs for getting to a positive answer to the core question. These are: dealing with the underlying constraints to increased agricultural finance such as widespread absence of collateralizable assets and absence of data; improving the robustness of regulations; moving public expenditures and policies away from subsidies for private input use towards promoting critical public goods such as research, extension, and infrastructure; engaging at the highest levels with neighbors to promote long term regional agricultural trade; and addressing the looming dangers of land degradation and improving climate resilience.

Outline of sections

39. **In a predominantly rural country such as Uganda, everything matters to agricultural growth and the resilience of rural people whose main living is from agriculture.** There is little in the country that is not relevant in some fashion to agricultural outcomes. Apparently non-agricultural issues are in fact vital to agriculture, such as roads and energy. Agriculture also impacts on and is impacted by fiscal policy and social protection. Agricultural incentives can be strongly affected by political and macroeconomic events that are well outside the agricultural purview. The strategy pursued in the present study was hence to reach out widely for inputs from a wide array of Global Practices at the World Bank representing insights across multiple agriculture-related sectors. However, the discussion in the text itself is focused primarily on issues of policy relevance to government agencies and private sector enterprises (including small farms) that deal directly with agricultural and livestock activities as well as the end products that come from agricultural raw materials, principally foods.

40. **Following the above logic, the study is structured into seven parts.** First, it looks at the most significant elements and trends confronting Uganda's agri-food system, many of which can be seen more broadly in the region. Second, it examines developments in Uganda's public-sector institutional base for agriculture, many of which arguably contributed to the potential -performance divide in recent years, and which only now are beginning to be addressed. Third, it looks at barriers to commercialization of agriculture despite surging opportunities and desirable ways to overcome hindrances. Fourth, it analyzes the main challenges from climate change and other environmental factors such as soil depletion to the resilience of agricultural livelihoods and agroeconomic systems in Uganda, and suggests pathways to foster resilience. Fifth, it assesses policy issues in promoting sustainable commercialization of agriculture. Sixth, the component parts are woven into a "big picture" narrative. The seventh and final section gives specific recommendations for investment and policy action suggested by that narrative.

In a predominantly rural country such as Uganda, everything matters to agricultural growth and the resilience of rural people whose main living is from agriculture.



II.

Key Elements and Trends Confronting Uganda's Agri-Food System

- Agriculture is the economic sector most critical to the majority of Ugandans, and vital to overall growth. But it is confronted with multiple structural challenges such as a predominance of smallholdings practicing rainfed, low-yielding agriculture; growing population density on arable land; tenure insecurity; a lack of access to financial resources; poverty; poor infrastructure, and low levels of educational attainment.
- Agriculture sector growth is well below population growth, and adoption rates of improved technologies have remained low. Total Factor Productivity growth has been negative for the past 2 decades. Main reasons include low connectivity; low access to finance, reliable inputs, extension or market information, and a lack of reliable outlets for products.
- Uganda is among the most vulnerable and simultaneously least adapted countries to climate change, and increasingly frequent climatic shocks pose a heavy toll on rural livelihoods and the economy. Limited access to financial resources, social safety nets, and climate-smart practices are among the main barriers to smallholders being able to cope with and adapt to shocks.
- Alongside traditional commodities such as coffee, Uganda is rapidly expanding regional and global trade into non-traditional exports such as fish fillets, confectionary, sugar, and vegetable oils. While regional trade of agricultural commodities could stimulate growth, and improve the living conditions of many Ugandans, export performance is still well below its potential.

Demographics and agrarian structure

*"Agriculture still employs over **70 percent** of the labor force, with a somewhat lower share among youths (>60 per cent).*

41. **Agriculture still employs over 70 per cent of the labor force, with a somewhat lower share among youths (>60 per cent).** Due to the expansion in access to education, literacy has spread also to rural areas (72 per cent of adults being literate), but the overall quality of education has remained poor for most. Poverty declined significantly from over 50% to around 20% of the population between the early 1990s and 2012/13, but remains higher in rural areas and includes substantial food insecurity among the poor. The poverty level in rural areas is 27% compared to 9% in urban areas. It is geographically concentrated in the North and the East (World Bank 2016a).

42. **Population density, the road network, location, soils, rainfall, traditions, and a relatively peaceful status tend to favor Uganda's agriculture compared to its neighbors.** Population density is relatively high, and the road network is denser than in several of the comparator countries. Road density was already 29.3 km of road per 100 square km of land area in 2003 (latest comparative figures available), compared to 7 km in Ethiopia (2007), and 7 km in SSA on average (2000). Population density was 173 persons per km2 according to the 2014 census (UBOS 2017), compared to about 100 in Ethiopia, 85 in Kenya, and 60 in Tanzania. Soils are relatively

fertile, and mostly benefit from adequate rainfall. Agricultural production is regionally distinct, with some regions being predominantly farmland, and others engaging in mixed pastoral and farming activities. Fishing also plays an important role given large freshwater lakes. Bananas/matooke is the main food staple, with maize, cassava, beans, millet, sweet potatoes, and sorghum as secondary staples. Coffee has been grown as the main cash/export crop, as well as tea and cotton. Agricultural traditions are strong in the country; and agricultural topics are widely discussed in the media. Moreover, Uganda has good opportunities for regional agricultural exports to South Sudan and Kenya, but also to other neighboring countries; which is facilitated by growing trade linkages within the East African Community (EAC). Not least, the country has experienced a period of peace, and even in the North where conflict continued in the 1990s and early 2000s, peace has been restored over the past decade (Joughin and Adupa 2017).

Uganda has good opportunities for regional agricultural exports to South Sudan and Kenya, but also to other neighboring countries; which is facilitated by growing trade linkages within the East African Community (EAC).

43. **Yet Uganda has one of the highest birth rates in Sub-Saharan Africa (SSA), and one of the fastest population growth rates (3.3%), which puts enormous pressure on already strained natural resources** (World Development Indicators 2018). By 2050, Uganda's population is expected to rise to 102 million people, with cereal demand projected to increase by 396% compared to 2010 (van Ittersum et al. 2016). Uganda also has the youngest population of any country in the world, with a median age of 16 years; roughly 80% of the population is below the age of 35 years (Aga Khan University 2016). This potentially yields a tremendous demographic dividend. However, 64% of youth (national definition: 18-30 years) were unemployed in 2012 (UBOS cited in Ahaibwe and Mbowa 2014).

44. **Few young people in Uganda wish to become farmers.** A survey among young Ugandans from both urban and rural areas revealed that youths are very entrepreneurial, with the majority aspiring to start their own business rather than pursuing careers in teaching, medicine or engineering. Although agriculture is one of the leading sectors in Uganda, only 12% of survey respondents wanted to become farmers (Aga Khan University 2016). Food value chains beyond the farm provide substantial opportunities for entrepreneurship and good jobs with a bright future for career development.

45. **Nonetheless, the agricultural production share of overall employment increased from 69 to 72% over the last two decades** (UBOS 2016). Major factors were rapid rural population growth and limited employment opportunities outside agriculture. Population density of 173 persons/km2 in 2014 had grown from half that in 1991 (85 persons per km2) In consequence, land has been (further) fragmented, particularly in highland areas. In lowland areas, the land-to-labor ratio is often reversed due to relatively abundant land leading to lower population pressure. Both areas, however, are gradually experiencing rising labor shortages due to youth migration to urban areas.

46. **Uganda's agricultural production sector is dominated by smallholdings, with average farm sizes in the range from 0.8 to 1.6 ha** (Anderson et al. 2016). Farm sizes vary across regions, and are mainly a factor of population density, farming system, available arable land and economic development. The greatest density of smallholders is concentrated in the Western and Eastern regions. Less than one-quarter (23%) are found in the Northern region, where national statistics show the highest poverty levels. The smallest share of smallholders is in the Central region (16%), which is Uganda's most economically thriving part (Anderson et al. 2016). On a national basis, average plot size was 0.51 ha/worker in 2011 (Deininger et al. 2017). This is considerably larger than neighboring densely- populated countries like Rwanda (0.12 ha/worker), but still is relatively small. Land expansion and unsustainable land use practices have come at the price of reducing available, fertile farmland, but have also led to conflicts with other land uses such as pastoral areas and forest ecosystems.

TABLE 1: DECREASING AVERAGE HOUSEHOLD OPERATED FARM LAND IN ALL PARTS OF UGANDA 2005/06 TO 2015/16[1]

	Unit	Net Land Operated[2]		Gross Area Operated[3]	
		2005/06	2015/16	2005/06	2015/16
Share of HH < 2 ha	%	74.7%	82.8%	54.1%	65.4%
Mean Operated Farm Size < 2 ha	ha	0.80	0.73	1.0	0.9
Mean Operated Farm Size > 2 ha	ha	4.5	3.3	5.4	3.9
National Mean Farm Size All HH	ha	1.7	1.2	3.0	2.0
Central Region rural mean farm size	ha	1.5	1.1	2.8	2.1
Eastern (ditto)	ha	1.8	1.0	3.1	1.7
Northern (ditto)	ha	2.4	1.9	3.7	2.8
Western (ditto)	ha	1.5	1.0	2.8	1.8
Urban based farm HH (ditto)	ha	1.3	0.9	2.2	1.5

Source: Uganda National Household Survey (UNHS) and Uganda National Panel Surveys (UNPS) years indicated. UNPS is a national, multi-topic panel household survey with a strong focus on agriculture, implemented by the Uganda Bureau of Statistics (UBOS) since 2009/10, with technical and financial support from the World Bank Living Standards Measurement Study – Integrated Surveys on Agriculture (LSMS-ISA) initiative. The UNPS started in 2009/10 as a direct follow-up to a national sub-sample of approximately 3,200 households that had been interviewed by the Uganda National Household Survey (UNHS) 2005/06. UNPS/UNHS are representative at the national and regional levels. Intermediate UNPS rounds between these two endpoints confirm the trends shown. Notes: (1) The UNHS/UNPS surveys are representative of the household sector, but not the large, commercial farm domain, for which recurrent surveys in Uganda currently do not exist.
(2) "Net" land is actual farm size, counted only once even if cropped more than once a year.
(3) "Gross" land is area operated (typically harvested), so a given 1 ha farm with crops grown separately twice a year would be counted as 2 ha gross land operated per year.

47. **A worrying trend is that average household operated farm land has declined substantially in all parts of Uganda since the start of systematic national household sample surveying in 2005/06.** As shown in Table 1, the data in question are representative of rural Ugandan households, but do not capture the effect of the rise of large commercial farms established primarily in the North in recent years. Over the decade from 2006 to 2016, the share of all household farms that were less than 2 ha in size rose from 75% to 83%. The average amount of net land operated fell from 1.7 ha per household to 1.2 ha. Although not shown, rural population density has grown over the same period in absolute if not in relative terms (UBOS 2017a). It is likely that land operated per adult resident on the farm has fallen even faster than the 3.4% per annum compounded rate of decline in average farm size 2005/06 to 2015/16 suggested by the data in the table.

48. **The trend of declining average farm size holds for all major regions of Uganda, as also shown in Table 1.** The effect is especially large in the Eastern region, with average net land operated per household falling from 1.8 ha to 1.0 ha over a decade. Reasonable hypotheses are that these trends are due to insufficient job opportunities outside family farming and inheritance customs that split farms over time among successive heirs.

49. **Finally, a few large-scale commercial farms have been established in recent years, especially in Northern Uganda.** This followed the re-establishment of peace in the region. Foreign as well as domestic investors were involved. These farms are not included in Table 1. Land use disputes remain an issue for the commercial farms. The commercial farm AGRISERV, for instance, has legal access to 1,400 ha, but has only been able to farm 150 ha. The rest of the land in question is arguably occupied by squatters. AGRISERV has been involved in several court cases, but land rights could not be clearly attributed to date. Similar problems affect other commercial farms such as AFGRI or AMATHEON (Joughin and Adupa 2017).

50. **A man is three times as likely to be the head of a smallholder farming household as is a woman** (77% men vs. 23% women; Anderson et al. 2016). While households are male-dominated, women make up 55% of the economically active population in agriculture, and contribute more than 75% to total farm labour as well as over 90% to farm-level primary processing operations (UBOS 2016). This has implications for development in other areas including education, extension, inputs and credit provision, land tenure. among others. Almost half (45%) of heads of households are under the age of 40, and one in five is older than 60 years.

51. **Farmers in Uganda largely use small-scale, labor-intensive technologies, dependent on rainfall that is distributed in two rainy seasons in most of the country.** The hand hoe is the main production tool. Roughly 10% of farmers use animal traction, and 1.2% use tractors. Irrigated agriculture comprises 1.3% of total cultivated land (Olet 2017). The dependence of most smallholders on rain-fed agriculture without adequate water management is especially concerning in light of increasing climate variability and soil degradation that lowers the water retention of fields.

> *The hand hoe is the main production tool. Roughly* ***10%*** *of farmers use animal traction, and* ***1.2%*** *use tractors. Irrigated agriculture comprises* ***1.3%*** *of total cultivated land.*

52. **Over 80% of land is held under customary tenure as suggested in Table 2; that is, land governed by customs, rules, and regulations of the community.** While not being officially registered, customary tenure and hence legal pluralism is recognized by Uganda's land law. However, since customary land rights are of trusteeship rather than ownership, they are particularly vulnerable to expropriation (Doss et al. 2014).

53. **Under freehold tenure, owners have an indefinite deed to their land and complete rights to use, lease, transfer, subdivide, or mortgage their land in compliance with Ugandan laws.** Freehold interests are not widespread, and were formerly limited to a small category of individuals such as kings, chiefs, large-scale agricultural estate developers or special interest groups such as churches.

TABLE 2: EVOLUTION OF SHARE OF AGRICULTURAL LAND WITH DIFFERENT TYPES OF TENURE 2009-2014

	2009/10	2011/12	2013/14
% land = freehold[2]	13%	10%	12%
% land = leasehold[2]	1%	2%	1%
% land = *"mailo"*[3]	4%	4%	2%
Share documented	18%	16%	15%
Share customary[4]	82%	84%	84%

Source: Calculated from the three rounds indicated of the Uganda National Panel Surveys (LSMS) (Duponchel 2017). Notes: (1) These area figures pertain to documented parcels only (18% to 15% of total land operated). Average land operated in Uganda as a whole is larger, implying that land sizes operated under customary rights are typically larger than documented plots. Deininger et al. (2017) report the average farm area operated from the 2010/2011 LSMS survey in Uganda as 1.4 ha. The same farmers with documented plots might also operate undocumented ones as well, although
(2) Freehold and leasehold both include land use rights conducive to use as collateral.
(3) Mailo is a very small category of essentially rental land that includes long-term use rights, but generally is not land that can be independently sold by the user or used as alienable collateral to secure loans.
(4) Customary land here is almost all undocumented in the same sense that the other categories are documented. Shares may not sum to 100% due to rounding.

54. ***Mailo* is a system found in Central and central Western Uganda that was established by the British colonial government.** Most of this land is occupied by long-term tenants who do not hold full ownership rights, face some restrictions to land use, and must pay rent to the mailo owner. While recent reforms have aimed to strengthen tenant rights, landlord–tenant relations have degenerated and tenure insecurity increased due to increased commercialization of land and improved land markets (Doss et al. 2014).

55. **Finally, a landowner – in practice often government bodies – may grant a tenant use of 'leasehold land', usually for a specific period, which could be used as collateral for loans.** In return, the tenant usually pays an annual rent or provides service under specified conditions. Since leaseholders may not hold formal contracts with the owner, they can be evicted without legal recourse, although there is the risk of conflict.

56. **Uganda's customary land law is patrilineal, and usually accords women fewer land rights.** While women have the legal right to ownership, spousal co-ownership and inheritance, they rarely inherit land but rather receive only secondary usage rights through husbands, sons, or other male relatives. Hence despite legal ground for the recognition of female land rights, these continue to be determined by cultural norms and practices, leaving women highly vulnerable (Doss et al. 2014).

Poverty and malnutrition

57. **Poverty rates in rural Uganda are high, with roughly one-quarter of all smallholder households living on less than US$ 1.25 per day** (Anderson et al. 2016). Uganda's impressive progress in reducing poverty was mainly driven by forces within agriculture and not by productivity gains from migration from lower productivity rural areas to higher productivity urban areas (Hill et al. 2017). Between 2002-2013, the share of people living below the national poverty line more than halved, from 40% to 19.7%. Agricultural households accounted for 79% of poverty reduction in this period (World Bank 2016a). A major driver was a high rate of growth in household agricultural income, at roughly 6% per year from 2006-2012 (Ibid.). Yet, smallholder income growth from agriculture was largely driven by favorable weather conditions and higher crop prices, rather than by improved agriculture practices or new technology (Sheahan and Barrett 2014).

Poverty rates in rural Uganda are high, with roughly one-quarter of all smallholder households living on less than ***US$ 1.25 per day.***

58. **Although Uganda has made progress in reducing poverty, it still faces widespread deprivation on several human development dimensions.** These not only reduce human welfare directly, but also have major negative effects on efforts to boost labor productivity in agriculture. Only 14% of the population have adequate sanitation, leading to an increased burden of disease, and only one in seven households use electricity for lighting. Despite improved primary school enrollment, completion remains a challenge with a rate of 53% (Hill et al. 2017). The majority of Ugandan pupils lack basic literacy and numeracy skills, questioning the quality of education (World Bank 2016a). Education quality needs to improve for dropout rates to fall. Higher educational attainment levels have been shown to help households diversify income sources, to access wage employment, and to enhance their coping capacity with respect to agriculture-related risks.

59. **Between one-quarter and one-third of the population (depending on the estimate) are under- nourished in Uganda** (Hill, Mejia and Vasilaky 2017; FAO 2017a). Thirty-four percent of Ugandan children under the age of five were stunted in 2012 (IFPRI 2015). Stunting in children under the age of five is a key indicator of chronic undernutrition because it captures the effects of long-term deprivation and disease, and is a powerful predictor of the life-long burden of undernutrition. A study by the African Union Commission estimated the annual economic losses from child undernutrition through health, education and productivity costs and losses to be 5.6% of Uganda's GDP (FAO et al. 2017). The situation is also urgent amongst Uganda's neighbors in Eastern Africa, where one-third of people are estimated to be undernourished, and aggravated by conflict in Southern Sudan and in DRC. The sub-region's prevalence of undernourishment increased from 31.1% in 2015 to 33.9% in 2016 (FAO et al. 2017a).

60. **Even as agricultural-led poverty reduction has taken place, regional inequality has become worse.** Eighty-four percent of the poor lived in the northern and eastern regions in 2013, compared to 64% in 2006 (Hill et al. 2017). Access to services such as cell phone service, electricity and piped water is much higher in the Central Region than elsewhere (Ibid.).

Agricultural production, productivity, and technology adoption

61. **While the number of people employed in agriculture has increased, labor productivity remains lower than in the rest of the economy.** Labor productivity per agricultural worker per year is estimated at 13% of workers in other sectors. However, labor productivity per person per hour is not much different, with 1,850 hrs/yr in non-agriculture (7h/day) vs. 700 hrs/yr (2.7h/day) in agriculture (McCullough 2017). The apparent disparity in labor productivity largely results from the seasonality of agriculture labor calendars. Rural households often have insufficient opportunities to access wage employment in the non-agriculture business to smoothen out labor calendars. In contrast, urban households have better access to countercyclical work, resulting in smoother labor calendars and lower poverty rates overall (ibid.).

62. **Traditional food staples such as plantain and cassava have lost ground since the 2008 food crisis, whereas maize, Irish potatoes, and especially oil seed production have grown.** This is shown in Table 3. The 2016 harvest was especially poor for field crops such as maize and potatoes. So the figures in Table 3, if anything, under-emphasize the extent to which the latter have out-performed plantain and cassava.

TABLE 3: PRODUCTION OF MAIN STAPLE CROPS 2008/09 TO 2015/16

(000 metric tons)			
Crop	**2008/2009**	**2015/2016[1]**	**Annual Avg % change**
Plantain	4,297	4,010	-1.0
Cassava	2,894	2,728	-0.8
Maize	2,362	2,648	1.6
Irish Potatoes	1,819	1,978	1.2
Beans	929	945	0.2
Cereals excl maize[2]	844	852	0.1
Groundnuts	245	286	2.2
Other oilseeds[3]	125	408	18.4

Source: Data are from 2008/2009 Uganda Census of Agriculture; 2015/2016 annual average of 2015 and 2016 from 2017 UBOS Statistical Abstract. Average annual growth rates are compounded annual averages over the period. Notes: (1) 2016 was a disastrous drought year with sharply lowered production of most items.
(2) In declining order of importance in 2015/16: sorghum, rice, millet, wheat.
(3) In declining order of importance in 2015/16: sunflower seed, simsim, soybean.

63. **Agricultural production growth has been low and erratic since 1961, but has picked up in recent years, with the exception of 2016.** Figure 1 decomposes agricultural growth into components due to area expansion (in orange), increased use of inputs (including labour) other than land (in grey) and total factor productivity growth (TFP). TFP is calculated as a residual obtained by netting out from output growth all other measurable sources of growth at this level of data aggregation: examples are growth in agricultural land expansion, increased numbers of workers living on farms, and increased use of purchased inputs such as fertilizer.[1] Growth in the TFP residual is thought to reflect some combination of increased technical efficiency, increased allocative efficiency, and (or) technological progress. Improved technical efficiency comes from redeploying existing inputs, land, and labor regardless of prices in a way that leads to net physical gains using existing technologies.[2] Informally, gains here can be thought of as coming from catching-up to good practice elsewhere under similar conditions. Greater allocative efficiency arises from taking into account in resource allocation the costs of using different inputs and factors in addition to technical issues, in order to maximize profitability. Gains here can be thought of as the art of business, since private sector gains stem from using inputs and choosing outputs more profitably. Finally, technological change embodies scientific and technical innovation to get more from less.

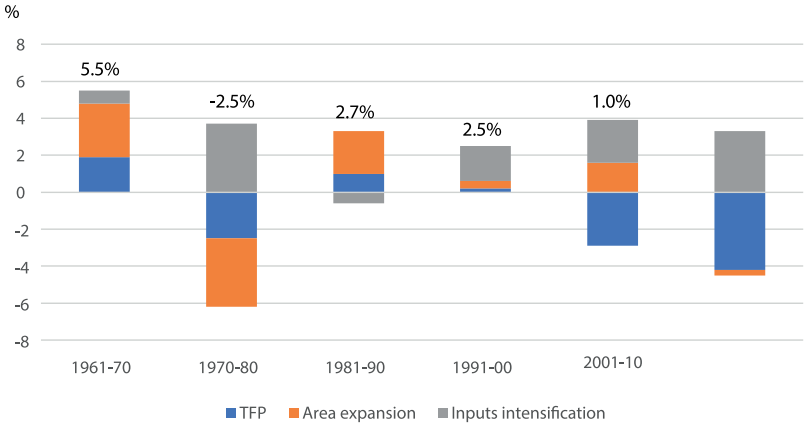


Greater allocative efficiency arises from taking into account in resource allocation the costs of using different inputs and factors in addition to technical issues, in order to maximize profitability.

[1] This approach using national level data implicitly calculates a weighted average (by field area) of data for all fields in the country, and assumes that the stock workers living on farms is a reasonable proxy for the flow of labor to agriculture and that this relationship is constant over time. While the latter assumption in particular is questionable, only panel data at the level of individual farms would allow escaping these limitations. The results are sufficient for present uses.
[2] Conversely, it could also reflect losses from systematic decreases over time in the average quality of inputs, such as land degradation or declining quality of fertilizer used, but this is not measured in the data.

FIGURE 1. DECOMPOSITION OF SOURCES OF AGRICULTURAL GROWTH IN UGANDA 1961-2014 (% PER ANNUM)

(Net agricultural output growth in % per annum at top of column in period indicated)



Notes: (1) The three sources of growth listed sum to output growth in the period in question. Output growth may be different than column height because of negative contributions to growth in the period in question. Growth not explained by area expansion or increased use per ha of inputs (including labor) is attributed to TFP. TFP is a combination of increased allocative and technical efficiency, and technological change.

Source: Compiled from the USDA International Agricultural Productivity database, available at: https://www.ers.usda.gov/data-products/international-agricultural-productivity/

64. **Agricultural growth was robust in the years immediately after independence in 1962, but the late 1960s until the mid-1980s were characterized by disruption and conflict, and most particularly during all of the 1970s when agricultural output fell at an average rate of 2.5% per annum.** During the 1980s, output grew at 2.7% on average, largely due to area expansion, most of which was late in the period as peace allowed the population displaced by war to return to abandoned areas north of Kampala. During the 1980s, input use fell overall, as it did in most of Africa due to the shrinking of input subsidies. Growth continued at a modest pace in the 1990s, now mostly due to increased use of inputs such as fertilizer. After 2000, agricultural growth was low, implying substantially decreasing per capita agricultural output. Food crops fared better than export crops, especially after the one- time major price hikes for food of 2008. Uganda also began to produce large amounts of grain for export to South Sudan. Fertilizer use has been increasing slowly in Uganda in recent years, but at an average application level still below 2 kg/ha in 2014 remain well below the already low average for Sub-Saharan Africa of 16 kg/ha (Joughin and Adupa 2107).

65. **Between 2010 and 2014, overall agricultural growth averaged 2.2% per year, but was still lower than average annual population growth of 3.3% in the same period.** Although crop estimates for 2005-2014 show that cereal yields improved steadily from 1.6 to 2.0 metric tons per hectare (mt/ha), root crop yields halved during this period. Cash crops also performed poorly. For example, tobacco yields declined on average by 3.2% p.a. while coffee yields stagnated (FAO 2017a). Within Sub- Saharan Africa, Uganda has one of the lowest adoption levels of improved seeds, inputs, or mechanized traction (Sheahan and Barrett 2014). In 2014, only 16% of farmers used purchased inputs of fertilizer or pesticide (Adjognon et al. 2017).

66. **The bottom line suggested by the data in Figure 1 is that total factor productivity (TFP) growth has been largely absent from Ugandan agriculture on an overall basis for the last three decades.** This is illustrated by the blue bars in Figure 1. It also seems that the problem has been getting worse over time, especially after 2010. It is not clear at this point what underlies Uganda's massive losses in TFP since 2000 shown in Figure 1. However, it seems that these losses are particularly large outside the cereals sector, are related to growing pest and disease incidence, and are very likely related to policy distortions that harm allocative efficiency. They may also likely reflect insufficient public priority to maintaining innovation in Ugandan agriculture. Since TFP is a residual, this data serves primarily to make the case that there is a problem big enough to show up on a very large canvas. Studies using data from individual farms and districts would be necessary to say exactly what the source of the problem is.

67. **In any event, market participation and technology adoption by smallholders have remained low.** An observed increase in smallholder sales and agriculture household cash incomes in 2005-2013 was largely driven by higher crop prices and favorable weather (Sheahan and Barrett 2014). The adoption rate of new technologies such as

improved seeds, inputs or mechanized traction has remained low. For instance, by 2011 only 7% of farmers rented, and 8% owned, ox-ploughs (Ibid.). The use of inorganic fertilizers remains concentrated on a few farms, mostly the larger and more commercially oriented ones in the Central region on which cash crops such as tea, coffee, and increasingly sugarcane or oil palms are grown. Only 8% of small farms apply inorganic fertilizer, with access to major output markets positively affecting its use rate (Okoboi and Barungi 2012; Suri 2011). The least commercialized 25% of farmers sell 4% of their produce and purchase inputs worth 1% of the value of their production (Nivievskyi et al. 2010).

68. **Low technology adoption and commercialization levels result from small farm sizes as well as a lack of connectivity and access to assets.** Assessing the factors driving commercialization in Uganda, Nivievskyi et al. (2010) found that a main determinant was access to physical, human, and financial capitals. Larger farm holdings were more eager to commercialize since they could realize economies of scale by adopting modern technologies. Farmers with access to assets and connectivity to markets actively engaged in markets. The geographic dispersion of smallholder farmers and poor infrastructure quality, in turn, are barriers to commercialization. Poor rural roads and road maintenance hamper the access of smallholders to input and output markets, drive up transaction costs, and lead many to pursue more subsistence-oriented practices (Oryokot 2017). High transportation costs are moreover a significant barrier to trade, and lead to lower farm gate prices or higher market prices since traders exploit their market power over farmers (FAO 2017b).

69. **The productivity of both female-headed farms and female-managed plots is lower compared to farms and plots managed by men, apparently due to lower access to and application of improved inputs.** Using data from the Uganda National Panel Survey, Ali et al. (2016) found that the land productivity of female-managed plots was about 30% lower than for men within the same household. Male-managed plots were on average 60% larger in size, and 11% more likely to be planted with cash crops. While the use of improved seeds and chemicals is generally low in Uganda, both use and applied quantities were lower on female-managed plots than the overall national average.

70. **Agriculture productivity is also lower in conflict areas.** Land conflicts are more prevalent in districts with high population growth and ethnically diverse communities. Mwesigye and Matsumoto (2016) found that yields were 22% lower on land parcels associated with disputes, compared to parcels without. Land disputes not only affect productivity, but also overstretch legal institutions, as in taking on average roughly 32 months to settle (Justice Law and Order Sector 2016). Besides, disputes have shown to negatively impact the viability of commercial farming investments, in particular in Northern Uganda where 93% of land is under customary tenure and where refugee influx is most pronounced (Joughin and Adupa 2017).

71. **Fifteen percent of surface area of Uganda is fresh water, and there is also adequate to abundant rainfall in most parts of the country. Yet water storage capacity and sustainable irrigation schemes have remained limited** (GoU/MAAIF-MWE 2017). Currently only about 7,000 ha of cultivated land is under formal irrigation, about 1.2% of an estimated irrigation potential of 600,000 ha. However, most existing irrigation schemes face difficulties to surmount financial and organizational constraints. Furthermore, the adoption of sustainable water management and conservation practices such as bunding, small catchments, and water retention via selective reforestation has remained limited.

72. **The unreliable quality of agricultural inputs is a major problem, as will be seen in more detail below. Fake, adulterated, and mislabeled inputs significantly lower returns and adoption rates in Uganda.** Bold et al. (2017), for instance, showed that hybrid maize seeds on Ugandan markets were equivalent to a mix of 50% hybrid and 50% landrace varieties, while the average nitrogen content of fertilizer was 30% lower than it should be. The sub-standard quality of (inauthentic) inputs reduced yield gains from using hybrid seeds and nitrogen (alongside other plant micronutrients) to 75-87% of expected outcomes. (Hill, Mejia and Vasilaky 2017). Estimates in 2015 suggested that less than 10% of planted seed was purchased from formal sources, and 30 to 40% of this seed purchased from formal sources was counterfeit (PARM 2015).

73. **Using quality inputs will increase agriculture productivity best if they are accompanied by improved farming practices.** Current yields for maize, millet, rice and sorghum are estimated to be only 20-33% of the potential yield for rain-fed agriculture, and even less for irrigated agriculture (PARM 2015). Hill et al. (2017) found that yields of

Hybrid maize seeds on Ugandan markets were equivalent to a mix of 50% hybrid and 50% landrace varieties, while the average nitrogen content of fertilizer was 30% lower than it should be.

four analyzed crops (maize, beans, matooke, coffee) increased in response to nitrogen application, with beans and maize yields being most responsive. Increased input use should however be accompanied by enhanced water and soil conservation practices for both greater efficiency of input use and less potential for damage to the environment. Improved farm tools and equipment have also been found to enhance the productive utilization of inputs (FAO 2016a).

74. **Compounding productivity problems, natural resource degradation in agriculture is rampant.** Human encroachment into protected areas, land use change due to agriculture expansion and rapid population growth severely threaten the country's ecosystems and biodiversity. Uganda's natural forest cover shrank from 54% in 1950 to less than 10% of total land area in 2015, while cropland increased by 35% (CCAFS 2017). Agriculture is also the main driver for soil erosion, that is, soil nutrient and soil productivity loss. 4 to 12% of Uganda's GDP could be lost annually due to land degradation (MWE 2016). Intensifying the production process sustainably, that is, obtaining more output from the same amount of land without negative environmental impacts, will be critical for reversing the declining growth in land productivity.

Vulnerability and resilience of farm household livelihoods to climate change

75. **The agriculture sector – and smallholders in particular – are very vulnerable to increasing climate variability and shocks.** In 2016, agricultural output plummeted and resulted in widespread food insecurity, largely a result of drought spells and pests such as the armyworm. According to the latest Uganda National Panel Survey (UBOS 2017b), poverty rates rose to 27% by September 2017. Average temperatures have increased by 1.3°C since 1960, and could rise by up to 2.5° by 2050 (CCAFS 2017) – an alarming trend observed across the African continent. Seasonal rainfalls have become more variable and less predictable, and in combination with higher temperatures are likely to reduce cereal crop productivity. Extreme events such as droughts, floods or landslides are projected to become both more frequent and intense, and are exacerbated by unsustainable land use practices and the expansion of agricultural land into other ecosystems such as forests (Ibid.).

76. **Uganda is among the most vulnerable and simultaneously least adapted countries to climate change, ranking 155 out of 181 countries on the ND-GAIN Country Index.**[3] Increasing climate variations and extreme events such as droughts or floods lead to massive economic losses, reductions in food production, and increases in food prices, heavily affecting the country's already fragile food security situation particularly in the Northeastern regions. Due to the 2010/11 drought, for instance, Uganda lost ca. US$470 million in food crops, cash crops and livestock – an equivalent of ~16% of the total annual value of these crops in 2011 (OPM 2012). By 2050, the production of Arabica and Robusta coffee could fall by 50%, and areas suitable for growing tea and beans could be severely affected, resulting in a massive loss of market opportunities (ReliefWeb 2015). As of July 2017, the fall armyworm has affected more than 1.3 million hectares, destroyed up to 40% of maize in Western and Central Uganda, and could cause up to US$ 193 million on medium predictions (Abrahams et al. 2017).

*As of July 2017, the fall armyworm has affected more than **1.3 million hectares,** destroyed up to **40%** of maize in Western and Central Uganda, and could cause up to US$ 193 million on medium predictions.*

FIGURE 2. AGRICULTURE AS PART OF THE LARGER ECOSYSTEM

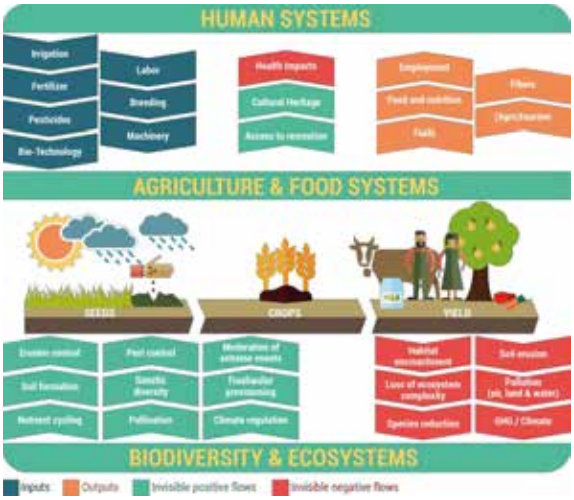


Figure 2a. The visible and invisible flows of agricultural production (TEEB 2015)



Figure 2b. Services provided by ecosystems and biological diversity (TEEB 2015)

77. **The comparably low resilience of rural livelihoods in Uganda to climatic and other shocks stems largely from the absence of financial resources and other livelihood assets that underpin the capacity to cope with and adapt to shocks.** Resilience can be described as the ability of (agricultural) systems and people to anticipate or recover from shocks that impact agriculture and food security in a timely manner, and thereby avoid disasters and crises (FAO 2014b). In Uganda however, as in most of the surrounding region, farmers usually work on a small-scale or subsistence level and have limited financial resources as well as access to infrastructure, information and knowledge, making them highly vulnerable to climate and market-related risks (Pereira 2017).[3]

78. **Although Uganda is highly vulnerable to climatic shocks, information on weather and climate as well as disaster management has often focused on relief and rehabilitation.** El Niño-induced food insecurity and famine risk in northern Uganda, or the outbreak of the fall armyworm (FAW) have demonstrated that responses were largely reactive rather than proactive. Limited availability of weather observing infrastructure and communications equipment, as well as low capacity to utilize weather forecasting and analysis technologies have resulted in inadequate monitoring and forecasting of weather hazards. This has likely led to restricted responses to known impending climate hazards, and also constrained planning for long-term climate changes in economic development and risk reduction efforts (Braimoh et al. 2018).

79. **Rapid population growth particularly in rural areas drive ecosystem service degradation and biodiversity loss, ultimately affecting agriculture productivity and human wellbeing.** Agriculture is essential to feed Uganda's rapidly growing population. However, cropping and grazing (or mixed) systems do not only provide food, fiber or skins, but a wide range of ecosystem services and functions which benefit humans and are not immediately 'visible' (Fig. 2a). These include nutrient cycling, local climate regulation or freshwater purification, among others (Fig. 2b). Unsustainable land use and landscape simplification, often resulting from increasingly homogenous land use and the loss of non- crop habitats, reduce these services on which agriculture production critically depends (TEEB 2015). Land use intensification, that is, the application of synthetic fertilizers and pesticides, can further reduce soil health through the reduction of critical soil organisms or insect and bird species necessary for pollination and biological pest control. This can increase the fragility of agriculture systems to pest outbreaks and other climate-related shocks (Landis 2017).

3 The Notre Dame Global Adaptation Initiative (ND-GAIN) Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. More information can be found at https://gain.nd.edu/our-work/country-index/

80. **The replacement of local varieties and landraces by genetically uniform, high-yielding commercial varieties needs to be matched by efforts to maintain biodiversity within crops**. Crop genetic diversity is critical to provide for pest control and pollination. Decreasing genetic variety lowers the number of traits and thus response options to pests and disease vectors, reduces adaptation to changing biotic and environmental conditions, and enhances the susceptibility of farmers to price shocks. For Ugandan rural livelihoods to better cope with and adapt to increasing climate variations and shocks, the resilience of agriculture systems needs to be enhanced while productivity increased at the same time.

Trade developments affecting agriculture

81. **Agriculture as a sector is highly sensitive to the overall economic climate and the trade opportunities and challenges resulting from it.** Overall economic growth, both domestically and amongst trading partners, determines the demand for agricultural output; determines fiscal space available; can influence exchange rates, and influences the opportunity cost of labor and capital used in agriculture. The dependence of agriculture on growth in non-agriculture sectors increases as the share of agriculture in the economy slips. In Uganda as elsewhere, the overall role of agriculture is shrinking over time in the economy, as is to be expected. Despite remaining by far the largest source of livelihoods (at roughly 70% of employment in 2016), the share of agriculture in GDP in Uganda declined from 55 to about 23 percent between 1990 and 2016, as the share of services jumped from 31 to 47 percent, and the share of industry rose from 14 percent to 31 percent (UBOS 2017a). The core inflation rate since 2013 has been in the range of 5 to 6 % per annum. Food is a critical part of this, and food inflation actually decreased significantly in 2016 (at a level of 3.1% for the year) compared to 2015 (at a level of 6.7% for the year) (UBOS 2017a).

82. **Agriculture is also very sensitive to the global trade economy.** Agricultural products (primary and processed) have accounted over the last decade for about 54 percent of total exports and for 49 percent in 2016. The latter year was one of commodity trade compression globally, and represents a low point. While on a gradual downward trend long-term as a share of total exports, they have nonetheless displayed solid growth in nominal value and unlike its share of GDP, the role of agriculture in exports remains high (Table 4). As of 2016, total agricultural exports are more than fourfold their early 1990s level in nominal terms, and more than threefold their early 2000s level. They also represent about 20 percent of the country's total foreign exchange earnings from exports of goods and services and transfers. Note that the figures below are only recorded (formal) exports. UBOS estimates informal (unrecorded) exports overall to be in the range of 15% of all exports, but no disaggregated data is available (UBOS 2017a). Unrecorded exports are primarily regional.

*Agricultural products (primary and processed) have accounted over the last decade for about **54 percent** of total exports and for **49 percent** in 2016.*

TABLE 4: EXPORTS FROM UGANDA BY VALUE (NOMINAL US$ MILLION), 2001-2016

	2001-2005	2006-2010	2011-2015	2016
Agricultural Exports	375.0	777.2	1,235.7	1,211.0
% Period Growth	-11%	107%	59%	-2%
% Share of All Exports	63%	54%	54%	49%
All Exports	593.6	1,441.9	2,290.7	2,482.3

Source: Uganda Bureau of Statistics, http://www.ubos.org/statistics/macro-economic/trade-2/

Note: The cumulative rate of inflation of the United States consumer prices in US$ was 35.6% from 2001 to 2016 (U.S. Bureau of Labor Statistics Consumer Price Index). Therefore, the inflation-adjusted growth in US$ terms of agricultural exports from 2001/05 to 2016 was +138% or a multiplicative factor of 2.38. Also note that the figures for agricultural exports in 2016 were marginally lower than the average for 2011 to 2015.

83. **Uganda continues as a traditional exporter to world markets of coffee (which remains the country's main export), tea, tobacco and cotton, with aggregate exports of these four crops tripling in nominal value and substantially more than doubling (X 2.4) in real US$ terms between the early 2000s and the early** 2010s (see Table 5). Coffee exports almost doubled, while exports of the other three traditional commodities rose between 5 and 10 times. Compared to the same baseline, traditional exports in 2016 are still more than double, even with coffee exports recording a level 11% lower than the previous five-year average. After an export boom in the first decade for the other three traditional commodities, with a peak of a 476% increase for tobacco, their export growth has continued but at a more moderate pace in the recent decade, ranging from 98 percent increase for tobacco to 126% for tea.

84. **The country has also become a major supplier of non-traditional agricultural products, including fish and fish products, which have grown nine-fold in nominal terms during the past two decades and have become the largest non-traditional agricultural export category** (Table 5). Traditional agricultural exports as a whole were larger in value terms than non-traditional ones through the 2000s, but by a steadily to diminishing amount. After 2010, non-traditional agricultural exports began to dominate and this trend is only likely to grow. There was a significant concern about decline in export volumes in the late 2000s, seen as a consequence of declining catches, falling stocks and overfishing (Mwijagye 2009). The latter are undoubted issues in Lake Victoria at least. Ugandan exports of fish and fish products in fact leveled off in the early and mid-2010s. This recent leveling is consistent however with an observed stable overall catch from the country's open fresh water bodies during the last five years. The largest markets for Uganda's exports of fish and fish products are Hong Kong, OECD countries, Gulf countries, Israel, and the U.S.A. They increasingly include neighboring countries such as Rwanda, Kenya and DRC.

85. **Other rapidly expanding non-traditional exports include sugar and sugar confectionary, cocoa beans, vegetable oils and sesame seeds, cereals (maize, sorghum and rice and their flours), hides and skins, beans and other legumes, flowers, and vegetables** (Table 5). In some cases, the cumulative growth of these exports is in the thousands, as they rose from a very small level to significant levels in recent years. An example is sugar and sugar confectionary, which now represents the second largest non-traditional agricultural export, around $100 million. Over the same baseline, maize exports had tripled by the early 2010s, and have risen four-fold by 2016.

"The country has also become a major supplier of non-traditional agricultural products, including fish and fish products, which have grown nine-fold in nominal terms during the past two decades and have become the largest non-traditional agricultural export category.

86. **The growth in these other nontraditional exports, save for cocoa beans, hides and skins, and flowers that are mostly shipped to OECD countries and China (as are traditional exports), have been driven mostly by increasing demand in neighboring countries.** The largest markets for Uganda's cereal exports in 2016, for example, are South Sudan ($70 million), Kenya ($38 million), followed by Rwanda ($18 million) and the DRC ($12 million). Other smaller markets are Burundi, Tanzania, and Sudan (ranging from $3 million to $1.5million) (ITC 2018a).

87. **In recent years, the most significant causes of distress to Uganda's regional export performance has been the South Sudan crisis.** By 2013, South Sudan had become the largest destination for Ugandan exports. However, this market has since become extremely unpredictable as a result of the outbreak of serious unrest in that country, and of the resulting intermittent blocking of trade routes to Uganda. In addition, severe drought in Uganda in 2016 had an impact on the production of agricultural commodities for export, particularly maize and beans (World Bank 2017b).

88. **Uganda is also a large importer of processed foods and a growing one for fresh food, including cereals.** Processed foods accounted for 9.3% of all Ugandan recorded imports over the 2012-2016 period; fresh (i.e. unprocessed) food accounted for 3.4% (ITC 2018a). While imports of processed food declined by 5 percent per annum during 2012-2016, imports of fresh food increased at an annual rate of 21 percent. In particular, wheat imports, mostly from



Russia, peaked at $165 million in 2014, ten times as much as was recorded in 2012. Rice imports also peaked in 2014 at $72 million and remain high as of 2016 at $47 million. Rising food import dependency reached almost 13 percent by 2016 (ITC 2018a). This can increase Uganda's vulnerability to global price fluctuations, and its ability to generate foreign exchange (Olet 2017).

TABLE 5: RECORDED ANNUAL AGRICULTURAL AND FOOD EXPORTS IN NOMINAL US$ MILLIONS 1990 - 2016

	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015	2016
Traditional Export Crops	**225.2**	**331.4**	**191.3**	**398.3**	**569.3**	**507.2**
Coffee	209.2	285.7	118.3	284.6	415.4	371.7
Tea	9.2	28.3	34.2	54.7	77.3	71.5
Tobacco	6.7	17.4	38.7	59.0	76.6	64.1
Cotton	7.7	18.9	21.7	19.2	47.1	31.6
Non-Traditional Agric/Food Exports	**56.6**	**88.0**	**183.7**	**378.8**	**666.4**	**703.8**
Fish and products	12.8	35.0	100.1	128.0	128.7	121.5
Sugar and Confectionary	0.1	5.8	2.3	38.0	84.9	100.3
Cocoa Beans	0.5	1.3	5.5	22.3	50.8	75.0
Maize	16.6	10.4	16.2	26.7	52.1	70.3
Animal/Veg Fats and Oils	0.1	2.3	5.5	46.2	98.6	62.1
Sorghum	0.0	0.1	0.1	1.5	20.2	55.3
Hides and Skins	7.1	8.6	10.5	12.3	55.2	51.4
Beans and other Legumes	9.7	9.5	5.6	12.3	28.9	50.5
Flowers	1.1	6.0	21.5	24.3	25.8	24.6
Other Non-Trad Agric and Food Exports[1]	8.5	8.9	16.4	67.2	121.2	93.0
Total Agricultural and Food Exports[2]	**281.7**	**419.4**	**375.0**	**777.2**	**1,235.7**	**1,211.0**

Source: COMTRADE database accessed via WITS

Note: (1) In declining order of importance in 2016: rice, vegetables, sesame seeds, beer, mineral water, soybeans, fruits, pepper, vanilla, groundnuts, live animals, bananas

(2) The cumulative rate of inflation of United States consumer prices in US$ was 76.2% from 1991 to 2016 (U.S. Bureau of Labor Statistics Consumer Price Index). Therefore, the inflation-adjusted growth in US$ terms of agricultural exports from 1991 to 2016 was +176% or a multiplicative factor of 2.76. This implies that in US$ inflation-adjusted terms, non-traditional agricultural and food exports grew by a factor of 7 from 1991 to 2016, while total agricultural and food exports grew by a factor of 2.4 over the same period.

According to the ITC Trade Performance Index that provides a global performance ranking among all countries exporting the same category of products, Uganda is ranked 44 in fresh food and 68 in processed food.

89. **Uganda's agricultural export performance is likely well below its potential.** According to the ITC Trade Performance Index that provides a global performance ranking among all countries exporting the same category of products, Uganda is ranked 44 in fresh food and 68 in processed food. The comparable rankings for Kenya are 37 and 94, respectively; for Rwanda, 94 and 119; and for Tanzania, 40 and 99. Thus, vis-à-vis its neighbors, Uganda's performance is average to better than average. However, significant export potential for most traditional and non-traditional agricultural products is left unrealized. To traditional destinations such as the OECD, ITC primarily sees substantial underutilized potential for unroasted coffee, and to a small extent for cocoa beans. To both Sub- Saharan Africa and other Non-OECD destinations, ITC calculates underuse of export potential in the high 40's to the 80 percent ranges by commodity (ITC 2018b).

90. **Overall, both domestic and regional trends in overall economic growth in the last year have been very positive for Uganda after a difficult period in 2016.** Growth in all of Sub-Saharan Africa is estimated to have rebounded to 2.4 percent in 2017, after slowing sharply to 1.3 percent in 2016, because commodity prices recovered, global financing conditions remained favorable, and slowing inflation lifted household demand (World Bank 2018a). This trend has been especially pronounced in Uganda, where real GDP growth was estimated at 2.5% in CY 2016, but is likely to be more than twice as much in CY 2017 when Q4 data are in, and to be well above 5 % p.a. in the next two calendar years (World Bank 2018b). In contrast, Uganda's neighbors (Kenya, Ethiopia, Rwanda, and Tanzania) are projected to have real GDP growth rates ranging from 5 to 8 % p.a. in 2017 when the numbers are all available, well above the figures for all of Sub-Saharan Africa. These rates are likely at least twice as high as what can be expected in the industrialized countries of Europe and North America that traditionally were the sought-after outlets for Uganda's traditional agricultural exports (Ibid.). Furthermore, the income elasticities of demand for higher priced and more processed foods and beverages are much larger in East Africa than in the OECD, as the dietary transition is only just beginning to get underway in Africa. This illustrates the stakes Ugandan agriculture has in contesting regional and other emerging country markets for agricultural products that increase in demand with income.

91. **Regional trade, particularly the trade of agricultural commodities, has the potential to stimulate growth and to improve the living conditions of the many people employed in the agricultural sector.** At the same time, net buyers of food in Uganda, who are mainly residents of urban areas, may lose out as consumers of higher value food items that are increasingly exported, at least in the short term, due to domestic price increases (World Bank 2013). The balance of overall costs and benefits is expected to be positive for Uganda. However, there will most likely be adjustment costs for some, at least initially. Over time the added national income going to rural producers and urban processors and shippers will generate growth that adds broadly to income opportunities. This means that it is vital to engage in dialogue with all relevant actors in Uganda, for which the recently revived public- private dialogue mechanism offers an appropriate framework.

While oil production has the potential to boost overall growth, a key risk is that it could damage agricultural production and exports due to an appreciating exchange rate.

92. **Another important structural factor for the future that could affect agricultural trade competitiveness is the beginning of oil production, and its repercussions for agriculture.** While oil production has the potential to boost overall growth, a key risk is that it could damage agricultural production and exports due to an appreciating exchange rate (World Bank 2015a). Food imports could become cheaper and exports become less competitive. An indirect negative effect could occur

through a deterioration of governance. Exploration activities have been intensifying since the early 2000s and major discoveries were made since 2006. Following the decline in global oil prices since 2014, development plans were delayed. As of mid-2017, oil production and exports are expected to commence in 2020.

93. **Natural resource booms harbor significant risks of deteriorating governance and increased focus on the distribution of the expanding rents becoming available and policy neglect of agriculture.** This has sadly been true in several other petroleum exporting countries in the region (Bates 2014). While coffee and other agricultural exports are currently critical to Uganda for generating foreign exchange, exporting oil could rapidly overtake the importance of such exports, and correspondingly reduce attention by policy makers. On the positive side, oil production and exports should increase the Government's fiscal space which could be used to boost agricultural productivity and performance.



III.

Institutional Developments Shaping Ugandan Agri-Food Production

- Institutional weaknesses and a lack of coordination among agriculture-related ministries and agencies have been an important bottleneck for translating policy plans into effective action.
- The extension system has steadily moved away from its core function in terms of knowledge transfer and has increasingly taken the role of distributing free or highly subsidized agricultural inputs, sometimes of low quality.
- While Uganda's agricultural research spending has in recent years been among the highest in the region, and research capacity within higher education has increased, it has been very dependent on development partners that are scaling back support.
- Alongside private sector processors and large-scale commercial farms, farmer cooperatives have the potential to aggregate the output of a multitude of smallholders and to foster commercialization. Their development has however been limited to date.

Diffusion of institutional responsibilities

"Fiscal allocations as well as sub-national capacities and other factors have restrained development and service delivery results.

94. **Uganda combines decentralization with strong political control from the center.**[4] Service delivery responsibilities have been devolved through a decentralization process in progress since the 1990s. However, fiscal allocations as well as sub-national capacities and other factors such as the continuous increase in the number of districts and associated administrative overhead costs have restrained development and service delivery results (e.g. Lambright 2010, Maractho 2017). Furthermore, central political influence over sub-national level and units continues to be an important aspect (Ssemogerere 2011).

95. **Institutional weaknesses among the set of responsible ministries and agencies have been an important bottleneck for translating policy plans into effective actions.** The main national level institution is the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF), including its main directorates and departments. Several assessments of MAAIF and reform proposals have been developed since 2001, but have largely not been implemented (see Box 2). The ministry has come to be seen by development partners as not very interested in internal reforms or in moving the sector forward. At the same time, it is perceived as being fragmented as a result of numerous development projects being pursued without effective coordination (Joughin and Adupa 2017).

[4] This and other governance-related sections of the present paper draw heavily from Joughin and Adupa (2017), which was funded through the present study.

BOX 2: PROPOSALS TO REFORM MAAIF GOING BACK TO 2001

2001: Reform proposals at MAAIF go back to the Plan for Modernization of Agriculture (PMA) and the "Core Functional Analysis" (CFA) of MAAIF undertaken in 2001. This identified three priorities: policy and planning, regulatory services, and agricultural promotion services. It proposed a structure aligned to these priorities. It was not implemented, reportedly "because of lack of consensus within MAAIF and other key ministries" (Agricultural Sector Development Strategy and Investment Plan (DSIP), 2010).

2002: A Reorganization of MAAIF study followed on and included additional proposals for re-organization and emphasis on Results Oriented Management (ROM) and Output Oriented Budgeting (OOB); this was not implemented. However, PMA led to the splitting away of the extension function of MAAIF to the National Agricultural Advisory Services Organization (NAADS), a semi-autonomous agency under MAAIF.

2009: A MAAIF Restructuring Report was undertaken as part of the DSIP approval process. In dialogue with MoPS, a further study (the Review of the MAAIF Restructuring and Reform Process--MRR) was undertaken and the conclusions presented in the published DSIP (2010). This advocated a four Directorate structure, with two new Directorates being created. One of the proposed new Directorates was Planning and Policy. The proposals were approved by MAAIF senior management team (with support from development partners) and Cabinet in March 2010, along with a plan for how to transition to the new structure. This was likely the closest MAAIF got to actual reform, but was not implemented.

2011: MAAIF commissioned another consultancy to review institutional linkages "and make proposals for facilitating effective cooperation and collaboration in the implementation of the DSIP between MAAIF, the sector agencies, local government authorities and other key stakeholders". The main findings of the report were that there was no single or common institutional and regulatory framework and this detracted from achieving coordinated DSIP implementation; there was no specific outcome.

2012: MoPS initiated a Functional Review of MAAIF by Adam Smith International, "to consolidate past public service reform initiatives dating back to early 1990s". The report proposed similar but modified structures to the MRR described above. The report affirmed the necessity for a directorate of crop, animal resources, fisheries and agriculture support services. It however recommended the creation of an additional directorate of Regulatory and Quality Assurance Services to bring together the regulatory services that are "scattered" in different departments and to promote economies of scale and interdependencies; not implemented.

2013: Launch of the National Agricultural Policy; but no mention of MAAIF reform in the document.

2015 to present: A Directorate of Extension was created (again) in MAAIF in 2015, possibly in response to sensitivities emerging around the creation of NAADS as an agency largely independent of MAAIF under PMA. Under the Agriculture Cluster Development Project funded by the World Bank, there is IDA financing of US$15 million for a component on Project Management and Capacity Building for Policy, Regulatory, and ICT functions of MAAIF. The component is targeted at strengthening MAAIF's effectiveness in assessing policy and regulations affecting agricultural input and output markets, and developing and implementing an ICT-based Agricultural Information Platform. There is presently associated discussion within the Government and stakeholders to: (a) update the 2006 Seed Act and associated regulations to make them consistent with the East African Community (EAC) harmonization protocols; (b) develop plant variety protection laws and regulations to promote private investment in genetic improvement; and (c) develop plans for strengthening the inspectorate division of MAAIF to effectively implement the revised seed law and regulations.

96. **Further relevant institutions under MAAIF include: the network of research institutes (NARO/NARS), the National Seed Certification Service, regulatory bodies for three main commodities – coffee, cotton, and dairy – and the National Animal Genetic Resources Centre.** Other agriculture-related institutions include the Parliamentary Committee on Agriculture, as well as development partners engaged in the sector, and structures established for aid coordination – such as sector working groups and a Joint Agricultural Sector Annual Review process; and finally, 'commodity platforms' for seeds, maize and oilseeds established in recent years. The latter are a consultation mechanism for stakeholders along the value chains of these commodities, called for in the DSIP and ASSP, and supported by development partners engaged in the sector such as USAID and the World Bank.

97. **Moreover, there are challenges concerning decision-making and implementation both within MAAIF structures and at the interfaces between MAAIF and other institutions.** A first aspect is that the Ministry, while having a central role, is neither the main decider on policies, nor is it the sole implementer. Important policy, as well as other ad hoc decisions are made by the State House, i.e. the Presidency (Joughin and Adupa 2017). Attached to the Presidency are several sector advisers. Secondly, an important part of implementation was set up as a semi-autonomous agency when the National Agricultural Advisory Services (NAADS) system was first established as the provider of extension services in 2002. Currently, just under half of all spending on the agricultural sector goes to NAADS (see the Policies and Public Finance Section). Third, an important agency under MAAIF is the National Seed Certification Service (NSCS), which in principle is responsible for licensing and controlling the availability of genuine improved seeds.

98. **However, as discussed below, the NSCS has struggled to fulfil this role effectively, especially in terms of controlling the presence of fake improved seeds.** Weak data collection and associated weak monitoring and evaluation are a further important institutional weakness, involving the interface between MAAIF and Uganda's Bureau of Statistics (UBOS). Further challenges include coordination problems between MAAIF and MAAIF subordinated structures and other relevant ministries, such as: Office of the Prime Minister; the Ministry of Water and Environment (responsible for irrigation); the Ministry of Land, Urban Development and Housing; the Ministry of Trade, Industry and Cooperatives and others.

99. **Further important institutional aspects and constraints concern other ministries, as well as subnational governments.** Ministries for water, roads and transport, and for lands all affect specific aspects that matter for agricultural performance. With regards to sub-national governments, Uganda has pursued extensive decentralization, and decentralized governments have had or currently have responsibilities related to agricultural extension, land management, as well as support (or hindrance) of farmers' groups. While decentralization has progressed, the number of sub-national entities has continuously increased. Some of the institutions that are meant to exist at sub-national levels have either not been established, or have had insufficient funding. This was for example the case when extension services were meant to be run by local councils.

The agricultural R & D system

100. **Agricultural R & D in Uganda under the National Agricultural Research Organization (NARO) has had a re-birth after falling by the wayside in the years leading up to the 2008 global food price crisis.**[5] In 2014, annual research spending by NARO at US$ 152.5 million (2011 constant PPP$) was mid-way between the regional leader (Kenya at US$ 274.1 million) and laggard (Rwanda at US$ 39.6 million) (Beintema et al. 2016). At 1 % of agricultural GDP, Uganda's agricultural research spending was the highest amongst its neighbors in 2014 and had reached the level recommended by the African Union and United Nations. This level of spending was three times higher in inflation-adjusted terms than it was in 2000 (Ibid.).

101. **Increased development partner funding to NARO has had a role in NARO's growth. NARO released a total of 198 technologies, innovations and management practices (or "TIMPS") under the Agricultural Technology and Agribusiness Advisory Services (ATAAS) project funded by the World Bank between 2013 and 2017 based on an ATAAS project implementation status assessment of December 2017.**[6] Development partner support amounted to just under two-thirds of total NARO spending in 2014, making the organization vulnerable to any variation in development partner support. Under the World Bank's Eastern Africa Agricultural Productivity Project (EAAPP), Uganda was selected as home to the sub-region's center of excellence in cassava research, receiving a US$30 million loan under Phase I, the majority of which was allocated to technology generation, researcher training, and the rehabilitation of NARO's cassava research facilities. Phase I was completed in 2015, and a successor project is planned for 2018. NARO also received funding from a wide range of development partners, enabling improvements in infrastructure and investment in high-quality equipment (Beintema et al. 2016).

102. **Capacity strengthening has been taking place at NARO.** In addition, through the EAAPP and the World Bank project 'Agricultural Technology and Agribusiness Advisory Services' (ATAAS), 42 researchers received, or are currently undertaking, MSc- and PhD-level training in Uganda or abroad (31 and 11 researchers, respectively). With these

[5] Insights on the agricultural innovation system presented in this section draw heavily on IFPRI/ASTI (2016).
[6] The component in question of ATAAS was costed at US$43 million effective CY 2012 to 2017. See the ATAAS Implementation Status Report of December 2017, available at: http://documents.worldbank.org/curated/en/227681514424909847/pdf/Disclosable-Version-of-the-ISR-Agricultural-Technology-and-Agribusiness-Advisory-Services-P109224-Sequence-No-14.pdf

and other improvements, NARO can now provide a more competitive and incentive-driven working environment (Ibid.).

103. **New universities have been established.** Rising demand for higher education has prompted a significant increase in the number of (mainly private) universities in Uganda since the 1990s, although only a minority offer agricultural programs. Those that do include four public universities (Makerere University being one), four private universities, two colleges, and one training institute. The establishment of these entities from the late 1990s has resulted in increased research capacity within the higher education sector (Ibid.).

Extension, NAADS, and OWC

104. **The organization (and re-organization) of the extension services has been at the center of public sector agricultural interventions in Uganda, and has become increasingly politicized over time.** In the 1990s, the government established an agricultural extension service directly under the Ministry of Agriculture, supported by a World Bank project since 1993. However, as part of the decentralization reforms, it was decided that MAAIF should no longer have a direct implementing responsibility and focus instead on a policy and regulatory role. As part of this change, MAAIF's staff was reduced by 80 per cent. Inevitably, such a radical reduction in staff was considered disruptive by those working in the Ministry (Joughin and Adupa 2017).

105. **Extension services were then provided by the National Agricultural Advisory Service (NAADS), with a secretariat separate from the Ministry.** NAADS management is physically located in Kampala, while the Ministry remains located in Entebbe. Whereas the previous extension service had been conceived as a public service, the extension service as delivered through NAADS was contracted out and expected to be more demand-driven. Initially limited to pilot districts and expected to roll out gradually, in the run-up to the 2006 elections it was decided that extension services must cover the entire country, as part of the campaign pledge of the ruling party (National Resistance Movement) of bringing 'Prosperity for All'. Subsequently, and contrary to the original design, Government decided to add the distribution of state subsidized inputs to the tasks of NAADS. This component rapidly increased in terms of resources allocated. In parallel, the NAADS secretariat remained unpopular with the Ministry, which felt that it had lost control over important business (ibid.). MAAIF proposed to re-integrate this responsibility as a line department during 2013 discussions as part of a next generation of external support to extension services.

106. **Then, in mid-2014, the executive announced that NAADS coordinators would be dismissed and that instead, the military would take on the responsibility to distribute subsidized inputs under the banner of 'Operation Wealth Creation' (OWC)**[7]. This represented a further step in changing the role of the extension services – by combining an appeal to rural voters with offering a new role and associated opportunities to the military. As of 2017, the NAADS secretariat is limited to a smaller core staff whose main task is to support management of the agricultural input distribution chains (largely through input procurement) plus strategic interventions for vale chain development. A MAAIF Directorate for Extension was re-created – with a new National Agricultural Extension Policy (2016) and strategy – and is hiring extension workers at the local government level. Some of the impacts of OWC, especially on the availability and use of quality seeds, are discussed further below.

107. **The situation was further aggravated by the procurement practices for seed, which have undermined private sector seed production and reduced seed quality.** Seeds and seedlings were centrally purchased for OWC on a large scale: 4.5 million kilos of maize seeds and 61 million coffee seedlings. Several interlocutors interviewed in 2017 (Joughin and Adupa 2017) raised the issue that these large-scale purchases of low quality seeds with public money were at above-market prices. At the same time, with free seeds being available to many smaller scale farmers, seed companies seeking to produce quality seeds for private sale to farmers have seen their market share and their ability to expand negatively affected. The cost of the 'OWC distortion' and of distorting public seed interventions generally are substantial, and have generated increasing public concern since publicly-distributed seeds often seem to have been of low quality. The cost of OWC input purchases and distribution is borne by all taxpayers in the country, including any cost of excessive payments if this was the case. Moreover, as suggested by a Ugandan Parliamentary hearing held in May 2017, some small farmers who relied on the free inputs distributed have faced large-scale failures of seeds and seedlings (Ibid.).

[7] The component in question of ATAAS was costed at US$43 million effective CY 2012 to 2017. See the ATAAS Implementation Status Report of December 2017, available at: http://documents.worldbank.org/curated/en/227681514424909847/pdf/Disclosable-Version-of-the-ISR-Agricultural-Technology-and-Agribusiness-Advisory-Services-P109224-Sequence-No-14.pdf

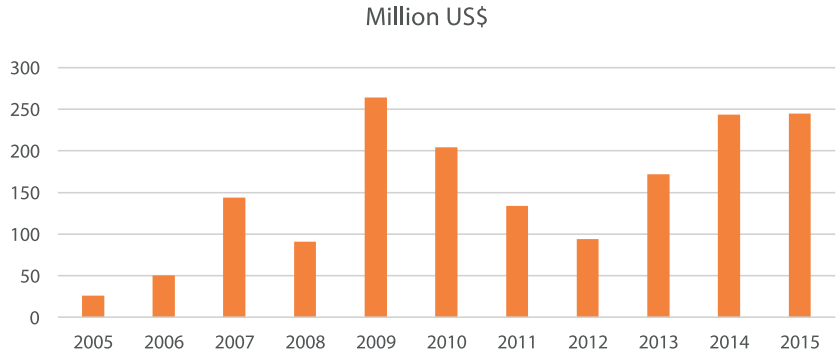
Farm groups, traders, and development partners

108. **Beyond the set of institutions and individuals involved in running them, a range of other stakeholders shape the sector, most notably individual farmers, farmers' associations or cooperatives, and traders involved in supplying inputs and marketing of outputs.** As noted above, the vast majority of farmers in Uganda remain small in scale. Larger farmers are mainly engaged in coffee and tea, as well as increasingly in sugarcane, maize, and palm oil. Like other countries, Uganda has a National Farmers' Federation (UNFF), which is, however, not seen as very effective in representing the interests of smallholders.

109. **In principle, farmers' groups and cooperatives have an important role to play, but their actual development has been limited, in part due to Government concern about possible political motives in rural organizations presented as being economic actors.** One of the key challenges of having myriad small farmers is how to organize access to markets for inputs and outputs, and associations can play a role in addressing this. Despite their potentially important role, cooperatives were sidelined in the 1990s and 2000s, arguably out of fear that organized farmers would exert greater political influence on issues other than agriculture. Accordingly, the Uganda Cooperative Alliance (existing since the 1960s) remained rather inactive, despite some support by development partners. More recently, this situation is beginning to change, with currently around 10,000 cooperatives being registered, and agricultural cooperatives being formed in various regions and for various products (e.g. Ankole Coffee Producers Cooperative Union, Mt Rwenzori Coffee Farmers' Cooperative Union, Doho Cooperative for rice, and others in the maize, sorghum, livestock, dairy, beef, and beans areas). One group of cooperatives are Savings and Credit Cooperative Organizations (SACCO) which constitute 23 per cent of all cooperatives. These are groupings for financial support and not explicitly for investment in agriculture.

110. **On the trading side, there are around 30 to 40 larger companies involved in importing and wholesaling agricultural inputs, and hundreds of small traders who re-sell to individual farmers** (1,992 agro-input dealers according to a 2008 census). The Uganda National Agro-Input Dealers Association (UNADA) has 1,300 members, including 48 larger scale ones. A further important stakeholder are seed traders, organized in the Uganda Seed Trade Association (USTA), with 18 ordinary members. As is discussed further below, ensuring the quality of traded seeds, fertilizers and other inputs is a key bottleneck for increasing sector performance.

FIGURE 3: ODA COMMITMENTS FOR UGANDA'S AGRICULTURAL SECTOR, 2005-2015



Source: OECD Query Wizard for International Development (QWIDS)

111. **In addition, the recently established large-scale commercial farms mentioned above, especially in Northern Uganda, are typically developed by foreign investors, while farms of 10-200 ha are being developed by domestic investors.** These domestic commercial farms mostly came into being in the past decade, and did so quite rapidly once the business case became clear. The business case was clearly helped by a long-term bump up in domestic food prices in 2008. At least some of the clarity came from the relatively recent development of a highly reliable market in the form of large annual procurement from the World Food Program, regularly funded from external sources.

112. **Along with relatively high national policy attention accorded to the sector, engagement by development partners has also been substantial.** Between 2005 and 2015, development partners captured by OECD databases contributed US$1.7bn to the agricultural sector, and nearly US$200m per year since 2009 (Figure 3).



IV.

Commercialization of Ugandan Agriculture in Response to Rising Demand

- Income growth and urbanization lead to high domestic demand for food in Uganda, including higher value, higher quality, and more processed products.
- Similar trends are at work throughout the broader region. Rising regional demand for value-added food offer massive opportunities for Ugandan farmers, for value chains beyond farm production, and for better jobs in agriculture.
- While finance is central to commercialization, financial inclusion of smallholders has remained limited. Mobile money transfers, value-chain financing, and warehouse receipt systems (WRS) are promising approaches to increase farmers' access to finance.
- Plot sizes, absence of documentation or absence of consensus on rights, and limited tenure security are critical bottlenecks hampering finance, agribusiness development, and commercialization. Several land registration and administration initiatives are underway to foster tenure security and ultimately agriculture development.
- Low technology adoption levels are also in part explained by weak regulatory measures and poor-quality control systems. Best-practice plant protection measures and input registration procedures are not used. Improvements in regulatory enforcement, input registration and quality control would help foster agribusiness development.
- Smallholders producing higher-value, quality-sensitive, or perishable commodities often suffer from a low ability to brand and market their products. Vertical coordination between smallholders and formal sector aggregators can help to overcome high transaction costs and to foster value addition.
- Several private business models along different agriculture value chains in Uganda have been shown to successfully link smallholders to international market opportunities for value-added products; to improve their incomes, capacities, and productivity; and to foster their adaptive capacity to climate and market-related risks and shocks.
- Information and communications technologies (ICTs) involving cell phones and tablets are particularly relevant for enhanced productivity and resilience, for market access, and for financial inclusion of smallholders, as well as for data collection and monitoring. ICT-based startups and app developers can be supported through better property rights protection, access to finance, and low-cost, speedy and reliable internet connection.

Consumer demand for food in East Africa is rising rapidly and changing in nature

113. **In stark opposition to the supply-side constraints to agricultural productivity and resilience outlined in the previous section, demand-side opportunities for agriculture and food in Uganda and its neighbors are the strongest they have ever been.** This demand is both domestic and regional. Domestically, it is certainly pushed by the high population and urbanization rates discussed above. It is also promoted by urban income growth that is leading to a rapidly expanding middle class. Similar processes are occurring in most countries in the region (Tschirley et al. 2015b). Table 6 cites results from analysis of the 2013 household panels for rural and urban areas in Uganda in 2012/13 to show the responsiveness of household consumption patterns to income growth, proxied as changes in total expenditures across households (Boysen 2016). As expected, the results show that income responses are higher for the poorest quintile of households than for the richest, and on average are higher in rural areas than urban ones. However, it is striking how high (>1 or elastic) mean urban consumption responses with respect to income are in both urban and rural areas with respect to meat, fish, milk and fruits. Demand for these items will likely continue to grow more quickly than income, and that growth will be widespread in both rural and urban areas.

In stark opposition to the supply-side constraints to agricultural productivity and resilience outlined in the previous section, demand-side opportunities for agriculture and food in Uganda and its neighbors are the strongest they have ever been.

TABLE 6. DEMAND (CONSUMPTION EXPENDITURE) RESPONSE TO A ONE PERCENT INCREASE IN HOUSEHOLD INCOME (TOTAL EXPENDITURE) IN UGANDA FOR RURAL AND URBAN AREAS IN 2012/13

	Rural				Urban			
	Mean Rural	Lowest Quintile	Middle Quintile	Highest Quintile	Mean Urban	Lowest Quintile	Middle Quintile	Highest Quintile
Maize	1.01	1.42	1.05	0.76	0.60	0.81	0.63	0.33
Cereals	0.95	1.37	1.01	0.59	0.49	0.69	0.52	0.34
Potatoes	1.03	1.83	1.08	0.63	0.67	0.85	0.70	0.40
Cassava	0.55	0.86	0.59	0.13*	0.58	0.65	0.58	0.45*
Matooke	1.53	2.86	1.62	0.91	0.95	1.73*	0.95	0.61
Vegetables	0.05^{ns}	0.37	0.05^{ns}	-0.24^{ns}	0.33	0.52	0.34	0.16
Fruits	1.24	1.71	1.28	0.95	0.97	1.16	1.00	0.77
Meat	1.92	2.83	2.05	1.43	1.37	2.36	1.47	0.89
Fish	1.62	2.22	1.69	1.23	1.25	1.75	1.30	0.90
Legumes	0.66	0.80	0.67	0.61	0.51	0.70	0.53	0.26
Milk	1.55	2.28	1.64	1.11	1.02	1.78	1.07	0.61
Fats	0.77	1.18	0.82	0.52	0.53	0.87	0.58	0.27
Sugar	1.17	1.97	1.24	0.81	0.63	0.88	0.65	0.48
Other	1.08	0.87	1.10	1.05	1.32	1.18	1.38	0.97

Source: Boysen, O. (2016). "Food demand characteristics in Uganda: estimation and policy relevance", *South African Journal of Economics* (84) 2, June. 260-293.

Notes: The table shows unconditional household expenditure responses in response to an increase in household total expenditures, proxying income response elasticities. Data are from the Ugandan National Household Survey 2012/13, a nationally representative sample of 6,887 households. Estimation is from a state-of-the-art two step procedure that factors a large number of household characteristics into the estimation, in addition to total and commodity-specific expenditures and prices. Quintiles refer to 20% segments of the income distribution as proxied by household quintiles with respect to total expenditures. All parameters are statistically significant at 1% unless indicated as follows: *signifies significant at 5%, "ns" conveys that the parameter is not statistically different from zero at 10% confidence.

114. **This evidence is consistent with the view that Uganda is entering into the dietary transition towards higher priced animal-sourced calories as incomes increase, that these changes are widespread across both urban and rural areas, and even across income groups.** The associated demand increases are likely to persist for the foreseeable future. Similar trends have been observed in neighboring countries. In Rwanda for example, similar household expenditure elasticities for meat, poultry, and eggs were recently found to range from 1.13 to 1.71 across rural and urban areas of different types (Diao et al. 2017). This suggests that countries such as Uganda with considerable livestock resources and potential have marked and growing regional trade opportunities in these commodities, assuming that domestic demand can be met and production costs be kept competitive.

Contrary to the norm for wealthy countries, demand for carbohydrates continues to increase in tandem with income in rural Uganda, and much faster than income for the poorest quintile of the income distribution.

115. **The high (>1) mean consumption elasticities in rural areas for matooke (plantain), sugar, potatoes, and maize are also striking.** Contrary to the norm for wealthy countries, demand for carbohydrates continues to increase in tandem with income in rural Uganda, and much faster than income for the poorest quintile of the income distribution. This is consistent with the view that household consumption of even the most basic starchy food staples is still constrained by low incomes in rural areas. For the lowest quintile of the income distribution, it seems likely (although this data cannot show) that per capita household consumption of basic staples is inadequate to begin with, and that this is one of the first things households deal with when they receive extra income.

116. **Income growth and urbanization are also driving changes in the quality of products required and in wholesale and retail market structures.** Kampala has already begun to experience the "Supermarket Revolution". Events in neighboring countries such as Kenya, Rwanda and Tanzania suggest that this will continue to develop in Uganda in the next decade and to spread widely to secondary and even tertiary towns, even as it continues to spread throughout the rest of East and Southern Africa. Supermarket procurement systems involve purchase consolidation, a shift to specialized wholesalers, and tough quality and safety standards. To meet these requirements, producers need to invest and adopt new practices. This is hardest for small producers, who risk exclusion from dynamic urban markets increasingly dominated by supermarkets. Smallholders will need to address these difficulties through collective action (Weatherspoon and Reardon, 2003; Jaffee et al. 2011). The rise of supermarket procurement in Uganda is likely to further specialization and regional trade, as supermarket chains will seek to source products in least-cost countries in the region.

117. **Urban and rural income elasticities for formally processed (manufactured) foods are also impressive: urban income growth favors growth of formal food processing and packaging.** Results are broadly as expected from work in other countries with income levels similar to Uganda. Research using household data in 5 countries of East and Southern Africa estimates for instance that demand for processed foods in urban areas will increase by a factor of 8 over the next three decades (Tschirley et al. 2015b). These patterns augur well for value-addition strategies based both on diversifying production patterns into higher valued commodities such as animal and horticultural products, and through processing of cereals and other starches into products more convenient to use and of more consistent quality. They also illustrate the value regionally of being the first player to cut unit costs of production.

118. **The trends in demand for processed foods in recent years can be seen in Table 7.** Several striking results emerge here. First, food and drink processing represent 56.8% of all manufacturing value added in Uganda in the 2011/12 to 2015/16 period. Less than 16% of total manufacturing value added came from traditional coffee and tea; if processing of the other main traditional export crops (cotton ginning and textiles) were added (not shown) this would rise to about 19%. This illustrates that the contribution of agriculture to manufacturing value added is not driven by the traditional export crops, but by domestic demand for processed food and drink.

TABLE 7: CHANGES IN REAL VALUE ADDED OF FOOD AND DRINK PROCESSING IN UGANDA 2011/12 TO 2015/16

Item	Weight in total manufacturing value added over period	2011/12 (2002 = 100)	2015/16 (2002 = 100)	Average annual % compound growth over 2002 to 2011/2012 period	Average annual % compound growth over 2011/2012 to 2015/2016 period
All food and drink processing[1]	56.8%	176	218	6.5%	5.5%
Sugar processing	13.9%	124	216	2.4%	14.9%
Beer	9.9%	282	216	12.2%	-6.5%
Coffee processing	8.9%	84	112	-1.9%	7.5%
Soft drinks and bottled water	6.9%	362	509	15.3%	9.0%
Tea processing	6.8%	122	131	2.2%	1.8%
Edible oils and fats	4.2%	275	349	11.9%	6.1%
Total manufacturing all sectors	100%	186	224	7.1%	4.8%

Source: Calculated from data in UBOS Statistical Abstract 2017

Note: (1) Weighted index that excludes tobacco. The sub-categories below this are the main sub-components in terms of weight of this entry. Only sub-categories that had a weight of at least 4% of total manufacturing are shown here.

119. **Food and drink processing value added grew from 2002 to 2011 at a slightly lower rate (by about 0.6% p.a. less) compared to overall manufacturing value added, but about 0.7% p.a. faster from 2012 to 2016,** as shown by the index numbers in Table 7. The change is due to the fact that whereas both overall manufacturing growth and food processing growth fell a bit in the later period compared to the earlier one, overall manufacturing growth fell more in relative terms. If the more recent trends continue, the weight of food and drink processing in total manufacturing will continue to grow, as it has since at least 2011.

120. **Finally, the stars of processing value-added in the food and drink sector in the 2002 to 2011 period were beer, soft drinks and bottled water, and edible oils.** Since 2011, beer has fallen off into negative growth, sugar processing has come into its own (almost 15% growth per annum), soft drinks and bottled water have continued to be strong growers (9% per annum growth), as has processing of edible oils (6.1% annual growth). And coffee processing has also made a growing contribution to manufacturing value added in the later period (7.5% p.a.), compared to negative growth in the earlier period. Sugar, soft drinks, coffee, and edible oils appear to be the most likely candidates presently for increased private investment, to the extent that supply response continues to follow apparent demand trends.

Regional and global demand shifts are creating opportunities

121. **As suggested by Uganda and Rwanda, rising regional demand for food and dietary shifts into higher value and more processed foods offer massive opportunities for Ugandan farmers and for Ugandan value chains beyond farm production.** Unlike domestic demand, which will always be constrained by the relatively small size of domestic markets, regional and global demands are huge and growing. Africa's demand for food is projected to more than double by 2050, driven by population growth, rising incomes, rapid urbanization, and more open intra-regional trade policies. The value of the African food market is predicted to rise to US$ 1 trillion by 2030, from US$ 300 billion currently, with rapid growth of both the

"Africa's demand for food is projected to more than double by 2050, driven by population growth, rising incomes, rapid urbanization, and more open intra-regional trade policies.

urban and rural middle class (AGRA 2017). Diets increasingly move away from cereal and tuber staples towards greater consumption of animal protein, fruits and vegetables (ibid.).

122. **Uganda has subscribed to a growing number of regional treatises and commitments concerning agriculture.** Regional treatises and commitments include those linked to the EAC and to the Common Market for Eastern and Southern Africa (COMESA): the East African Common Market Protocol (CMP) 2010; the East African Community's Agriculture and Rural Development Strategy (2005-2030), and the COMESA Seed Harmonization Implementation Plan (COMSHIP), which was validated by COMESA Member States in 2014. These regional commitments reflect the fact that agriculture has become a priority among many African countries. However, the implementation of such regional commitments tends to lag among most members.

123. **Current trade patterns as examined in detail above underline the current expansion of regional agricultural trade.** The examination of agricultural incentives that will be undertaken in the policy section below will show Uganda's as yet unused potential for further expansion of regional agricultural trade. Uganda benefits from both a very favorable resource endowment and a terrific location for meeting the rapidly expanding demand of inland neighbors like South Sudan and DRC. Uganda is especially well placed for meeting rapidly rising regional demands for processed foods, maize, dairy, fish, and animal products.

Commercialization through agribusiness

124. **Faced with these opportunities, agricultural commercialization has become the centerpiece of Ugandan development strategy in recent years.** Agricultural commercialization is attained when households separate production and consumption decisions, and participate in the markets for both staple and industrial products to maximize their profits (Jaleta et al. 2009). Both the new National Development Plan II and the Development Strategy and Investment Priorities for the Agriculture Sector emphasize the need to break the vicious cycle of subsistence farming and low productivity, and promote greater market participation by farmers.

125. **Agriculture in Uganda is no longer synonymous with farming, but includes rapidly expanding and lengthening value chains.** Some 40-70% of food costs to urban Africans are now incurred in the post-farm gate segments of the supply chain, such as processing, wholesale, transport, wholesale, and retail (AGRA 2017). Large numbers of SMEs invest in agriculture value chains, but also larger African and foreign firms. Private agro-dealers have expanded into the marketing of modern farm inputs like seeds, fertilizers, veterinary medicines, and agricultural machines. An inclusive agricultural transformation calls for efforts to promote SMEs and larger agribusinesses all along the value chain as an integral part of the development agenda. The public role is in overseeing truth-in-labeling to deal with adulterated inputs and outputs, including food safety issues.

126. **Fostering agribusiness development could not only increase farm productivity, but also create better job opportunities for the predominantly young African population further along supply chains.** Dietary change is driving structural changes in labor demand, a critical issue in current African policy debates given that over 700 million youth are predicted to enter the labor market over the next three decades (AGRA 2017). Yeboah and Jayne (2016) estimate that about 60% of the agricultural labor force in Africa is already between 15 and 35 years of age, and the share of this age group is rapidly growing. An analysis of six Sub-Sahara African countries showed that transforming their food systems could add more jobs than the rest of the economy between 2010 and 2025 (Townsend et al. 2017). Tschirley et al. (2015a) found that already in 2010, the number of jobs in agribusiness amounted to 10% of the number of jobs in agriculture. Labor productivity in agribusiness was up to seven times higher than in agriculture, depending on the type of activity. Context-specific agribusiness development should thus be leveraged to foster youth employment.

> *About **60%** of the agricultural labor force in Africa is already between 15 and 35 years of age, and the share of this age group is rapidly growing.*

127. **The private sector can help foster the access of smallholders to finance, as well as to information about land use practices, climate-related risks, and market prices.** While the financial inclusion of Ugandans in general has improved markedly over the past years, agriculture-related finance has remained low. Access to finance is critical for smallholders, however, to invest in better farming equipment and practices, but also to improve their livelihoods more generally. Savings and credit cooperatives (SACCOs) that serve their members—often smallholders - need to be included in the legal banking framework and supervision mechanisms (Nivievskyi et al. 2010).

Private investment and agricultural finance

128. **Finance is central to commercialization, but financial institutions in Africa are often reluctant to finance agriculture.** This is due to: lack of usable collateral, high transaction costs due to the remoteness of the clients, dispersed demand for financial services, the lag between investment needs and expected revenues, lack of irrigation, recurrent incidences of pests and diseases, small size of farms and of individual transactions, underdeveloped communication and transportation infrastructure, and high covariant risks due to variable rainfall and price risks. Other challenges include poorly developed agri-food value chains which significantly increase risks and exposure for banks, and the added transaction cost associated with physical absence of banking facilities in rural areas (World Bank 2007; World Bank 2015).

129. **Overall, Uganda has had remarkable improvement in financial inclusion, from 70% in 2009 to 85% in 2013, but agriculture is only a small share** (FinScope, 2013). The combined exposure of financial institutions in Uganda increased from UGX 626 billion in 2001 (US$ 361 million) to UGX 8,618 billion in 2013 (US$ 3,329 million)[8] (Bank of Uganda, 2015). This implies a real increase in 2013 compared to 2001 in US$ terms of nearly a factor of seven. [9]Agricultural finance represented only 8.4 percent of commercial bank lending in 2013 (up from 7.1% in 2011) (Bank of Uganda, 2015). And commercial banks provided

*Uganda has had remarkable improvement in financial inclusion, from **70% in 2009** to **85% in 2013,** but agriculture is only a small share.*

95% of all agricultural finance in Uganda in 2013 (World Bank 2015). Since the 2008 food crisis, formal financing for marketing has tended to grow more quickly than for production or processing; however, production loans more than doubled in 2013 and processing loans in 2014. As of 2014, formal loans for production, processing and marketing accounted for about one third each of agricultural finance (Bank of Uganda 2015). This is unusual in East Africa, where the production share (but not amount) of formal sector agricultural finance has tended to lessen over time due to the rise of agribusiness post-harvest value chain lending (Meyer 2015; World Bank 2016b), and in the Ugandan case may be explained by the surge of new commercial production of maize in the North after the peace agreement.

130. **The role of non-bank formal financial services increased from 7% in 2009 to 34% by 2013, mainly through the use of mobile money transfers.** FinScope (2013) reports that rural residents by virtue of their remoteness from formal financial institutions are twice as less likely to access finance from such institutions than their urban counterparts (17% compared to 36%), and hence mostly rely on informal institutions (%) and non-bank formal institutions (32%). The financing gap in agriculture can be closed by exploring various options including credit guarantees, interlocked markets for finance, and warehouse receipts systems.

131. **Impact investment funds are a relatively new entrant to financing agriculture in Uganda.** As of mid-2015, impact investors (mainly foreign) had financed 40 deals in agriculture in Uganda worth US$60 million (Box 3). Although the amount is small in the scheme of things, it represents a promising tool for expanding agricultural lending going forward.

[8] All values are in nominal terms; UGX to US$ annual exchange rates are median rates found at: https://www.facebook.com/notes/kampala-express/median-exchange-rate-of-uganda-shilling-to-us-dollar-1998-2016/840793532717628/
[9] For simplicity, using the U.S. Bureau of Labor Statistics Consumer Price deflator.

BOX 3: IMPACT INVESTING IN UGANDAN AGRICULTURE

Impact investment capital (IIC) is typically seen as distinct from Direct Foreign Investment (DFI). In Uganda, DFI overwhelmingly involves oil and gas exploration and has exceeded US$1 billion per annum since 2012. By comparison, IIC, which also comes largely from external sources, is more modest. In 2015, there were at least 119 IIC vehicles active in Uganda, managed by 82 impact investor general partners. At that time, there had been 139 IIC deals in Uganda that had disbursed US$300 million, more than 20% of all impact investment activity in East Africa overall. By comparison, Ugandan domestic banks lent US$3.3 billion in 2015.

Impact investment typically refers to a partnership structure where a general partner (the impact investor) raises funds from limited partners that seek both an investment return and evidence that their investment has had positive social or environmental impact. Limited partners cover a wide variety of entities from public development organizations (like the Commonwealth Development Corporation), Banks, pension funds, and wealthy individuals. Limited partners of impact investors are typically far more involved in following investments than is the case in other financial partnerships. Although capital structures vary, a common form for impact investment in land use in developing countries has been debt (paid first, a lower but fixed and relatively sure amount), covered by general equity (potentially more profitable but subject to depletion in the case of loss and thus riskier), the latter often further de-risked by a cover of first-loss equity held by a development partner or philanthropic organization. In the case of loss, the public or philanthropic investor loses first, the general equity investor next, and the debt investor only last. In return for financial support, impact investors need to put considerable effort into demonstrating the planned impacts to their limited partners.

In Uganda, agriculture and financial services are the two sectors most favored by impact investors. As of mid-2015, US$60 million had been disbursed in 40 deals involving agriculture. Twelve impact investors had local offices in Kampala in 2015, compared to 48 in Nairobi. Investors surveyed complained of too few bankable investment opportunities and insufficient numbers of suitable local candidates for staffing investments. These complaints mirror results of world-wide surveys of impact investment across all sectors. Even so, impact investment is growing rapidly from a small start. In 2015, US$2.5 billion was impact invested in East Africa, compared to only a very small fraction of that amount ten years earlier.

Source: GIIN (2015); Delgado et al. (2015)

132. **Credit guarantees have been used successfully in Uganda since the mid-2000s to cover part of the default risk ensuring secure repayment of all or part of formal sector agribusiness loans in case of default.** An example is the Agribusiness Loan Guarantee Company, started in 2006 as an off-shoot of the Agribusiness Initiative Trust, a wider multinational venture supported by development partner funding in Uganda with the objective of promoting agribusiness development (FAO 2013). Besides covering default risk, credit guarantees are useful in addressing the issue of lack of collateral and poor credit history faced by small agribusiness and hence improve loan terms. Additionally, by allowing loans to be made to borrowers that otherwise would have been excluded from the lending market, farmers groups and SMEs are able to establish a repayment reputation in future and allow them to benefit from lower transaction costs and help raise productivity.

133. **Interlocked markets for credit and value-chain financing have demonstrated their usefulness for promoting smallholder inclusion in India, Mexico and Turkey** (World Bank 2015). Formal sector agricultural integrators using contract farming with smallholder suppliers, vertically integrated operations, or out-grower schemes that provide inputs credit for farmers are the vehicles used. A Bank finances off-takers' suppliers, while the off-takers assemble credit documentation and handle disbursement and collection of repayments, and de facto assume a degree of credit risk. This form of financing is increasing in Uganda for tea, sugar, coffee, dairy, barley and sorghum (Ibid.).

134. **Warehouse receipts systems (WRS) are a proposed solution to the lack of collateralizable land titles for loans.** The absence of land titles and other encumbered fixed assets that could be used as collateral as well as the lack of indemnity for product quality deterioration and storage losses diminish banks' willingness to lend to the agricultural sector. A WRS can potentially be used to unlock the collateral value of inventories that farmers, traders and processors manage through warehouse receipt financing and help relieve part of the existing access to credit constraints. WRS have been promoted for some time in Uganda, notably with a pilot involving coffee and cotton

since 2004, with mixed results. The Government has more recently been promoting improvements to product grading and information technology in the system, and extended it to maize in the north, with seemingly more promising results (Katunze et al. 2017).

Strengthening land rights to encourage investment

135. **Land tenure issues are a critical bottleneck hampering finance, agribusiness development and commercialization.** Property rights provide the authority to decide on land use and investments, as well as incentives for sustainable resource management. Fourteen percent of farmers surveyed on access to finance in 2013 cited lack of collateralizable land as their primary constraint in securing financing. Yet, Uganda's land tenure system is very complex and largely undocumented. According to the 1995 Constitution and the 1998 Land Act, land is managed under four basic land tenure regimes: customary, mailo, freehold, and leasehold as discussed above. Each regime confers different land rights to the users and thus has different implications on tenure security.

136. **Many rural households participate in land markets.** Nineteen percent of households rent land, while less than 1% report renting out land. Land sales are less frequent. In Northern Uganda, for instance, only 5% of parcels are acquired through purchase. Overall rental market performance is low, which could be related to the high amount of undocumented land and hence the greater risk of expropriation. With plots averaging only 0.5 ha per adult, the land used for crop cultivation remains small, posing challenges to sustainable intensification (Deininger et al. 2017). Of all the land parcels enumerated in UNPS/LSMS 2013/14 (both documented and undocumented), only 7 % were reported as having been purchased, with the remainder acquired through inheritance or grants of some form (Deininger et al. 2017).

> *__Nineteen percent__ of households rent land, while less than __1%__ report renting out land.*

137. **Uganda's land tenure system is rooted in patriarchy, with customary law usually according women fewer land rights.** While women have the legal right to ownership, spousal co-ownership and inheritance, they rarely inherit land but rather receive only secondary usage rights through husbands, sons, or other male relatives. Hence despite legal ground for the recognition of female land rights, these continue to be determined by cultural norms and practices, leaving women highly vulnerable (Doss et al. 2014).

> *According to the 1995 Constitution and the 1998 Land Act, land is managed under four basic land tenure regimes: customary, mailo, freehold, and leasehold as discussed above. Each regime confers different land rights to the users and thus has different implications on tenure security.*

138. **Land ownership, size, and tenure security affect both land investments and collective action.** Deininger et al. (2008) estimate that shifting a plot from occupancy to full ownership would more than double incentives for soil conservation, and increase tree investment almost five-fold. Women's landownership increased the probability of joining a women's coffee cooperative in Western Uganda, with land size positively affecting participation (Selhausen 2015).

139. **Tenure security is hard to achieve given traditional legacies and weak governance.** The share of total arable land used for farming is high, most of which being undocumented and often with overlapping land rights. Furthermore, policies and legal processes are not well established to adjudicate when disputes over land tenure arise. The Justice Law and Order Sector (JLOS) reports 18,000 land disputes pending (as of Dec. 2015; Duponchel 2017).

140. **Improving clarity of land tenure is both difficult and politically unattractive.** Once multiple claims over land exist – e.g. between squatters and investors or between former internally displaced populations (IDPs) and those who settled the land during conflict periods – it becomes difficult to establish rights that accommodate the interests and livelihoods of all parties involved. Besides, the government is challenged to appeal to all voter groups including elites and rural households. The default of political non-action, however, could aggravate tenure conflicts.

141. **Increasing land values and a growing population aggravate the situation over time.** Increasing land values in principle involve increasing land rents that should be paid to owners, while continuing divisions multiply the number of boundaries. Issuing individual land titles could result in increased landlessness and the exclusion of those with less power and influence, including women.

142. **Lack of secure property rights also fuels conflicts, which have shown to be higher in districts with high population growth and ethnically diverse communities.** Disputes have also shown to negatively impact the viability of commercial farming investments, mainly in Northern Uganda where 93% of land is under customary tenure and where refugee influx is most pronounced (Joughin and Adupa 2017). Should land tenure challenges remain unresolved, commercial farms could not only be forced to leave the region, but also be incentivized to overuse land, rather than improving farming practices and generating both positive spill-overs for the economy. Initiatives strengthening land administration and registration to foster tenure security are ongoing and should be further supported.

143. **The prospective continuation and further increase of land disputes is an important barrier to the adoption of improved technologies and the creation and development of agribusinesses and commercial farms.** Small-scale farmers who experience tenure conflicts or insecurity are likely to have fewer resources available to invest in technology adoption. With regards to agribusiness and commercial farms, possible effects could include limiting their profitability and ability to grow, and/or the concentration of a powerful few that can overcome existing challenges.

144. **Multiple policies and legislations underline the importance accorded by the Government to clarifying rights and tenure security.** From 1995, the GoU embarked on a suite of legislative reforms including a land chapter in the 1995 Constitution. The 1998 Land Act had the objective to establish a new land system to develop agriculture and land markets. Implementation, however, remained weak. In 2002, the GoU launched a 10-year Land Sector Strategic Plan (LSSP 2002-2012) which was followed by the National Land Use Policy (NLP) and a suite of legal acts, inter alia to reduce illegal evictions. Land has also been recognized as central in support of Uganda's Vision 2040 and the National Development Plan II.

Land has also been recognized as central in support of Uganda's Vision 2040 and the National Development Plan II.

145. **Uganda has made progress in fostering land administration, supported among others by the World Bank Competitiveness and Enterprise Development Project (CEDP) (2015-2020).** CEDP aims to improve land administration, registration and management, and to strengthen mechanisms for land dispute resolution. Key activities include the digitalization of existing land titles and the development of a decentralized Land Information System (LIS). As of March 2017, over 500,000 titles were registered in LIS, largely in urban areas. Further benefits include reduced time to register land transactions, and significant increase in revenues through tax collection (Duponchel 2017). The newly built infrastructure will be an important tool to monitor land governance and progress of implementing the NLP.

146. **Multiple initiatives are ongoing to foster tenure security through the delivery of adequate documentation to land owners.** The Systematic Land Adjudication and Certification (SLAAC) program under CEDP, among others, aims to secure rights of land owners through the delivery of freehold titles for ca. 50,000 and 25,000 parcels in rural and peri-urban settings, respectively. It also targets the voluntary registration of 800 Communal Land Associations. Lessons learnt from these initiatives will be important to maximize benefits of land registration exercises.

147. **The low level of documentation is being actively tackled by government, which is investing heavily in building the infrastructure for sound land governance with setting up the Land Information System (LIS) at decentralized level.** A pilot systematic land adjudication and certification exercise will be launched to expand further the coverage of the existing registry, with the aim to eventually provide documented titles to all Ugandans, under the various type of tenure recognized by the law. Impact evaluations will play a critical role in shedding light on the impacts of obtaining documented rights on perceived security, land related investments, agricultural productivity, land markets, access to credit, land conflicts, but also on potential risks associated with such programs such as distress sales (Duponchel 2017).

Regulatory issues in promoting commercialization

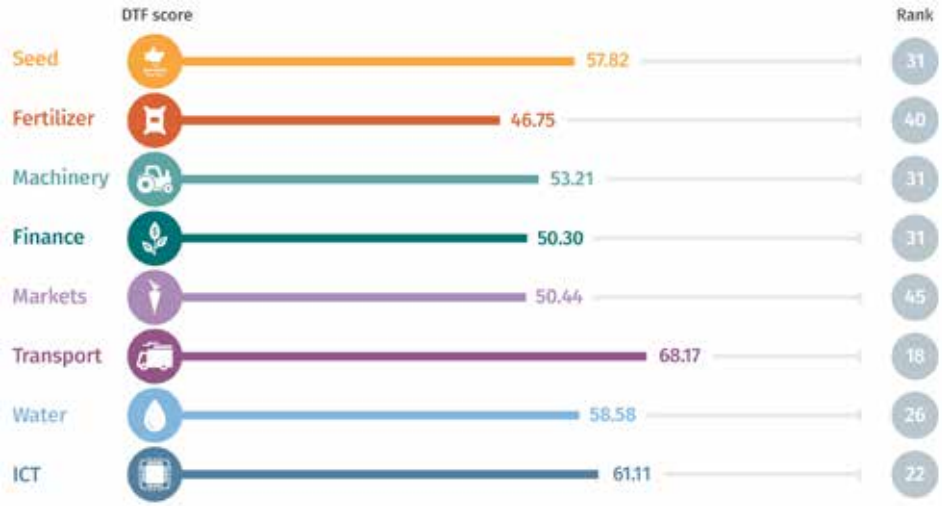
148. **Another reason for low technology adoption and commercialization levels relates to weak regulatory measures and poor-quality control systems.** The Agricultural Chemicals Board (ACB) in charge of fertilizer quality control and registration, for instance, has few resources to test fertilizers found in markets, and to impose fines to deter the sale of fake bags. This leads to high levels of adulteration at multiple stages of the supply chain, affecting smallholders the most (Luswata and Mbowa 2015). Unregulated entry of international buyers into Uganda's grain market can discourage agribusinesses that are providing quality agro-inputs and guaranteed output market structures (AGRA 2017b). Finally, licensing procedures and import processing for fertilizers and new seed varieties are restrictive and involve significant delays, further hindering agribusiness development at the farming input level (Benson et al 2013).

149. **Uganda's regulatory environment for agribusiness development has been ranked by the Enabling the Business of Agriculture (EBA) Initiative (Figure 4).** Enabling the Business of Agriculture (EBA) measures and monitors key elements of countries' regulatory framework that impact the enabling environment for agribusiness. It provides indicators that can be used to compare the regulatory environment of different countries; to identify strengths and areas for improvement, and to monitor progress in this area. EBA currently covers Uganda alongside 61 other countries. EBA has so far developed scores for 8 topics in Uganda, namely, seed, fertilizer, machinery, markets, transport, finance, water, and information and communication technology (ICT), defining regulatory good practices to assign scores. Scores are assigned based on a methodology which compares countries' laws, norms, regulations and certain processes to a set of globally-relevant regulatory good practices.

150. **While most of Uganda's indicators are close to the global EBA average, a rank of 31 out of 62 countries suggests that a number of improvements should be made in terms of the seed regulatory framework, seed registration, and seed quality control.** First, plant breeders are not required to ensure traceability or retain records of their plant reproductive material. Second, an official fee schedule for seed certification activities carried out by the National Seed Certification Services is not publicly available, unlike in several other countries in the region. Third, National Seed Certification Services are not required to perform post-control tests on certified seed, nor is there a percentage of certified seed subject to such testing. And fourth, even though private seed companies or other third parties can legally be accredited to perform part or all of the activities required during the certification process, this is not happening in practice in Uganda. For plant breeding, a legal mechanism could be implemented for materials protected by plant breeder's rights to be licensed to other parties for production and sale. The variety registration process is relatively efficient; nonetheless, Distinctness, Uniformity and Stability (DUS) Testing data issued by other countries is not accepted by the testing authority as official data in Uganda, nor can newly registered varieties be commercialized immediately after their approval (World Bank 2017).

*While most of Uganda's indicators are close to the global EBA average, a rank of **31 out of 62 countries** suggests that a number of improvements should be made in terms of the seed regulatory framework, seed registration, and seed quality control.*

FIGURE 4: ENABLING THE BUSINESS OF AGRICULTURE SCORES FOR UGANDA



Source: World Bank. (2017), Enabling the Business of Agriculture 2017

Note: The "Distance -to-Frontier" (DTF) score is a measure of how close the national score is to the best practice score across countries. The higher the DTF, the better the country is doing.

151. **A new plant protection law (Plant Protection and Health Act) was adopted in February 2015 and entered into force in 2016 (the previous dated from 1962).** Strong plant protection frameworks protect crops from pests and diseases by regulating the processes and practices to which agricultural products may be subjected during production, processing and trade. They allow governments to regulate cross-border agricultural trade more effectively and in a cost-efficient manner; to negotiate access to foreign markets for their producers, and to issue valid and reliable phytosanitary certificates for exports. Producers and exporters rely on the guarantees of phytosanitary certificates to show that their products comply with the plant health requirements in destination markets. The new law streamlines imports of plant-based products by allowing officials to target border inspections and controls, and facilitates trade with trusted exporters and trading partners. In addition, a government agency has been clearly designated to conduct pest surveillance in the country and carry out pest risk analysis.

152. **However, Uganda has in place only 3 of the 8 regulatory good practices captured by the plant protection indicator, as shown in Figure 5.** Even though it scores better than some other countries studied by the EBA 2017 report in the East African Community, Uganda's performance is relatively weak globally. Two regulatory practices of note that are missing are: (1) land users/ owners are not required to report pest outbreaks to the Government. The reporting obligation is important for prompt management of endemic pest populations. Growers/producers also cannot obtain information on plant pests and disease present in Uganda on a government website. (2) Even though a specific government agency is designated by law to conduct pest risk analysis (PRA) for imports of plant products, PRA reports are not publicly available online. Publishing PRA reports online can help create a transparent phytosanitary policy environment, as PRAs provide the technical justification for phytosanitary legislation, and are often used by government agencies to determine the frequency and strengths of import inspections (IPPC 2003).

153. **Fertilizer registration in Uganda is highly burdensome, and ranks 40th amongst the set of 62 countries studied by EBA in terms of the time and cost involved.** In Uganda, they include limited opportunities for economies of scale for the procurement and transportation of fertilizers, the high costs of their transport and distribution, foreign exchange shortages and fluctuations, a stringent control of standard high-analysis inorganic fertilizers used in Uganda, and the high costs of securing import permits and trading licenses. On average, it takes the equivalent of 215% of income per capita and 663 days to submit a completed fertilizer registration application. In addition, the prevalence of fake or expired fertilizers has eroded the confidence of farmers in fertilizer purchase and use. EBA data indicates that the sale of fertilizer products from open bags is neither prohibited nor penalized, increasing the risk of tampering or

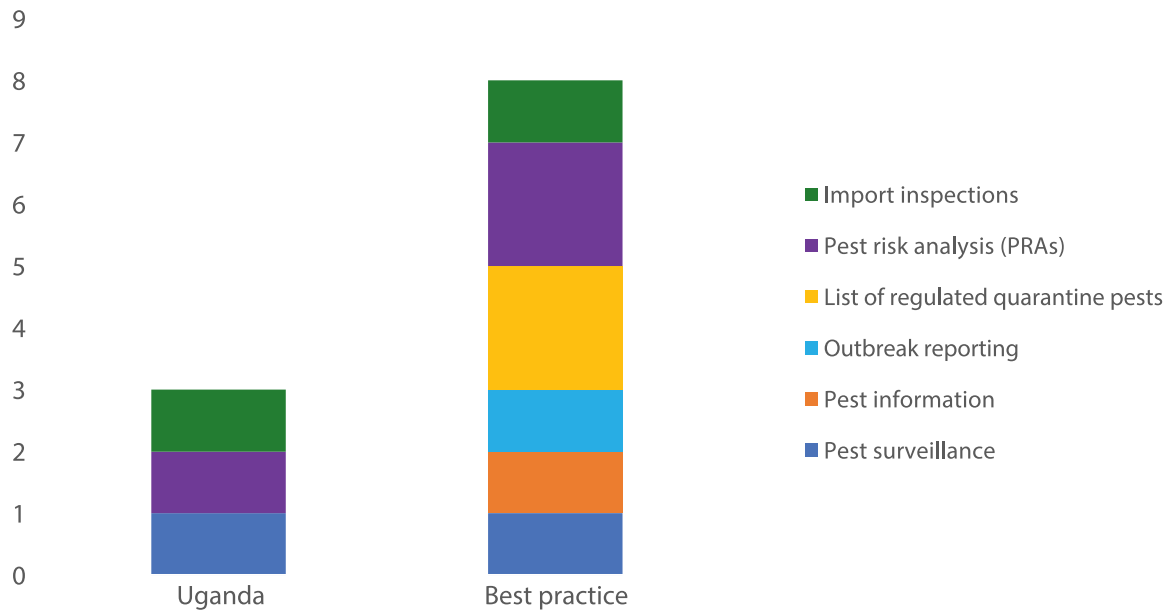
counterfeiting products. Other issues of relevance include: non-governmental organizations are not allowed to import fertilizer; companies are required to renew their registration every two years; and private companies are required to obtain an import permit for each fertilizer shipment, not available online, and the latter have a validity of only 3 months (World Bank 2017).

154. **Just like for seeds, the regulatory system for fertilizer is ineffective.** Studies by Luswata and Mbowa (2015) and by Bold et al. (2015) have documented that the contents of fertilizer bags do not match statements on the label.[10] Adulteration appears to happen at multiple stages of the supply chain, possibly already starting during the importing and shipment stage through transit countries, and then continues when wholesale and retail traders break large 50kg bags into smaller bags for sale to smaller farmers. Large-scale commercial farms purchase the fertilizer they use directly from international suppliers and hence can circumvent issues of poor regulation, while smaller farmers are most affected.

155. **Similar to seeds, policies and licensing requirements are rather restrictive, while actual controls of fertilizers in markets is ineffective.** The Agricultural Chemicals Board (ACB) under the Crop Protection Department in MAAIF is the Government agency responsible for ensuring that fertilizers are registered and are efficacious, safe, and of good quality. One challenge is that the Agricultural Chemicals (Control) Act 2006 treats all agricultural chemicals (fertilizers and pesticides) the same, without distinction as to their relative risks to public health and/or farming systems. Licensing procedures and import processing are seen as restrictive and as involving significant delays (Benson et al 2013). At the same time, the ACB has few resources to actually test fertilizers found in markets, and to impose fines to deter the selling of sub-standard bags.

156. **With regard to inorganic fertilizers, Uganda has one of the lowest levels of use across Sub-Saharan Africa, at under 2kg/ha.** Data based on household surveys confirm a very low level of use compared to a set of five other countries (1.2kg/ha in Uganda compared to 45 in Ethiopia, 146 in Malawi, 4.5 in Niger, 128.2 in Nigeria, and 16.2 in Tanzania; Sheahan and Batter 2017).11 Moreover, the actual use of inorganic fertilizers is concentrated on a small share of farms, mostly larger and more commercially oriented farms, with only 8 per cent of small farms purchasing and applying fertilizers (Okoboi and Barungi 2012).

FIGURE 5: ONLY 3 OUT OF 8 REGULATORY ELEMENTS FOR A STRONG PLANT PROTECTION FRAMEWORK ARE PRESENT IN UGANDA



Source: World Bank. (2017), Enabling the Business of Agriculture 2017

[10] Bold et al. 2015 tested urea/nitrogen fertilizer purchased in 360 randomly selected locations. None of the bags had the complete level of nitrogen content expected as per the label.

157. **A consequence of uncertain quality of improved inputs is that the likely returns for a small farmer are negative.** When Bold et al. (2015) used the actual seed and fertilizer purchased as well as alternatives at NARO research stations in Uganda, they found a negative 12.2 per cent return. Volatility and significant periods with very limited presence of extension services in the country compound the problem of low adoption of improved inputs, as farmers receive little advise, e.g. on when and how to apply fertilizer most effectively.[11]

158. **Development partners have sought to support greater industry self-regulation through the introduction of an AgVerify label since early 2016.**[12] The label is attached to sacks of seeds, and includes a scratch code and a phone number. Farmers can call the number and enter the code to check if the seed is genuine. This has shown some initial results. However, the wide-spread distribution of free seeds and the distortions in profitability of seed companies created by large-scale input purchases has limited the demand.

159. **Sugar-processing companies have been fairly successful in Uganda, as shown in Table 6, but the expansion of sugar growing raises concern about the effectiveness of land use regulations designed to reduce emissions and ecosystem service losses more generally.** While the sector has been comparably successful economically, there have been repeated disputes and environmental concerns over plans to expand sugar production into protected forest areas. These include the years 200713 and 2011 about plans to allow the growing of sugarcane in a quarter to a third of the Mabira forest reserve, and 2016 about a possible revocation of the protection of the Zoka forest in Northern Uganda (Joughin and Adupa 2017).

Value addition through vertical coordination with the private sector

160. **Increasing private sector involvement in value addition and fostering the development of sustainable food value chains will increase agricultural productivity and create much needed employment.** A sustainable food value chain is "profitable throughout all of its stages; has broad-based benefits for society; and has a positive or neutral impact on the natural environment" (FAO 2014). The shift from primary production to modern, integrated agribusiness through commercialized agricultural value chains and enhanced linkages between farm-gate and consumers would provide lucrative job opportunities to smallholders and generate higher and more predictable incomes. To date, the proportion of processed agricultural commodities and products in Uganda is however less than 5% (GoU/MAAIF 2011; Tatwangire 2014).

161. **In Uganda as in many other places, there has long been the perception that smallholders lack market power and that public sector led cooperative movements can help smallholder economic inclusion through better farmer organization.** As mentioned above, agricultural cooperatives were long sidelined out of concern for their potential political role. EBA ranks Uganda's regulatory practices for cooperatives significantly below other countries in East Africa (World Bank 2017). However, more recent developments such as increased formation and registration of (nearly 10,000) cooperatives across Uganda, and the appointment of a new State Minister for Cooperatives (in the Ministry of Trade and Cooperatives) suggest that there is now political will to take up this challenge (Joughin and Adupa 2017).

162. **In this context, it should be considered that various private business models have been shown to be successful in linking smallholder farmers better to international market opportunities for value-added products, improving farmers' incomes, capacities, productivity, and resilience.** Both multi-national and increasingly larger domestic firms bring managerial skills, capital, extension of knowledge to farmers, and entree into commercial networks outside the country. They have the expertise and the scale to achieve cost-effective global certifications in desirable traits. Key issues from the integrators' standpoint include the ability to enforce agreements—especially regarding recouping input credits given by companies to farmers and most especially securing adequate supplies of raw materials at pre-defined and generally high-quality levels. From the farmers' standpoint, these arrangements can finance improved inputs and extension for the use of those inputs; provide

[11] The household surveys used were mostly collected in 2010-12.
[12] http://www.aginputsuganda.org/Pages/home.aspx. The initiative was sponsored by USAID (Feed the Future).
[13] http://www.reuters.com/article/environment-uganda-forest-dc-idUSL17239907200710 17 (Mehta Group seeking land in Mabira forest); these plans were revived in 2011 -- http://www.redd-monitor.org/2011/08/31/can-redd-protect-the-mabira-forest-in-uganda/

some reliability in outlets and prices received, and through grading and the better traceability of raw materials supplied, allow farmers to garner premia for quality.

163. **In Uganda as in other parts of the developing world, smallholders producing higher value, quality sensitive, or perishable commodities suffer from a major disadvantage relative to large-scale operations in regard to the absence of ability to brand.** Very small producers living amongst a very large number of competitors in areas far from final markets essentially cannot brand reliably. Their product is only available in small quantities once a year, is soon mixed in with batches from other - possibly less careful - farmers, and gets the lowest bulk price prevailing. Branding is critical to commercialization: it is essential to building market reputation and to monetizing in the marketplace otherwise difficult to monitor product quality differences. The solution to this issue typically involves organization of production and facilitation of quality grading by an integrating processing firm (Delgado 1999). Honey production in Uganda provides a nice example of a solution to the branding problem along these lines (Lynch et al. 2014).

164. **Firms processing, trading and retailing products made from smallholder produced raw materials have a similar problem.** Of course, it is possible—in theory at least - for a firm producing processed rations for children to test every small batch of maize procured for aflatoxin contamination (or less satisfactorily rely on a bulking trader to do this). However, costs mount, the danger of not catching a bad batch are real, and not being able to procure enough satisfactory raw material at the end of the day is not an option. Dairies face a similar set of issues, having to go to considerable lengths to know the freshness and adulteration of small batches of milk from different farms that they will mix together. For dairy, issues are amplified by the fact that market power is in the hands of farmers in the dry season when milk is scarce, and in the hands of dairies in the rainy season when milk is surplus, adding to the mutual advantage of year-round trust and cooperation amongst the same actors. High value export crop processors like coffee roasters can only get top prices for their product if they have consistent quality of raw material and in sufficient quantity. Farmers, on the other hand, would like to sell to roasters in a position to achieve and share retail premia for known quality, in an industry where lots of small batches are lumped together for processing, and where the default outlet is a bulk trader paying a bulk price.

> *Maize production in Uganda has been steadily growing from* ***1.3 million metric tons*** *of production in 2003 to about* ***2.6 million metric tons*** *in 2015/16.*

165. **The root issue here is that as agriculture evolves into a value-added and increasingly anonymous industry, smallholder farmers need to work with formal sector aggregators in the value chains they contribute to in order to reap a share of increased final value-added from reputation and quality.** This creates a space for aggregators—whether intermediaries, coops, or final processors—to make or save money from vertical coordination operations with known groups of farmers. Such aggregators are increasing all over East Africa, including in Uganda. The key asymmetries between farmers' and processors' information (about how the product has been treated prior to the sale to processors) that create the issues above in the first place are different in the three chains. For maize, the main issues are cleanliness and dryness (to prevent aflatoxin). For dairy, the main issues are freshness, hygiene, and lack of adulteration. For coffee, the issue is taste which stems from a long list of production and handling issues such as varieties, soils, altitude, humidity, ripeness, and handling post-harvest, including washing. The differences across chains in asymmetries of information (or "transaction cost") suggest desirable differences in industrial organization of each chain. This is illustrated in the Ugandan examples in the 3 boxes that follow, involving Afgri-Kai Ltd. (maize), UCCCU (dairy), and NUCAFE (coffee). While all these chains have domestic and regional demand growth behind them—and coffee has global demand growth as a driver as well—the major changes and lessons portrayed here for maize are primarily with regard to regional markets; for dairy they are primarily domestic, and for coffee they are primarily global.



Case studies of the maize, dairy and coffee value chains

166. **Maize production in Uganda has been steadily growing from 1.3 million metric tons of production in 2003 to about 2.6 million metric tons in 2015/16** (FAOStat 2017 and Table 3).[14] While domestic market demand is responsive to urbanization, demand for maize by neighboring countries is very much on the rise due to drought and especially to political crisis, as in neighboring South Sudan. Both disrupt food production, and are the basis of requests for aid shipments from the World Food Program. For instance, maize exports from Uganda to neighboring countries rose from 400,000 Mt in 2004 to about 1,100,000 Mt per annum in 2015. The private sector has responded by setting up grain buying companies that do cleaning, drying, and storage. Off-farm grain storage capacity in Uganda is estimated for 2017 at 350,000 – 400,000Mt, of which formal warehousing storage capacity is 151,520 Mt; the World Food Program (WFP) alone accounts for one-third of this.

167. **A number of medium and small-scale grain traders, handling of the order of 100,000 to 150,000 Mt of grain annually in total, have entered the market in recent years to take advantage of the rising trade opportunities,** including selling to the WFP, which regularly procures grain in Uganda for shipping to South Sudan. An example is Afgri-Kai Ltd, which entered the Ugandan market in 2012, and is portrayed in Box 4.

168. **The dairy sector in Uganda has been actively promoted by government, development partners, and the private sector,** with liberalization of private entry into processing starting with the Dairy Industry Act of 1998 and the launch in 2000 of the Dairy Development Authority (DDA), a parastatal that regulates the private-sector industry (Box 5). DDA is also tasked with supporting smallholder cooperatives, extension, research on breeding, product development, and promotion of exports. Underlying this has been steady increase in domestic demand for milk since the late 1990s. The national cattle herd was over 11 million head in the last full count in 2008 and small-scale farmers accounted for about 90% of this. Annual milk output however has steadily grown from 1.5 billion liters in 2010 to 1.8 billion in 2012, and to 2.2 billion liters in 2016. Regulations on the acquisition of milk transporting vehicles have been made easier, and regulations on acceptable modes of transporting milk have been enforced. Large private and cooperative investments have been made in setting up coolers throughout the milk producing areas. Private sector investment in setting up milk processing plants has increased very significantly. Milk processing has grown from 5 processors in 2003 to 76 milk processors in 2017, of which 15 are large-scale. Eight of the latter export milk and milk products. Milk processing capacity is estimated at about 1.3 – 1.5 million liters per day.

[14] The three cases that follow draw heavily on Jagwe (2017), which was commissioned for the present study.

BOX 4: GROWING REGIONAL DEMAND FOR CLEAN MAIZE: EXAMPLE OF AFGRI-KAI LTD.

Afgri-Kai Ltd. entered Uganda in 2012. Its core business is to purchase grain; to clean and store maize for sale to WFP, and also directly within the region (60% to Kenya and the rest to South Sudan and Rwanda). The Afgri-Kai story illustrates how a private sector firm can open the potential of a major regional demand shift for the benefit of smallholders and traders that individually would not be able to meet the quality and reliability of shipment needs of the clients. Approximately 90% of grain purchases are from traders, while the remainder is from approximately 5,000 farmers. Afgri pays a premium of up to 20% higher than the spot market price to farmers and traders who comply with strict EAC quality standards, such as the absence of foreign materials (such as stones), excess humidity, and pests. Afgri supports the formation of new and the strengthening of existing farmer groups with training in production, primary processing and handling.

Farmers under this arrangement can access high-quality inputs of seed and fertilizer as well as support services such as spraying and maize shelling equipment. Farmers under this arrangement have been able to increase their yields from 600kg/ha to about 2Mt/ha due to using good quality inputs. Currently, Afgri-Kai moves volumes of grain estimated at 22,000 metric tons; up from 10,000 metric tons when they entered the Ugandan market in 2012. The lesson drawn from this experience is that in the presence of strong and reliable multi-year demand for grain of a given quality level, private sector actors can make appropriate investments that enable the commodity to be bulked, collected, handled and stored well, while ensuring observance of quality standards through price incentives to farmers and traders. And this despite both having many smallholder suppliers and the absence of a public regulating authority.

Source: Jagwe (2017)



*Coffee value chains support over **3.5 million households** and contribute roughly one-quarter of the foreign exchange earnings of Uganda (UCDA, 2016). Robusta accounts for about **80%** of the harvest, Arabica the rest*

169. **Coffee value chains support over 3.5 million households and contribute roughly one-quarter of the foreign exchange earnings of Uganda (UCDA, 2016).** Robusta accounts for about 80% of the harvest, Arabica the rest. Coffee is produced on land holdings ranging between 0.25 acres and 30 acres. About 6% of coffee produced is consumed locally, while the rest is exported. Coffee exports in 2015 accounted for 17.8% of total exports by value (UCDA 2017). Coffee exports are estimated at 254,000Mt, with approximately 94% of total production with a value of about US$400 million (Jagwe 2017). Current production of coffee in Uganda has grown from 189,000 metric tons in 2010/2011 to 270,000 metric tons of Fair Average Quality grade dried beans in 2015/2016, worth US$422 million. The government through its "Operation Wealth Creation" (OWC) has been actively promoting coffee growing and distributing seedlings to households, especially in the Central part of the country.

170. **Since liberalization of the sector in the late 1980s, multinational companies such as Ibero, Kyagalanyi, Armajaro and Olam have come in that mostly export dried graded beans.** The firms have started to invest in the production and primary processing components of the value chains to ensure good quality and boosting the volume of beans supplied to them. They have set up processing plants and organizing coffee growers into groups, associations and cooperatives through which extension services, access to high quality inputs and credit or advanced payments can be provided.

BOX 5: DOMESTIC DAIRY DEMAND AND THE UGANDA CRANE COOPERATIVE CREAMERIES UNION (UCCCU)

The Uganda Crane Cooperative Creameries Union (UCCCU) is an innovative farmer-owned tertiary cooperative union registered in 2005 after sector liberalization. It epitomizes the rise of the sector and illustrates a good approach to including smallholders meaningfully in rapidly expanding and increasingly demanding markets for a high value and perishable item. UCCCU currently comprises 10 district unions, involving 140 primary cooperative societies, mostly located in the mid and southwestern parts of Uganda, with a consolidated membership of almost 20,000 households. Altogether, UCCCU members produce 700,000 liters of milk daily, of which 300,000 liters are sold formally through UCCCU. UCCCU renders services to its members in terms of building their capacity in milk handling, collection and processing, while organizing its member cooperatives for collective marketing of their products. UCCCU also trains farmers on how to do farming as a business and on developing a saving culture as well as conducting some basic research especially on market issues. UCCCU farmers are able to access drugs, credit, insemination services and other inputs through their cooperatives as well as advice on how to improve the quality of their breeds.

UCCCU makes its money as a dairy on a private sector basis, but in parallel serves as a quasi-rural development authority for it members. Some of its successful farmer interventions have been: (1) animal nutrition, herd health, improved genetics, milk quality assurance, and farm management; (2) facilitation of partnerships with service providers and suppliers of farm inputs; (3) a 100,000 liter capacity dairy processing plant, 100 milk cooling tanks, and 10 road tankers; (4) facilitating contractual arrangements with buyers of milk through the installed UCCCU milk cooling tanks and road tankers, with substantial price premia to farmers; strengthening the financial management capacity of member cooperative societies; according youth and women special attention for skills development and access to investment credit through all its programs; actively promoting the consumption of milk through a school milk program; and establishing a savings and credit cooperative for its members (UCCCU Community SACCO). The latter gives advances to farmers against potential milk sales, provides credit, and pools savings of farmers for future investment.

Source: Jagwe (2017); UBOS (2008) Livestock Census Report; FAOStat; Uganda Dairy Development Authority (various); Mbowa et al. (2012)

171. **Local investors such as Good African Coffee, Savannah Commodities and NUCAFE have also emerged to compete in the same space.** They too have come up with similar structures that organize producers and render them services such as extension while ensuring steady supply of commodity to designated processing plants. Furthermore, both local and foreign companies have ventured into adding more value to exported coffee by investing into grinding and roasting to make branded shelf-ready products for export and also for the local market. Currently there are twelve domestic roasters registered with Uganda Coffee Development Authority (UCDA) and these include Kyagalanyi, NUCAFE, Good African Coffee, Star Coffee, Ban café, Café PAP and a few others. Box 6 gives additional information on Kyagalanyi.

Both local and foreign companies have ventured into adding more value to exported coffee by investing into grinding and roasting to make branded shelf-ready products for export and also for the local market.

BOX 6: THE GLOBAL DEMAND FOR HIGHER QUALITY COFFEE AND KYAGALANYI COFFEE LTD.

Kyagalanyi Coffee Ltd was founded in 1992 when the Ugandan coffee industry was liberalized, and is the oldest licensed coffee exporter in Uganda. The firm is one of the ten companies controlling over 80% of coffee exported from Uganda. It mainly exports graded green beans and is currently working with 15,000 coffee farming households. It provides knowledge and training in coffee husbandry and access to inputs. Local interventions are built around one or more primary processing sites. The latter are professionally managed to produce the best quality parchment, Fair Average Quality grade beans, and to ensure traceability. Each scheme is headed by a manager in charge of day-to-day certification and training operations. Overall guidance and development of the schemes is provided by Kyagalanyi's Sustainability Manager. The field teams consist of 60 staff in total, of which 14 are agronomists and seven are nursery operators. Farmers are organized in producer organizations of 20 to 40 members.

Kyagalanyi has established washing stations—critical to quality - across Mount Elgon, West Nile and Rwenzori regions to enable proximity to the farmers they serve. Most of the stations are equipped with eco-pulpers, waste water treatment systems, nurseries and agro-input stores. Farmers are taken through an intensive agronomy training program that includes business skills. They are eligible for annual cash and fertilizer bonuses, access to quality agro-inputs (although even the company has had trouble sourcing these on occasion, as discussed more generally under regulatory issues), farm tools and good quality seedlings. Personalized advisory services are also rendered. Farmers are also able to use mobile phone technology to gather geo-tracked data on coffee traceability, adoption of Good Agricultural Practices, and use of good socio-economic practices. Coffee yields have improved tremendously as has the quality of coffee marketed. Premia are paid for better quality Arabica beans. Some participating farmers under have been able to register yields of 1 mt/ha for Arabica, compared to a norm of 0.4 mt/ha. The use of mobile money systems to provide payments to farmers has greatly reduced risks associated with transacting in cash.

Source: Jagwe (2017)

172. **Several lessons emerge from the three otherwise very diverse examples of vertical coordination of smallholders into changing markets for maize, dairy, and coffee.** First, rapid demand growth is key to creating the conditions under which private aggregators and smallholder farmers can work well together. This was true whether it was primarily in local markets (dairy), regional markets (maize), or global markets (coffee). The demand growth in question was for known and consistent qualities of products which have undergone a significant amount of industrial processing that smallholders could not meet on their own. The vertical coordination arrangements allowed smallholders to get a share of the benefits from branding and better access to inputs and advice; and the aggregators were able to secure, expand, and improve their supply chains for raw material.

173. **Second, all three cases underline the central role of building trust through coordination to reduce the costs of search, bargaining, contracting, monitoring and enforcement that are net losses borne by both farmers and aggregators.** The more that commodity quality is hard to observe in spot markets, the greater the savings to both buyers and sellers from coordination. Whether it is the absence of aflatoxin in maize, bacteria in raw milk, or off-tastes in coffee, creating the conditions where all can be sure that these aspects are not in the product is the key to achieving value addition.

174. **Third, more reliable quality control of raw material, combined with a higher degree of processing, was essential to meeting changing market demands.** Being able to serve the needs of the processed food "revolution" will be essential to the economic welfare of smallholders, and this will be difficult without vertical coordination.

175. **Fourth, in each case, aggregation provided economies of scale in collection, input supply and finance that would be very difficult to achieve through any other form of organization, including parastatal activities.** In addition, farmers had a strong incentive to provide the monitoring of their own production practices and the care of their own parcels that would have been lacking for laborers on large commercial farms. This was especially important for items where quality is very sensitive to both high and careful labor inputs, such as dairy and coffee.

176. **Fifth, the three cases above are all success stories, and a key to each one of them is the fact that the aggregator shared the benefits of success with producers in the form of significant premia (of the order of 20%) for improved quality of deliveries.** Business is a mutual benefit activity, or it will not last long.

Information and communications technology and commercialization

177. **Ugandan agriculture is largely traditional, practiced by smallholders and pastoralists, predominantly rain-fed, and low-yielding; it lacks access to critical information, market facilitation, and financial intermediation services.** The role that Information and Communications Technology (ICT) can play in addressing these challenges is increasing as personal ICT devices – such as mobile phones or tablet PCs – are becoming more widely available (World Bank 2012).

178. **ICTs involving cell phones and tablets have particular relevance for productivity and resilience, market access, and financial inclusion.** Adoption of ICT solutions can improve short-term and long-term productivity; minimize the negative effects of crisis events (for example, by informing on how to protect crops from inclement weather in the short term); and improve field-based risk management, for example, by guiding the implementation of crop rotation to preserve the soil in the long term. ICT services can provide farmers with access to information on pricing of agricultural products (both inputs and outputs), and on finding and connecting to suppliers, buyers or logistics providers, such as storage facilities and transport companies. Such services include simple pricing services, virtual trading floors (matching services or full commodity exchanges) and holistic trading services.

179. **Market access services also cover ICT solutions that typically help larger downstream firms, such as processors or exporters, to better manage their operations and the quality of their produce.** With regard to financial inclusion, ICT solutions for transfers and payments, credit, savings, insurance and financial derivatives can help improve rural communities' access to finance by creating viable business opportunities for financial institutions to enter potential rural markets. ICT services combine the advantages of informal financial services: convenience (e.g., door-step service), and flexibility (e.g., ability to save and withdraw small amounts) with another key criterion – security. Thus, ICT enhancements for financial inclusion services can either entail making informal providers more secure, or making formal players more convenient or more flexible.

180. **In Uganda, the internet plays an increasingly important role.** In 2015/16, the number of internet subscribers and users grew respectively by 30.2% and 19.6%, resulting in a 42.5% aggregate internet penetration as of June 2016. Total mobile phone subscriptions stand at over 22 million. Almost 124.000 new mobile subscribers were added in the FY ending June 2016 – with a 0.6% growth rate almost negligible compared to a 14.6% growth in 2014/2015 (UCC 2016). This is concerning as mobile phones are the main conduit for accessing ICT services in rural areas. Poor telecommunications infrastructure, unstable power supply, lack of ICT skills, high costs of acquiring and maintaining ICT equipment, lack of property rights, and difficulties in making information available in local languages all hamper diffusion of ICT in rural areas.

*In Uganda, the internet plays an increasingly important role. In 2015/16, the number of internet subscribers and users grew respectively by **30.2%** and **19.6%**, resulting in a 42.5% aggregate internet penetration as of June 2016.*

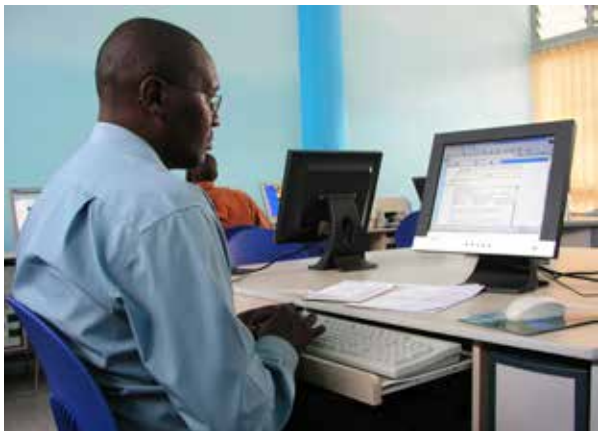
181. **Innovations such as digital payment offer significant opportunities for farmers, providing them with a safer and more efficient way to transfer money at lower costs than traditional cash-based transactions.** One example is SmartMoney, a savings and payment system operating in Tanzania and Uganda (AGRA 2017). Information and Communications Technology can help farmers along the farming cycle, for instance in terms of input management, pest control, post-harvest handling or marketing. Enhancing the regulatory environment for both ICT development and agriculture finance mechanisms such as branchless banking are critical measures to boost agriculture productivity and for commercialization in Uganda.

182. **Mobile money (MM)-using households in Uganda sell more coffee produce as shelled beans, receive better prices for their shelled beans, and earn higher off-farm incomes** (Sekbira and Qaim 2016). Use of MM-services allowed households to receive remittances that smoothen consumption and relieve consumption-based pressure on selling coffee,

enabling households to save and process coffee for sale in high value form for better prices. Better prices boost investment in off-farm employment, thus higher off-farm incomes for MM-users.

183. **Gender disaggregation of effects of mobile phones in rural Uganda further revealed that women benefit over-proportionally from mobile phone technologies, which is consistent with the view that women are more constrained than men in their access to markets and information.** Hence, a new technology that helps reduce transaction costs and allows new forms of communication can be particularly advantageous for women. Higher incomes and better access to information for women influence their bargaining position within the household, thus also improving gender equality (Sekbira and Qaim 2016).

184. **There are many applications and ICT-enabled tools for data collection purposes currently available in Uganda; some significant ones are:**
    - **The Jaguza Livestock App is an e-Agriculture App developed to improve livestock production and productivity in Uganda and other developing countries.** It includes a mobile online and offline monitoring system for farmers to detect individual movements of cattle, detect strays, and keep track of health and fertility status of cattle. The innovation helps access veterinary services, and enhances better treatment of livestock after early detection.
    - **Ensubiko is a solution designed specifically for enhancing financial inclusion.** One of the offered services, "Mobis", is a core-banking software that enables rural-based financial institutions to manage information and reporting, while delivering financial services on a mobile wallet.
    - **The M-Voucher (Mobile Voucher) system uses the USSD (Unstructured Supplementary Service Data) platform to enable agro-input dealers to redeem electronic vouchers using basic mobile phones.** Through the USSD interface, input agents redeem vouchers, collect basic data on beneficiaries, and receive instant payments for each voucher redeemed. M-Voucher is integrated directly with MTN mobile money, enabling fast payments to input agents and other suppliers participating in the voucher activity.
    - **MUIIS is a satellite based market and data service project to make markets more accessible for farmers in Uganda.** MUIIS deliver a bundled service with products including accurate satellite weather information, agricultural advice, trend analysis for soil, water evapotranspiration, insurance, and market information for farmers.



185. **The spread of ICT capabilities has particular power when paired with advances in Big Data technologies.** Especially BlockChain technology — which enables the keeping of a widely distributed, collaborative, and tamper-proof electronic ledger of transactions—offers tremendous potential for situations like Ugandan agriculture.[15] It has the potential for lowering the costs of small financial transactions involving smallholders that require secure record-keeping and periodic decentralized input, such as land registration and mortgages. Rwanda is already moving in this regard to digitize its land registry. The technology enables secure transactions, digital authentication, and legally binding signatures.

186. **The combination of a very high-tech centralized technology and large database with easy-to-use field data entry points offers great potential for overcoming the twin tyrannies of distance and multiplicity of small independent farms.** This excluded so many in rural Uganda from services that were not economic to provide on an individualized basis previously, but now can be much more cheaply by electronic means. An example of the latter with relevance for climate-resilient agriculture would be the use of hand-held soil scanners on individual farms for soil diagnosis, through intermediation cooperatives that could own the field equipment, combined with wireless transmission of results to a large centralized regional database, and receipt a few minutes later of a detailed individualized electronic soil amendment recommendation for a small farm.[16]

[15] See: https://www.wisekey.com/press/wisekey-and-microsoft-collaborate-to-support-rwandan-government-make-secure-transactions-using-block-chain-technology/
[16] An example already in use in developing countries is detailed at: http://www.soilcares.com/en/products/scanner/.

The combination of a very high-tech centralized technology and large database with easy-to-use field data entry points offers great potential for overcoming the twin tyrannies of distance and multiplicity of small independent farms.

A changing role for government under private-sector led commercialization of smallholder agriculture

187. **The economic need for vertical coordination to overcome transaction costs which to date exclude smallholders from high value markets (asymmetries of information as discussed above) is best served by private aggregators.** However, as value-addition and globalization in agriculture heat up, there are a number of critical functions that also need to be met by the public sector. Government needs to play a role in ensuring the enforcement of agreements, especially regarding recouping input credits given by companies to farmers and securing adequate supplies from zones where extension investments have been made; and in ensuring the traceability of supplies of raw materials, allowing farmers to garner premia for quality. In many cases, multinationals also seek active financial involvement by the government through Public-Private Partnerships, which can be highly beneficial for the promotion of high-value specialized crops. Government should ensure clarity on goals and a definition of satisfactory performance, coupled with an institutional structure to follow up transparently at regular intervals, and redeploy public resources where performance has fallen short. This system is highly developed for PPPs for infrastructure in Korea, for example. Government financial participation should likely be limited to a very small number of activities that have compelling cases for the need for public participation.

188. **Allowing for the diversity of aggregation needs across different commodities, Government should seek to develop a knowledge platform on which forms of industrial organization work best for addressing specific industrial organization problems in Uganda's smallholder context.** The platform can provide reliable data on vertical coordination, finance, prices, costs, and weather. This information will be critical to reducing uncertainties and risks for investors, and should encourage competition among them. Documenting and publicizing the impact of different private, public, and public-private experiences with vertical coordination can help share experiences across commodities. It will also facilitate a key policy role of Government to promote a level playing field of knowledge and regulation that encourages formal sector private investment while advancing the interests of the farming population.

189. **One of the main ways that Government can help smallholders become better integrated into private-sector led commercialization and to improve their market power is through strengthening their independent access to credit.** The most effective way to do this is through improving their ability to borrow on their own within the developing private financial system, as opposed to having the public sector become the direct lender of last resort. The public sector can be of best assistance by establishing registering land titles in rural areas, an area where Uganda is far behind other members of EAC. Rural farmers will continue to fall behind urban inhabitants under market-led development if they continue to be without collateralizable assets.

190. **Government must play a lead role in re-establishing farmer confidence in the integrity and accuracy of the regulatory system for agriculture, in concertation with producer and marketing interest groups of the private sector.** These issues are critical for agricultural operations large and small. However, they are especially important for smallholders that obtain agricultural inputs such as seeds and fertilizer in small quantities on spot markets. Unit costs are often high and quality much different than what is claimed on the label.

191. **Finally, implementation of national programs of the Government such as the Poverty Eradication Action Plan (PEAP), the Plan for Modernization of Agriculture (PMA), Vision 2040, among others, would increasingly benefit from interactions with beneficiaries through ICT apps.** Issues slowing down increasing connectivity are priority items for consideration in the policy issues section below.



V.

Resilience Challenges to Agricultural Livelihoods and Production Systems

- Poverty and food insecurity in rural areas are compounded by the impacts of climate change that are already visible, and are predicted to worsen in the future.
- Rapid population growth and unsustainable land use drive soil erosion. This leads to a loss of biodiversity and agriculture productivity, and to a reduction in ecosystem resilience to climatic shocks through lower capacity to hold rainwater and poorer soil structure.
- Climate-smart land and livestock management practices as part of the climate-smart agriculture (CSA) concept are needed to enhance productivity and smallholder incomes while limiting agriculture emissions and enhancing resilience to climate-related risks and shocks.
- Successful adoption of CSA requires an enabling environment of functional institutions, regulations and coordination. The dissemination of CSA technologies and knowledge often requires specific financial incentives to internalize market externalities.
- Improved water storage capacity, irrigation systems, and sustainable water management and conservation practices are further critical to fostering the resilience of farmers to climate variability and change.
- Long-term preparedness and prevention of climate-related hazards require more robust Early Warning (EW) mechanisms than presently available in Uganda. Technical and financial discussions should be aligned across national and local governments, and user-friendly messages coordinated across authorities. Vulnerable communities need to be supported in the development of local-level emergency response mechanisms.

Poverty and resilience

*"While the share of the population living in poverty more than halved between 1993 and 2013, poverty is still widespread particularly in rural areas. These comprise **85%** of the population and **94.4%** of the country's poor.*

192. **Poverty and food insecurity are among the greatest challenges for Uganda, and especially for rural livelihoods.** While the share of the population living in poverty more than halved between 1993 and 2013, poverty is still widespread particularly in rural areas. These comprise 85% of the population and 94.4% of the country's poor (CCAFS 2017). Although agricultural households accounted for 79% of poverty reduction in 2006-2013, the relation between poverty and agriculture is highly vulnerable to climatic factors. According to Sheahan and Barrett (2014), poverty reduction in this period was driven by favorable weather conditions and comparably high crop and livestock incomes, rather than by the adoption of technologies that could buffer against climate-related risks. The reliance of farmers on good weather and markets was pronounced in 2016/2017 when agricultural output plummeted, food insecurity soared, and poverty rates rose to 27% (UBOS 2017b) – largely a result of drought spells and pests such as the armyworm.

193. **To reduce food insecurity and poverty especially in rural areas, Uganda's agri-food systems need to become resilient to climatic and market-related shocks.** Smallholders, which make up the vast majority of farmers in Uganda, are particularly vulnerable to agriculture-related risks such as market price fluctuations or climate change impacts because they are disproportionately dependent on rainfed agriculture and usually possess limited livelihood assets such as financial capital, physical infrastructure, or information about adequate adaptive and coping strategies. At the same, poverty and food insecurity or insufficient dietary energy consumption, respectively, are particularly pronounced in rural areas, fostering vulnerability to shocks. Many households suffer from high levels of malnutrition, with 34% of children under 5 years being stunted (IFPRI 2015). In Northern Uganda, 59% of households often consume only one meal per day. The number of food-insecure people is projected to rise from 7 million (2015) to 30 million by 2025 (CCAFS 2017).

194. **Poverty and food insecurity are compounded by the impacts of climate change that are already visible today, and predicted to worsen in the future.** Uganda has been described as one of the world's most vulnerable countries to climate change, with increasingly unreliable rainfall, drought, seasonal fires, precarious water supply, and endemic poverty characterizing major climate-related hazards. Since 1960, temperatures have increased by 1.3°C. In the next 50 years, near-surface temperatures are expected to increase by 2-2.5°C, and by up to 4.5° until 2100. Rainfall patterns are becoming increasingly unpredictable, and floods and droughts are predicted to become more frequent and intense. Between 1900 and 2000, the frequency of years with significantly below normal rainfall increased from once every 20 years to once every five years, with severe impacts on agricultural production (FAO 2016b). Climate variability particularly affects Uganda's Northern and Northeastern areas, that is, those which are already impoverished and less food secure. Rain scarcity and the belated onset of rainfalls during land preparation and planting months in 2016/17 led to high food prices, and forced families to sell off their assets, take children out of school or resort to environmentally harming practices to secure food (FEWS Net 2017).

195. **Human well-being and resilience in rural areas disproportionately depend on healthy ecosystems.** Resilience can be described as the ability of (agricultural) systems and people to anticipate or recover from shocks that impact agriculture and food security in a timely manner, and thereby avoid disasters and crises (FAO 2014b). A precondition for climate-resilient agriculture systems and livelihoods are healthy ecosystems, which have been described as 'the wealth of the poor' (WRI 2005). Cropping and grazing (or mixed) systems do not only provide food, fiber or skins, but a wide range of services which benefit humans, and which are not immediately 'visible' (see Figure 2a). These include nutrient cycling, pollination, freshwater purification, pest control and landscape aesthetics, among others. Ecosystem services and other non-marketed goods provide 50-90% of total livelihoods among poor rural households (TEEB 2010). Unsustainable land use, climate shocks such as droughts and the loss of non-crop habitats reduce ecosystem services on which agriculture production critically depends (TEEB 2015).

196. **Rapid population growth particularly in rural areas and unsustainable land use also drive soil erosion, that is, soil nutrient and soil productivity loss.** Population growth rates are relatively high at 3.3 percent per annum, which accelerates agriculture expansion and forest clearing due to increased demand for food and energy (largely fuelwood), land fragmentation (see Table 1), soil nutrient depletion, and unsustainable production. While highland ecosystems are predominantly affected by population pressure, it is overgrazing that degrades marginal lands such as the semi-arid ecosystem of the cattle corridor that stretches from Rakai in southern Uganda to Karamoja in the northeast of the country (FAO 2016b). The cattle corridor accounts for over 90% of the national cattle herd and livestock production, which contributes about 7.5% to Uganda's GDP (ELD 2015). Here, soil compaction, erosion, and the emergence of low-value grass species have subdued the land's productive capacity and lead to desertification, wreaking havoc on Uganda's economy and escalating poverty (ibid). Estimates

> *Estimates of the loss to Uganda's GDP due to environmental degradation range from 4 to 12%, with **85%** of this from soil erosion. Over **80%** of Uganda's total surface area could be prone to erosion.*

of the loss to Uganda's GDP due to environmental degradation range from 4 to 12%, with 85% of this from soil erosion (NEMA 2016). Over 80% of Uganda's total surface area could be prone to erosion (Karamage et al. 2017).

197. **Agricultural commercialization and related land use intensification often entail the increased use of pesticides, synthetic fertilizers, and herbicides,** all of which can reduce soil organisms critical for nutrient cycling and the number of insect and bird species necessary for pollination and biological pest control. This increases the fragility of agri-food systems to pest and disease outbreaks and other climate-related shocks (Landis 2017). Similarly, reducing crop genetic diversity lowers the number of traits and response options to pests and disease vectors, and thus the adaptation to changing biotic and environmental conditions (Kansiime and Mastenbroek 2016). The role of public research and extension will need to increase in helping promote sustainable farming systems and production.

Agricultural water management and irrigation

198. **Agriculture in Uganda is largely dependent on rainfall, which creates an increasing challenge for agricultural production in light of rising climate variability.** Most of Uganda has traditionally experienced at least one long rainy season sufficient for farmers to produce at least one crop per year. Irrigation was mainly practiced during the dry season and at a small-scale, informal level, along the fringes of lowlands (Olet 2017). However, rainfall has become less reliable, and damaging drought events more frequent in recent years. Resulting yield and price volatility affect rural livelihoods, leading to high levels of food insecurity in years of below-average rainfall (CCAFS 2017). Expanded or supplementary irrigation as well as improved water management more generally are needed to increase resilience to higher and more extreme climate variability.

199. **Robust irrigation schemes can boost agriculture productivity dramatically.** Bastiaanssen and Perry (2009) compared biomass production of irrigated land with cereal yields from rainfed agriculture. In Uganda, average cereal yield for rainfed agriculture was 1,539 kg/ha, while yields under irrigated agriculture were as high as 7,064 kg/ha. At an assumed market price of US$ 0.50/kg, the net financial increment due to irrigation was US$ 1,667/ha.

200. **The Government recognizes the critical role of improved water management for agriculture in broad strategy documents such as its Vision 2040 and NDP II (2016-2020), in addition to the new National Irrigation Policy (NIP).** According to the 2017 NIP, total irrigated area should be expanded to 400,000 ha by 2040. This is ambitious insofar as currently only about 15,000 ha of cultivated land is under irrigation countrywide, out of a potential area of 3.03 million hectares (Oketch 2018; GoU/ MAAIF-MWE 2017). Irrigation potentials and rainfall patterns are unevenly distributed across the country. About half of the country has bimodal rainfall distribution that allows for two harvests per year, with annual rainfall reaching up to 1200 mm. Only the north-east of Uganda has one rainy season and low annual rainfall with less than 900 mm. Out of its total area of 241,559 km^2, around 37,000 km^2 or 15% of Uganda is occupied by open water (GoU/ MAAIF-MWE 2017).

201. **Given the poor performance of many larger-scale irrigation systems in Uganda, priority should be given to rehabilitation and improved management of existing schemes.** While performance varies temporally and spatially, the Ministry of Water and Environment (MWE) estimates water use efficiency of existing schemes at 60-70% in average, with other sources speaking of 50% at best (Olet 2017). One reason is the reliance on surface water sources associated with high water losses through seepage and evaporation. Further, most schemes possess inadequate mechanisms for cost recovery, for beneficiary empowerment and engagement in irrigation system management, or for operations and maintenance (O&M). These factors have resulted in low returns on investments, costing in the range of US$6,000 to US$12,000/ ha (ibid.). In the Mubuku scheme, for instance, average yields for milled rice could be as high as 6t/ha under optimal conditions. Yet due to water delivery and distribution constraints and a lack of adequate water management practices on the side of farmers, average yields currently do not exceed 2.5 t/ha of milled rice/maize (ibid.).

202. **The poor performance of existing schemes has further been attributed to institutional inefficiencies and weak law enforcement.** To date, there is no dedicated irrigation management authority, and management capacity at the national, district and scheme levels is limited. The

division of water-related responsibilities and lack of coordination between MWE (off-farm water storage dams and delivery infrastructure to the farm gate) and MAAIF (on-farm irrigation) is a major challenge for overall sector planning and investments in multi-purpose infrastructure. Another challenge is weak governmental capacity to enforce land use and planning regulations and to regulate water abstractions effectively in the face of increasing demand (Olet 2017). Given the severe constraints on public sector resources and capacity, tapping into private sector capital and management skills, for instance through public-private partnerships, will be essential to upgrading irrigation infrastructure and drainage services in Uganda. To this end, the government should create incentives for the private sector by lowering investment risks and by rigorously enforcing land and water use regulations.

203. **While yield increases through well managed schemes can be dramatic, the average costs for irrigation infrastructure and services are often too high for non-commercialized smallholders.** In neighboring Rwanda, medium and small-scale irrigation solutions including sprinklers and fuel-powered pumps are currently deployed. Average irrigation costs have been estimated at US$ 1,500 per hectare arising from the terrain's hilly topography and low accessibility. To increase affordability, the government provides subsidies of up to 50% of the costs for individuals and cooperatives (Fiala and Apell 2017). The sustainability of irrigation hence often depends on farmers' ability to pay, which is presumably enhanced through higher income. Kondylis et al. (2017) demonstrated that combining irrigation with agriculture training, facilitation, and better market access can increase crop yields and foster the cultivation of high-value crops while raising farmers' incomes.



Combining irrigation with agriculture training, facilitation, and better market access can increase crop yields and foster the cultivation of high-value crops while raising farmers' incomes.

204. **For non-commercialized smallholders, low-cost irrigation and water storage options should be supported, in addition to the transfer of water-smart management practices.** Rainwater storage or harvesting systems through farm ponds, valley dams or community tanks that trap rainfall or runoff water in high-rainfall areas can build resilience while providing clean water to rural households. Drip irrigation systems, either solar-powered or through manual pumps (Miti 2011) can more than double incomes and boost agriculture production, especially when tied to microfinancing mechanisms (Awulachew et al. 2005). There are low-cost alternatives such as the "bucket and drip" system at prices that smallholder farmers can afford (Nicol et al. 2015). Other 'water-smart' management options such as the introduction of more drought-tolerant crops or water conservation practices such as terracing and mulching can help foster soil moisture retention and maintain cropping intensity while providing opportunities to diversify into high-value crop production at the same time (ibid.). Monitoring soil moisture through technological advances can be used to mitigate adverse weather patterns, and to provide forecasting and early drought warnings (Fiala and Apell 2017).

Climate-smart agriculture

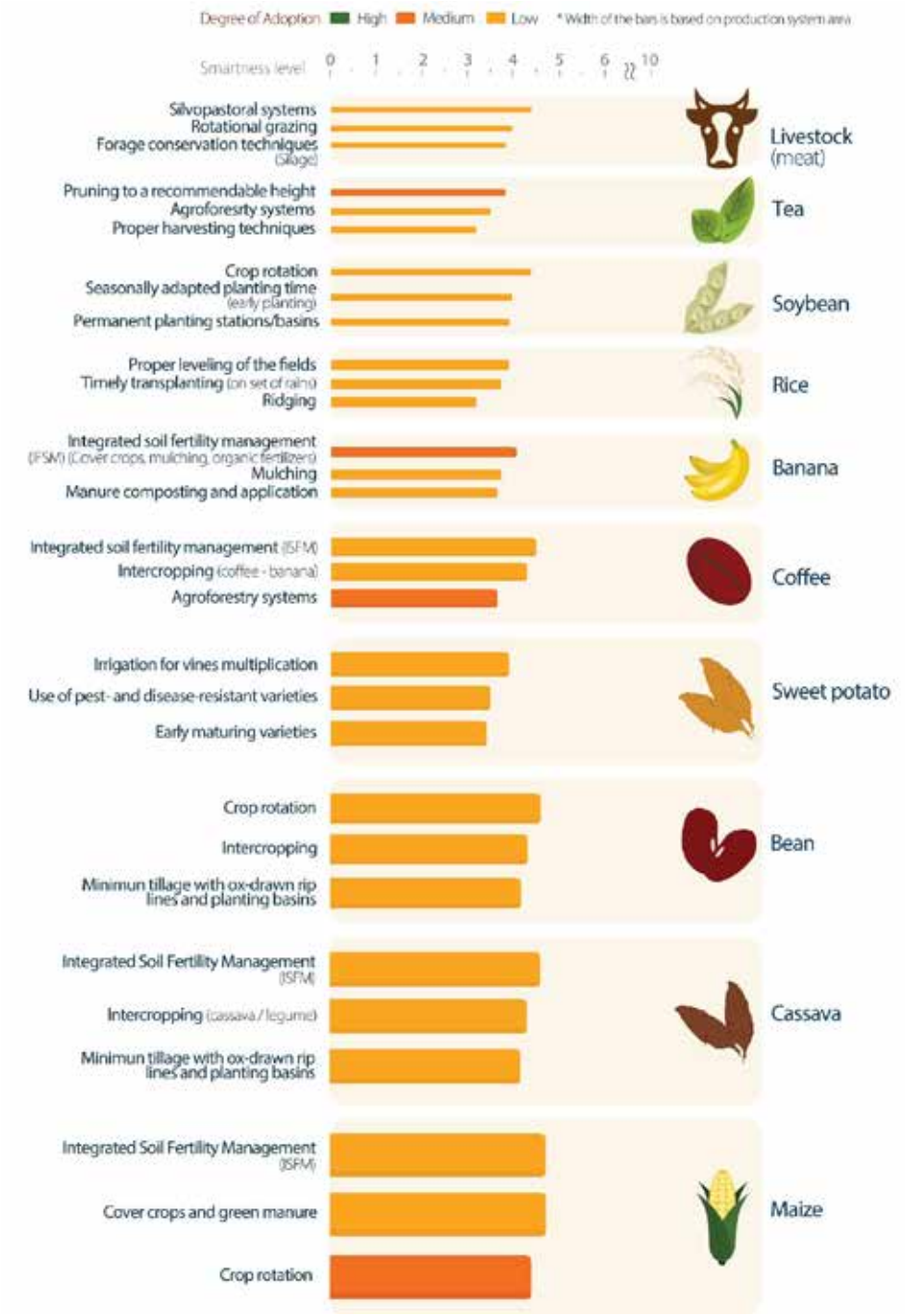
205. **To enhance productivity while fostering low-emissions and climate-resilient agriculture, climate-smart land and livestock management practices are needed.** The climate-smart agriculture (CSA) concept aims to sustainably enhance agricultural production and rural livelihoods, to increase resilience to climate variability, and to lower agriculture emissions or foster carbon sequestration (mitigation) at the same time. For each of Uganda's key crop and livestock production systems, CSA measures are summarized in CCAFS (2017). Crop rotation, integrated soil fertility management (ISFM; e.g. cover crops, mulching), or intercropping staples with nitrogen-fixing plants or trees such as Faidherbia albida are some of the most promising CSA practices which, in addition, provide a vast array of ecosystem services. Adopting ISFM for maize, for instance, increased yields of Rwandan smallholders by 86%, and by 260% in DRC. Net returns per hectare increased by US$ 700 and US$ 600 respectively (Winterbottom et al. 2013). Maize yields on experimental plots in Malawi increased by 116% when intercropped with legumes (Gilbert 2012).



Community seed banks can help access, multiply and conserve seeds of local varieties that are rare and unique, and that possess different functional traits such as early maturity or drought tolerance.

206. CSA measures can further entail the application of organic fertilizers, strategies for integrated pest management, and seed banks. The organic fertilizer Safi Sarvi® as developed in Kenya, for instance, is a mixture of biochar (charcoal made from crop residues), crushed limestone and other plant waste, and has shown to increase crop yields by 30% while simultaneously limiting carbon emissions. The fertilizer also lowers soil acidity and aids retention of soil nutrients and moisture, reducing irrigation needs by 15% (safi.strikingly.com). Push-pull is a strategy for integrated management of pests (e.g. stemborers), weeds such as striga, and poor soil fertility by using a natural repellent (push) and an attractant (pull). Testing the impact of Push-Pull (PPT) adoption on the welfare of smallholders in Uganda, Chepchirchir et al. (2017) found that average maize productivity was nearly three times higher for adopters compared to non-PPT plots. To protect crop genetic diversity and reduce farmers' dependency on external inputs, community seed banks are key. Community seed banks can help access, multiply and conserve seeds of local varieties that are rare and unique, and that possess different functional traits such as early maturity or drought tolerance. They can further enhance related indigenous knowledge and skills in plant management, including seed selection, storage, and distribution (Vernooy et al. 2017).

FIGURE 6: SELECTED CSA PRACTICES FOR KEY PRODUCTION SYSTEMS IN UGANDA



Source: CCAFS 2017

207. Albeit Uganda has one of the lowest greenhouse gas (GHG) emissions per capita in the world, emissions grew by 50% between 1990 and 2012. The agricultural sector has the highest emissions, contributing about 46.25% to the country's total GHG emissions (CCAFS 2017). Livestock (enteric fermentation, manure left on pasture) is the highest contributor, followed by burning savanna and the cultivation of organic soils. To reduce emissions from livestock, opportunities such silvo-pastoral systems can be promoted for the sustainable management of rangelands and pastures. There is also a high potential for emissions mitigation through zero grazing and the use of feces for household biogas production in intensive livestock systems. From pastoralism, methane emissions can be reduced by improving pastoral livestock keeping practices, such as the use of improved breeds and feeding regimes.

208. **The introduction of CSA practices should account for differences in terms of risk perception, adaptation capacity, and information levels between men and women.** A study by Kristjanson et al. (2015), for instance, revealed that women are more likely to perceive climate change and to experience related shocks. However, they usually had access to less types and sources of targeted, timely and credible information on the nature of changes and appropriate response options. Besides, women typically had less knowledge of feasible adaptation practices.

209. **While Uganda specifically mentions the expansion of CSA as main area for action in its Nationally Determined Contribution (NDC), several barriers to adoption need to be overcome.** Alongside its NDC, Uganda developed climate change mainstreaming guidelines and a 10-year Climate Smart Agriculture Program (2015-2025) which have the potential to foster the adoption of CSA on a community or even landscape level. Yet, several barriers need to be overcome which entail, among others, physical inputs such as land, human resources, equipment, infrastructure and finances, as well non-physical barriers such as policy and regulatory environments; knowledge and skills; or technologies and innovations (James et al. 2015). For instance, there is limited knowledge of key CSA practices among farmers and particularly women, as well as a lack of access to assets. Many CSA practices require special equipment or materialize economically only after a few years and some initial investment. A lack of secure land rights often inhibits long-term investments in sustainable agriculture. Since perceptions of risks and adaptation strategies differ across gender, approaches to CSA and information transfer are required which are gender-sensitive and tailored to the needs and knowledge levels of smallholders (van Campenhout 2017).

210. **Successful practice of CSA further requires an enabling environment characterized by functional institutions, regulations and coordination; as well as governance structures favoring the generation, dissemination, and use of CSA.** Uganda's National Agricultural Advisory Service (NAADS) and research network (NARO/NARS), for instance, currently do not seem geared towards CSA promotion. To this end, it will be important to raise investment in sustainable agriculture research and development. Besides, many CSA-related projects and policies in Uganda are implemented in a fragmented manner with limited coordination, hampering the awareness and success of CSA more broadly. Improving the agricultural extension system and ensuring its staff have adequate technical capacity and knowledge to disseminate tailored, gender-sensitive and climate-smart technologies will be a key action area. Moreover, the GoU could promote greater coherence, coordination and integration among food security, poverty reduction, economic development, social security and climate change adaptation/mitigation efforts as well as related strategies, and mainstream climate-smart agriculture into broader public policy, expenditures, and planning processes (Harvey et al. 2014).

211. **To foster CSA adoption across Uganda, the dissemination of CSA technologies and knowledge needs to be accompanied by innovative business models, financial, and other incentives.** CSA provides opportunities for novel financial instruments to foster agricultural technology adoption, including climate and value-chain finance, both of which can be harnessed to deliver CSA benefits to smallholders. In Ghana, Nicaragua and Peru, for instance, voluntary certification schemes were tested in coffee and cocoa producing smallholder organizations (Vermeulen and Dinesh 2016). Resulting from the collaboration between the research center IITA, the certification agency Rainforest Alliance and the impact investor Root Capital, as well as public and civil society actors, smallholders incorporated site-specific CSA practices, received a 'climate-smart certification', and are now producing in commercially viable and climate-resilient agriculture systems.

212. **Multi-stakeholder platforms can help to identify and prioritize the most cost-efficient CSA practices for a given agroecological context, to develop 'farmer friendly' financial incentives, and to channel investments effectively.** The Climate-smart Lending Platform, for instance, helps lenders incorporate climate risk in their loan portfolios while incentivizing the adoption of climate-smart farming methods by smallholders. The Platform helps to mainstream CSA metrics into the credit scoring systems of financial institutions to improve their agricultural lending portfolio, as well as to develop climate-smart loan products for traditional and non-traditional lenders. The GoU could explore such collaboration opportunities with various stakeholders towards a coordinated approach to CSA in the country, for instance through the National Climate-Smart Agriculture Task Force. An overview of CSA-related stakeholders, programs and projects in Uganda is provided in FAO (2016b).

Monitoring vulnerability

213. **Although Uganda is highly vulnerable to increasingly frequent and severe droughts, floods and pest outbreaks which endanger the country's already fragile food security situation, information on weather and climate as well as disaster management has often focused on relief and rehabilitation.** El Niño-induced food insecurity and famine risk in northern Uganda in 2016 as well as the outbreak of the fall armyworm (FAW) demonstrate that responses were still largely reactive than proactive. Limited hard (e.g. weather/climate observing infrastructure and communications equipment) and soft (e.g. weather forecasting and analysis) technologies as well as human capacity to utilize these tools have resulted in inadequate monitoring and forecasting of climate hazards; insufficient communication and restricted responses to impending climate hazards; and constrained planning for long-term climate changes in economic development and risk reduction efforts (UNDP n.d).

214. **To build public awareness of the threats of climate-related hazards and to mitigate their impacts on food security and livelihoods, the Government of Uganda is refocusing its disaster risk management strategy to proactive preparedness and prevention.** Early warning systems are an important element of this strategy. An Early Warning System (EWS) generates information that allows individuals and communities exposed to hazards to act in a timely manner, and to prevent or reduce their exposure to climate and disaster risks. For EWS to function properly and to ensure that the needs of both decision-makers and primary users are met, it is critical that countries, regional organizations, development partners, and private sector entities collaborate closely. Moreover, EWS for food security should not be perceived as emergency response mechanisms, but they should become a critical part of an expanded food security information and analysis system that can produce relevant, viable and credible information necessary to respond to short-term emergencies, and to contribute to longer-term development programming at the same time (Braimoh et al. 2018).

215. **There are several organizations and agencies implementing EWS in Uganda, with varying spatial and temporal responsibilities.** Uganda has established a National Emergency Coordination and Operations Centre (NECOC) whose primary function is the generation of EW information and their dissemination by appropriate media to members of the National Platform for Disaster Risk Management, District Disaster Management Committees, and communities. Alongside NECOC, main actors entail the Ministry of Agriculture Animal Industries Fisheries (MAAIF), Agency for Technical Cooperation and Development (ACTED), Famine Early Warning Systems Network (FEWS NET), Uganda National Meteorological Authority (UNMA), and the Ministry of Health (Atyang 2014).

216. **Uganda's National Disaster Preparedness and Management Policy of 2011 details the collection and dissemination of EW information as well as activities such as risk mapping and vulnerability assessments by mandated institutions.** However, there is no clear channel through which collected information should flow to the coordination center (National Emergency Coordination and Operations Centre; NECOC), in the Department of Relief, Disaster Preparedness and Management. Besides, standardized protocols are lacking for warning communication and dissemination, effective coordination and data exchange among the actors in the EW process. The policy stipulates that the Uganda Broadcasting Council and Uganda Telecommunications Commission establish memoranda of understanding (MoUs) with FM radio stations and mobile phone companies to send out early warning messages through their facilities (Braimoh et al. 2018). Currently, the electronic media and FM radio system disseminate EW information upon release of weather forecasts through talk shows. To provide reliable and accurate early warning messages in a timely manner, better coordination among agencies involved in EWS and private sector companies such as broadcasters is needed.

217. **To strengthen Early Warning (EW) mechanisms in Uganda, several barriers need to be overcome.** This entails institutional, financial, sustainability, and technical challenges. For instance, there is poor coordination of response and accountability, and a lack of adequate policies supporting disaster risk management. Early warning information is transmitted to relevant ministries and other agencies, which however are not well aligned, making it hard to arrive at a coordinated action. Moreover, funding is inadequate and non-constant, leading to insufficient equipment, knowledge and capacity levels as well as threatening the sustainability of existing early warning systems. Due to limited technical capacity, most of the country's

EWSs do not have a forecasting element to them, making it hard to engender early action. Existing forecasts regarding climatic factors, food security or commodity prices face challenges to downscaling to local levels such as districts or villages. Finally, EW methodologies, tools, and techniques are often inadequate or poorly integrated, threatening the reliability and timeliness of EW information.

218. **To improve early warning mechanisms in Uganda and ultimately foster food security and resilience, several measures can be undertaken.** The incorporation of climate forecasts into nationally available EWSs and tools should be supported to foster timely action. To this end, specialized training on the use of forecast models and tools should be provided, and capacity built to better downscale information to the subnational level. EWS messages should be user friendly and include risk information that link threat levels to response actions. They should be provided by a single or coordinated authoritative source. Technical and financial capacities should be better aligned across national and local governments to facilitate the out-scaling of relevant EWSs and tools. In addition, vulnerable households and communities should be supported in developing emergency response mechanisms at the local level. A national early warning committee or secretariat could be established to coordinate across jurisdictional levels. Finally, the government should be supported in developing a comprehensive law on disaster risk management and food security-related emergencies (Braimoh et al. 2018).



VI.

Agricultural Policy, Policy Implementation and Public Finance

- There is a disconnect between stated agricultural policies and actual implementation. This gap is partly related to a lack of coordination among responsible institutions.
- While policy documents emphasize the importance of the agriculture sector, de facto budget allocations have remained modest.
- At the same time, inefficiencies in spending are high. The major share of funds allocated to the NAADS budget line (70-80 per cent) has been used for purchasing and disseminating subsidized inputs, especially since the creation of OWC in 2013.
- Other institutional challenges are inefficiencies in staffing patterns, weak data collection and monitoring of sector trends, and a lack of monitoring and evaluation capacity by the Government.
- The free distribution of subsidized inputs has undermined quality seed production by the private sector, and led to the crowding out of the private sector from distribution.
- Producer price incentives for traditional exports such as coffee and tea are often not well correlated with world market prices. Domestic transfer costs can be very high.
- Trade liberalization and reforms since the early 1990s resulted in big gains for agricultural GDP as a whole, diversifying products and markets, and increasing FDI. Yet, while Uganda faces a relatively open market for agriculture commodity exports, non-tariff barriers (NTBs) continue to pose a big challenge.

Stated agricultural policies

"Today, the most important plans for agriculture are the National Development Plan (NDP) 2 and the Agriculture Sector Strategic Plan.

219. Agriculture has been a key area of policy attention at least since the 1990s, including in the national development plans and sector development policies.[17] Today, the most important plans for agriculture are the National Development Plan (NDP) 2 and the Agriculture Sector Strategic Plan. In addition, multiple agriculture-specific policies have been adopted or are under consideration. Main recent policies include a National Coffee Policy (2013), which sets ambitious targets for increasing coffee output; a National Fertilizer Policy (2017); the National Agricultural Extension Policy (2016), a draft National Seed Policy (under consideration), and a National Irrigation Policy that has been presented for cabinet approval. Uganda has further subscribed to multiple regional treatises and commitments including those linked to the EAC and to COMESA, such as the Seed Harmonization Implementation Plan (COMSHIP; see above)

[17] This section draws heavily on FAO (2017b), which was commissioned for present paper.

220. **The government of Uganda's long-term vision is to transform the agricultural sector from a predominantly subsistence to a commercial one.** This vision has served as the motivation for programs such as the Plan for Modernization of Agriculture (PMA), implemented in 2001, and designed to address the factors that undermine agricultural productivity, such as limited access to credit, weak transport, communication and marketing infrastructure, and land tenure insecurity (EPRC 2009). PMA was structured around seven areas of policy and institutional reform, of which MAAIF took particular responsibility for the first two areas, namely: (i) agricultural research and technology development, operationalized through the National Agricultural Research System (NARS); and (ii) agricultural advisory services, implemented by NAADS (EPRC 2009; Benin et al. 2011). NAADS was centered around the role of farmer institutions in empowering farmers to procure advisory services and to conduct demand-driven monitoring and evaluation of advisory services (Benin et al. 2011).

221. **The Agricultural Sector Development Strategy and Investment Plan (ASDSIP or DSIP 1) 2010/11–2014/15** was formulated with a view to operationalize and prioritize investment in the agricultural sector, as a precondition to the signing of the CAADP Compact. PMA, NAADS, and NARS (NARO) remained at the core of implementing the strategy. ASDSIP had four program areas of implementation, namely: (i) enhancing agricultural production and productivity; (ii) improving access to and sustainability of agricultural markets; (iii) creating an enabling environment for investment in agriculture; and (iv) institutional strengthening in the agricultural sector. However, a NAADS review undertaken around the time of the launch of ASDSIP highlighted the weak relationship between research institutions and extension agents. The consensus was that agents lacked access to quality technologies and were therefore unable to provide sound, research-based advice to farmers. As a result, the Agricultural Technology and Agribusiness Advisory Services (ATAAS) project was launched in 2010—ostensibly as a reformed "NAADS II"—and co-implemented by NARO and NAADS.

222. **A new Agriculture Sector Strategic Plan (ASSP) 2015/16–2019/20 has been designed,** following the adoption of the National Agricultural Policy (NAP) in 2013 and an evaluation of the now expired ASDSIP. The ASSP was approved by Cabinet in 2016 although the final version has not yet been published. The National Development Plan (NDP II) 2015/16–2019/20, which identifies agriculture as one of five priority investment areas and is designed to propel Uganda towards middle income status by 2020, provides the overarching framework for the ASSP. The ASSP proposes the introduction of a new Agriculture Extension directorate. Moreover, the PMA Secretariat, which supported the development of the DSIP and ASSP, was closed as the PMA had been superseded by the current sector strategies. The revised list of semi-autonomous MAAIF agencies still includes NAADS, NARO, the National Animal Genetic Resources Center and Data Bank (NAGRC&DB), and various sector authorities (e.g. for the coffee, cotton and dairy sectors).



223. **The ASSP has the same four "program areas of implementation" as did its predecessor ASDSIP, with the important addition of Operation Wealth Creation (OWC), established in 2013.** As discussed above, OWC is a Presidential initiative that provides a variety of agricultural and non-agricultural services to rural populations, such as agricultural support, housing and rural infrastructure. At the core of its agricultural program is the provision of farming inputs and credit to farmers. As such, OWC appears to have replaced some of the functions previously performed by NAADS. Already the OWC budget is substantial in comparison to that of MAAIF, and there are concerns that OWC is crowding out investment in important areas, especially extension services. Current uncertainty about MAAIF's future role in OWC and the budgetary implications of the scaling up of OWC follows more than a decade of developing, adopting and reforming a plethora of major policies, strategies and initiatives for agricultural transformation. This makes for a highly uncertain and complex policy environment.

Policy implementation and public finance

224. **While the record of written agricultural policies is impressive in Uganda, there has been a disconnect between policy formulation and actual implementation** (World Bank 2015c). For example, while policy documents emphasize that agriculture is a critical sector, de facto budget allocations have been limited, and are far from the 10 per cent of total expenditures that the CAADP compact recommends. Moreover, the funds that are allocated have been used inefficiently, not least due to significant ad hoc decisions not aligned with policy documents. Data collection, monitoring and follow-up to understand 'what works' and to update policies accordingly have likewise been neglected. MAAIF spending declined in nominal terms by 15% between 2006/2007 and 2012/2013, from US$ 436 million to US$ 244.5 million (Joughin and Adupa 2017).

> *MAAIF spending declined in nominal terms by **15%** between 2006/2007 and 2012/2013, from **US$ 436 million** to **US$ 244.5 million**.*

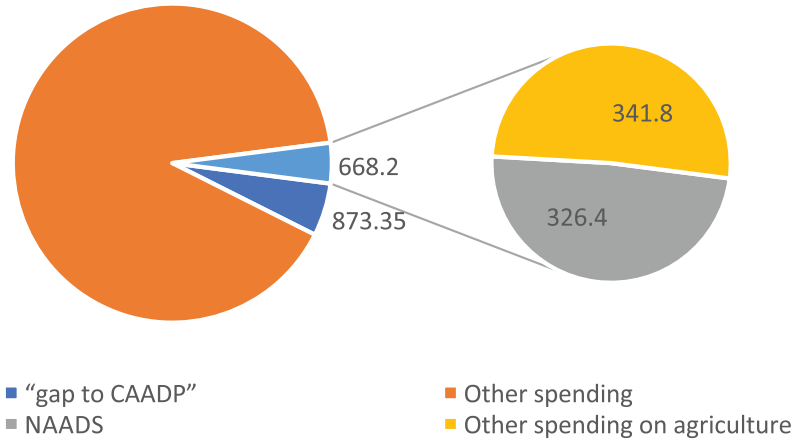
225. **The gap between policy formulation and actual implementation can partly be related to a lack of coordination among responsible institutions.** While the main national level institution, MAAIF, has a central role, it is neither the main decider on policies, nor the sole implementer. Multiple stakeholders engage in the agriculture sector, some of which are under the guidance by the Presidency and agriculture advisors. These comprise the network of research institutes (NARO/NARS), regulatory bodies for three main commodities (coffee, cotton, dairy), and 'commodity platforms' for seeds, maize and oilseeds. Besides, coordination with other ministries with impact on agriculture (e.g. water resources, local government, roads and transport, land, trade and cooperatives) has remained weak. Decentralized governments continue to have responsibilities related to agricultural extension, land management, and the support of farmers' groups, but they are constrained in their functioning through a lack funding, alongside other challenges (Joughin and Adupa 2017).

226. **While budget allocations to agriculture have remained modest, inefficiencies in spending are high from the standpoint of increasing agricultural value-added.** For instance, most funds allocated to the NAADS budget line (70-80%) have been used for purchasing and disseminating subsidized inputs, especially since the creation of OWC in 2013 (Joughin and Adupa 2017). Alongside its core mission to provide farming inputs and credit to farmers, OWC also provides non-agricultural services to rural populations, such as housing and rural infrastructure. Importantly, members of Uganda's Armed Forces distribute farming inputs without necessarily transferring knowledge of their application or other relevant extension services. The role of MAAIF/NAADS has been largely reduced to the procurement of inputs and technologies (FAO 2017b). While a detailed assessment is lacking, news reports and an OWC review by the Ugandan Parliament suggests that the level of waste of resources is high, inter alia due to poor input purchasing and handling, and misallocation of distributed inputs (Joughin and Adupa 2017).

227. **Key budget allocation decisions are seen as being made by the Presidency rather than by the Ministry itself, or through consultations between MAAIF and MoFPED.** As a consequence of limited budget allocations, and reinforced by significant variations during budget implementation, as well as the relatively high importance of external funding, Ministry staff are perceived by development partners and other stakeholders as paying only limited attention to the preparation of budgets and their correspondence with sector policies.

228. **Staffing patterns suggest institutional inefficiencies.** MAAIF has a substantial discrepancy between allocated positions (411) and actual staff (279) as of April 2017. In particular, critical regulatory functions such as the National Seed Certification Service (NSCS) remain weak. Re-hiring of extension workers has started, and nearly 2,000 were recruited. However, as of the first half of 2017, they did not have sufficient operating budgets to undertake extension services.

FIGURE 7: DOMESTIC FISCAL ALLOCATIONS TO AGRICULTURE AND WITHIN AGRICULTURE:
averages for FY2016/17-FY2018/19 (approved and projected budgets, in billions of Ugandan Shillings)



Source: Joughin and Adupa (2017)

229. Data collection and timely monitoring of sector trends has also remained weak. For example, the most recent statistics published by UBOS and MAAIF are the 'Uganda Census of Agriculture', published in late 2010, and reflecting 2008/09 data (UBOS 2010). Generally, data collection for the sector is relatively costly, since it requires visiting a range of localities. Thus, data on yields is not considered to be very reliable. Data remains unavailable in a number of other critical areas, such as on mapping soil qualities and changes. Several initiatives are under way to improve this situation, including a National Agricultural Sector Statistics Committee (NASCC) established in early 2015, and a Statistics Division established in MAAIF.

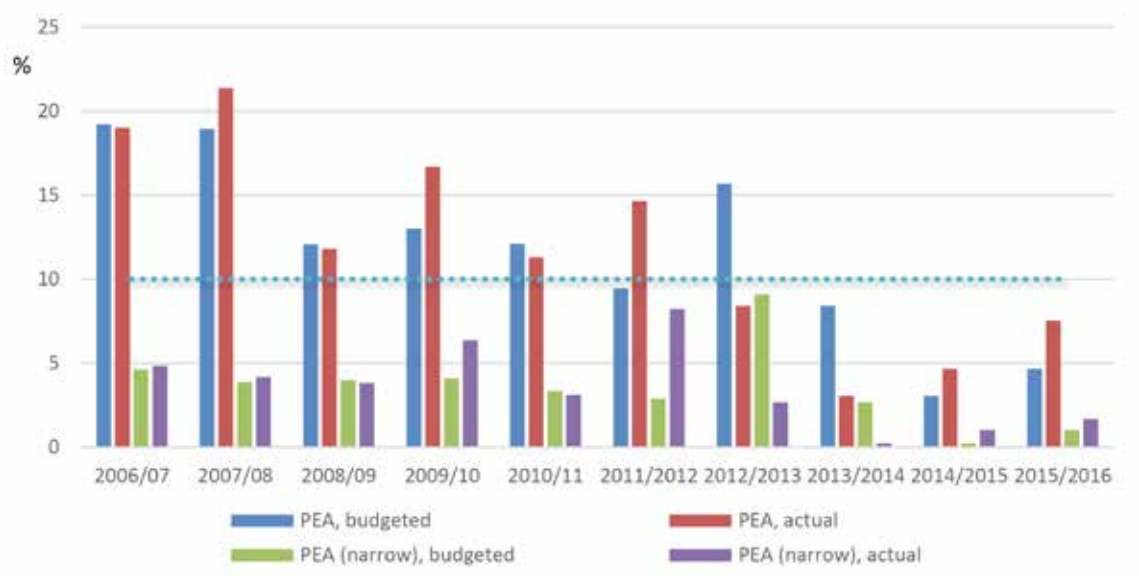
230. Recent trends in funding show both movement in the right direction and the difficulties in doing what is needed. The 2017/18 sector overall "approved" budget for agriculture had an allocation to MAAIF of ~US$ 227 million[18], making up ~3.6% of the national budget and a 5% increase compared to 2016/17. The largest shares of agricultural resources are allocated to MAAIF and to NAADS. However, development partner funds make up ~80% of public allocations to agriculture, and are only partially reflected in the national budget, and are difficult to project (Joughin and Adupa 2017). With development partner funds fully added, agriculture is estimated to account for 4.2% of total public expenditures in 2017/2018. Projections for 2018/2019 are that agriculture will get less in 2018/2019 at 3.9% of total spending, due to a decline in development partner funding (the national budget share is projected to increase slightly, by 0.2%). The budget share going to NAADS (largely for input procurement for OWC) will drop from 45% of agricultural funding to 41% (GOU/MoFPED 2018).[19]

*With development partner funds fully added, agriculture is estimated to account for **4.2%** of total public expenditures in 2017/2018.*

231. Actual expenditures were well below budgeted amounts in most years, reflecting issues in the implementation of projects and programs, and the poor absorption capacity of the public institutions involved. MAAIF has regularly come under fire after internal audits revealed unsatisfactory levels of service delivery (MoFPED 2014). Figure 8 tracks both broad ("PEA") and narrow ("PEA narrow") definitions of agricultural expenditure over the 200607 to 2015/16 period. PEA does a better job than PEA narrow of capturing the true public spending effort to support agriculture in Uganda, since the PEA narrow definition is unduly restrictive (see notes to Figure 8).

[18] At the mid-March 2018 exchange rate of UGX 3,638 = US$ 1.00
[19] The source for 2018/2019 projections is the MAAIF budget contained in the MoFPED Second Budget Call Circular of February 15, 2018, as shared with the March meeting of the Agriculture Sector Working Group.

FIGURE 8: ALLOCATED VS. ACTUAL AGRICULTURAL EXPENDITURE IN UGANDA 2006-2015



Source: FAO (2017b)

Notes: PEA is Public Expenditure on Agriculture, composed of MAAIF spending plus all other non-MAAIF government spending in direct support of agriculture, such as agricultural infrastructure, estimates of Government agricultural spending supported by development partners off the MAAIF budget, or inputs purchased by Government outside the MAAIF budget. "PEA narrow" is the less expansive Africa Union Commission definition of PEA, which adheres more closely to the UN Classification of Functions of Government (COFOG) definition of PEA. See http://www.fao.org/mafap for discussion of PEA categories. The dotted blue line in the figure is the CAADP commitment of 10%.

232. **However, whether broad or narrow, actual PEA spending was far below budgeted spending in 2012/2013 and 2013/14,** contrary to the earlier and later periods where actual spending was in line with or exceeded budgeted spending. Declining allocations to agriculture from the Ministry of Finance, Planning and Economic Development (MoFPED) after 2012/13 may in part be a response to weakening absorption capacity in MAAIF and its related agencies (FAO 2017b). In any event, it is clear that MAAIF and its associated agencies have difficulty in matching actual to planned expenditures.

233. **The large development partner role in financing agriculture may also hinder fiscal management and agency continuity.** For example, the Government allocation to NARO, the Ugandan NARS, which has benefitted commendably from increasing funding in recent years as set out above, was increased by UGXs 24 billion (US$ 6.6 million) in the 2018/2019 projected MoFPED budget. However, with the closure of a large externally financed project in mid-2018[20] current projections are for no development partner funding after then for NARO and an actual 26% decline in NARO's annual funding (GoU/MoFPED 2018).[21] Other major development partners have preferred to keep their assistance off budget, which makes tracking public expenditures especially difficult.

Incentives in the agri-food sector

234. **The free distribution of subsidized inputs has undermined quality seed production by the private sector and led to the crowding out of the private sector from distribution.** To operate OWC, seeds and seedlings are centrally purchased on a large scale at above-market prices. The availability of free seeds has dramatically reduced the market share of companies that seek to produce quality seeds. Combined with the 2016 drought, the crowding out of private seed companies from distribution seems to have resulted in even less quality seeds available in the market (Joughin and Adupa 2017). Promising initiatives such as AgVerify,

[20] The World Bank funded Agricultural Technology and Agribusiness Advisory Services (ATAAS), a US$ 127.2 million project approved in 2010 and closing June 30, 2018.
[21] The source for 2018/2019 projections is the MAAIF budget contained in the MoFPED Second Budget Call Circular of February 15, 2018, as shared with the March meeting of the Agriculture Sector Working Group.

a scratch code label scannable and transmissible by cell phones and used to improve traceability and seed quality control, have increasingly been sidelined. Finally, the cost of OWC is substantial and borne by all Ugandan taxpayers. Some small farmers who relied on the free inputs distributed have faced large-scale failures of seeds and seedlings, creating increasing criticism of government action (ibid.).

235. **Producer price incentives are often not well correlated with world market prices.** The Monitoring and Analyzing Food and Agricultural Policies (MAFAP) program of the FAO undertook price incentive analyses in key value chains in Uganda (FAO 2017b).[22] MAFAP analyzed the effect of Ugandan policy and market distortions on incentives (or disincentives) received by producers or wholesalers in coffee, tea and cotton, rice and maize to highlight sector-specific features and to draw general conclusions about the distorting effects of Ugandan policies on the agricultural sector.

236. **Producers' price incentives and their driving factors vary significantly across the different value chains.** In the case of rice, a net-imported commodity, there are substantial incentives for farmers to engage in production mainly due to the adoption of the 75% CET on rice imports. However, despite this protection, the sector remains relatively small. Incentives for export crops—including maize, which has emerged as a highly sought-after commodity in regional markets—are generally much lower. The Ugandan government could consider some measures to better promote exports, particularly in the context of a growing regional market and Uganda's favorable agronomic conditions to truly become a "bread basket" in the region (see section IV).

237. **In at least some important instances, producer prices are not highly correlated with world market prices.** This may reflect either a situation where indicative minimum farm gate prices are not directly informed by international market signals, or simply where price transmission effects are weak in the value chain as a result of poor market information available to farmers. Or transport costs are so high that local prices (especially for bulky starchy staples) can in some cases respond substantially to local market conditions before being affected by export or import parity price movements. The former may allow intermediaries along the value chain to exploit producers. In the latter case, an effort is required to reduce transfer costs. A related problem is the perceived large number of intermediaries in some value chains, which further removes producers from world markets in terms of the share of the domestic retail or export price they can command at the farm gate. Of course, extreme volatility in international prices may create both the conditions and an incentive for lags in domestic price transmission (see Muratori 2016), particularly in instances where government policies are aimed at stabilizing domestic prices.

TABLE 8: PRICE INCENTIVES FOR MAJOR CROPS IN UGANDA 2005-2016

(in percent)

	Observed Nominal Rate of Protection (NRP)	Adjusted Nominal Rate of Protection	Market Development Gap (MDG)	% years NRP < 0
Coffee	-14.3	-17.9	-5	83
Tea	-6.3	-24.1	-17.2	50
Cotton	42.7	27.5	-8.1	8
Rice	60	60	0.0	17
Maize	24	23	-1	25

Source: MAFAP in FAO (2017b)

Notes: Definitions of the variables are in the text and the methodology is laid out in FAO (2017c). Further elaboration of the approach is found at: www.fao.org/mafap.

[22] The MAFAP work in FAO (2017b) was funded by the present study and is used heavily in this section.



238. **In Uganda, high transportation costs caused by poor infrastructure remain a significant barrier to trade.** This can mean that it is not profitable to trade at all in some years for commodities that have local outlets, like maize, as remote areas become economically isolated from larger markets, at least in the rainy seasons. For commodities grown primarily for export and with limited long-term storage potential, like coffee, remoteness can make farmers even more vulnerable to intermediaries (Muratori 2016). Besides the uneven quality of transport infrastructure, taxes on fuel play a major role in determining transportation costs (FAO 2017b). Investments in rural roads and other market infrastructure have demonstrated advantages and should be prioritized as part of the agricultural transformation strategy for the country (Benin et al. 2012).

Investments in rural roads and other market infrastructure have demonstrated advantages and should be prioritized as part of the agricultural transformation strategy for the country.

239. **A summary of policy-induced price effects (incentives or disincentives) is given in Table 8.** The "Adjusted Nominal Rate of Protection at the Farm Gate" measures (in %, respectively positive or negative) the extent to which actual farmer producer prices exceed or are under what is estimated they would be at the farm gate (as part of a global market) – in the absence of major policy distortions in exchange rates, international, or domestic markets. The "Market Development Gap" is the estimated share of the gap between undistorted international prices at the farm gate and actual prices due to "excessive" or inefficient access costs within the value chain in question. These may stem from poor infrastructure, high processing costs due to old technology, government taxes, excess profit margins of intermediaries, bribes and other non-tariff barriers. In effect, adjusted NRP roughly measures the effects of deliberate governmental policy incentives (positive) or taxation (negative), while MDG is a measure of inefficiencies to be addressed in the market chain itself.

240. **For coffee, farmers are receiving less than they should, despite the liberalization of the coffee sector.** International coffee prices are more volatile than domestic ones, so low international prices in 2010-2011 saw positive adjusted NRPs for coffee. However, since then, NRP's have fallen on trend (except briefly in 2014), and exceeded 30% by 2016. Coffee farmers are saddled with poor infrastructure, high domestic transport costs, and high processing costs in getting their product to market.

241. **Tea farmers are in even worse shape in terms of incentives.** Tea is produced both for the substantial domestic market and export. Tea processors in Uganda receive international price premia for exports, but these are not passed back to farmers. The good news is that increased efficiency along the tea value chain should allow farmers to receive a premium for quality, which they presently do not get and hence do not always do the necessary actions to produce the quality needed. Relief for farmers and likely processors in the longer run would come through farmers being in a better position to garner quality premia for tea, which will require organizational forms to provide traceability back to the farm.

242. **For cotton, the world market price is highly volatile, but on average domestic producers are protected by the system in place.** Profitability for farmers is low, so protection helps keep marginal producers in business. The present system however does not encourage investment in either cotton production or in processing, as domestic cotton is expensive.

243. **Rice is an import-substitute and is highly protected in Uganda, as in most members of the EAC** with the Common External Tariff of 75% in place. The Uganda adjusted NRP in 2016 is approaching 90 percent. At the same time, there is a rise of (presumably subsidized) rice exports from virtually none in the early 2000s to an annual average approaching US$ 30 million in the 2011-2015 period (COMTRADE via WITS). The high policy-induced rice price is a significant tax on domestic rice consumers in Uganda. This combined with the rise of rice exports makes it difficult to view rice protection as justifiable by food security concerns.

244. **Maize prices in Uganda and thus NRPs calculated with respect to maize imported from outside the region are significantly dependent on regional demand for Ugandan maize.** The output market for maize in Uganda is completely liberalized. There has been no significant government incentives intervention (other than input subsidies) since the 1990s. Strong regional and national demand for maize since the 2008 global food price crisis (except in 2012) have kept Ugandan and EAC prices high relative to world prices without protection, especially given high transport costs.

245. **In sum, in the early 1990s, Uganda had a strongly protectionist and distorted agricultural trade regime, with taxes on coffee (the major export) and high tariffs and restrictions on imports, and especially on agricultural commodities.** By the early 2000s, however, a more liberal trade regime was put in place for agriculture. Direct taxes on exports, including on coffee, were eliminated. To correct the remaining anti-export bias of the trade regime, there were also (inefficient) incentives under which import duties on certain raw materials could be refunded under VAT and a duty drawback scheme. Under the Fixed Duty Drawback (FDD) scheme introduced in 2000 and which applies also to exporters of agricultural and fishery products, duties paid on inputs that went into production of exports are refunded.

246. **By the end of the 2000s, the average simple MFN tariff on non-agricultural imports was 12.6 percent, but the agricultural sector was afforded a higher degree of tariff protection at 19.9 percent.** In trade-weighted terms, the applied average tariff for non-agricultural imports was 8 and that for agricultural imports was 23.7 percent (World Bank 2010). By 2015, the average simple MFN tariff had dropped only slightly further to 11.7 percent and the trade-weighted applied tariff (including preferences) to 7.9 percent, while that applying to food imports had decreased to 14.2, from 22.2 in 1990 (World Bank WITS query).

247. **Uganda also faces a relatively open market for its exports, with the trade-weighted average tariff applied by the rest of the world at the end of the 2000s at only 3.1 percent for its non-agricultural exports and only 4.5 percent for its agricultural exports.** Following implementation of further trade liberalization within COMESA and within the EAC, average tariff rates faced by Uganda's agricultural exports are likely to drop further.

*Uganda also faces a relatively open market for its exports, with the trade-weighted average tariff applied by the rest of the world at the end of the 2000s at only **3.1 percent** for its non-agricultural exports and only **4.5 percent** for its agricultural exports.*

248. **Non-tariff barriers (NTBs) continue to pose a big challenge to Uganda's exports.** For example, in markets, where Uganda's products enjoy preferential treatment, such as the US Africa Growth and Opportunity Act market, entry remains very difficult on grounds of quality, packaging, handling and so forth. Even at the regional level, NTBs continue to affect negatively Uganda's exports in the form of delayed procedures, unwarranted excuses for rejection at entry, and deliberate misinterpretation of COMESA and other trade provisions (Government of Uganda 2010).

249. **Overall, the liberalization and reform process that began in 1993 resulted in big gains, increasing the country's openness, diversifying products and markets, and increasing FDI** (World Bank 2013). As a result of a liberalized trade environment:

    - **Uganda trades in a greater range of products:** This is particularly true for agricultural products, although trade diversification has extended into non-agricultural products, particularly non-traditional service exports. Uganda's goods and services became more diversified as local firms became more competitive, particularly in non-traditional exports, such as processed fish, flowers and foodstuffs such as grains.
    - **Uganda has more diversified markets, mostly among its neighbors:** Uganda has increased its share of the world export market, while at the same time, Kenya's and Burundi's share declined. While trade beyond the continent remains very important, trade within Africa has grown at a considerably faster rate. The share of exports to the EU, the main destination for Uganda's exports, declined, mostly due to increased trade with the Great Lakes regional economies. As the terms of trade became favorable to Uganda in the 2000s, exporters diversified into new, mostly regional markets. While Uganda runs a trade deficit with its two biggest neighbors, Tanzania and Kenya, it enjoys a trade surplus with Rwanda and Burundi.

VII.



Conclusions: The Big Picture

- Although Uganda is launched on a private-sector-friendly growth path for manufacturing and services, the same does not apply to the large mass of farmers.
- Agricultural public investment and policies are presently largely devoted to distributive rather than productive ends.
- A concerning picture emerges of agricultural production challenges unmet, declining productivity, increasing natural resource degradation, and looming climate change.
- Yet there is considerable hope from booming demand, new agricultural technology in the ICT and data spheres, a growing skills base, and enhanced understanding of how to better include large numbers of smallholders in increasingly more demanding high-value agricultural markets.
- The present report identifies key issues for strengthening the institutional base of agriculture, removing distortions of incentives, increasing total factor productivity growth, facilitating trade, and dealing with resource degradation and climate change.
- Ultimately these are national choices and both the decision to address them and the precise pathways for doing so are best discussed in multi-stakeholder fora under national coordination.

"Overall aggregate agricultural output growth has been modest over the period, at best of the order of ***2.5% p.a.*** *in the 1980s and 1990s, and* ***1 to -1.5% p.a.*** *since then.*

250. The history of Ugandan agriculture has been mixed over the past 5 decades, despite the country's endowment with high quality natural resources for agriculture and a growing rural population. As shown above, total factor productivity (TFP) growth has been poor since the 1970s, and even quite negative on an average annual basis since 2000. Overall aggregate agricultural output growth has been modest over the period, at best of the order of 2.5 % p.a. in the 1980s and 1990s, and 1 to -1.5 % p.a. since then. Some of the decline in measured TFP in recent years likely is due to technical issues such as drought, crop pests or diseases, and declining quality of inputs and land. However, it seems equally likely that a large part is due to falling allocative efficiency due to input subsidies and other government interventions, especially since 2008. Fiscal expenditure on agriculture has until very recently been increasingly devoted to distributive ends, such as input subsidies handed out for largely non-economic reasons, rather than much needed public goods of benefit to all, such as better roads, communications, skills development, agricultural research, and extension services (other than distribution of subsidized inputs). Furthermore, what net agricultural growth there has been is predominantly driven by cropland expansion into other land use areas, higher commodity prices after 2008, and a peace dividend after the Lord's Resistance Army was pushed back from the North. These factors are not likely to be able to add new growth much into the future.

251. **The global commodity boom after 2000 and until 2014 percolated through to Uganda in terms of higher returns measured at the border to its traditional exports of coffee, tea, and cotton, and to non-traditional exports of items like fish and food crops after 2008.** Close to home, South Sudan and DRC provided considerable and sustained outlets for Ugandan agricultural commodities similar to those consumed at home and unlike what was traditionally exported to Europe or Asia. However, the end of the global boom in 2014 and heightened civil conflict in South Sudan and DRC were not kind to Ugandan farmers in 2015 and especially 2016. Fortunately, 2017 and early 2018 have been more encouraging, as regional demand for highly processed food and more expensive calories such as animal sourced foods is once more growing rapidly. The same has been true for traditional agricultural exports such as coffee and tea, increasingly exported to the emerging economies of Asia, and where quality premia are rising, at least at the level of the exporting firms.

252. **As seen above, agriculture accounted for nearly four-fifths of the very substantial poverty reduction from 53% to around 20% of the national population as assessed in a comprehensive review from 2005 to 2013** ($1.90/day 2011 constant PPP $). However regional inequality also worsened, with the Northern and Eastern districts not growing as fast. This has likely helped encourage the metamorphosis of significant agricultural programs from ones mainly focused on productivity objectives to ones concerned with equity or distributive ones, with unfortunate consequences for continued productivity growth and sustainable poverty reduction going forward. The fact that apparent equity transfers through input subsidies also appear to have not been very effective at fostering incomes among intended poor farmer targets has worsened matters.

*Agriculture accounted for nearly four-fifths of the very substantial poverty reduction from **53%** to around **20%** of the national population as assessed in a comprehensive review from 2005 to 2013.*

253. **Relatedly, the institutional base for public engagement in stimulating agricultural development in Uganda has gone through considerable volatility and wide swings in approaches over the past 20 years,** as set out above. This was manifested in a fragmented set of agricultural institutions with overlapping and unclear responsibilities. This has been particularly true of extension services, which in recent years have accounted for up to half of all public agricultural expenditure, but primarily for subsidized inputs distributed by the military. Some form of extension is likely to remain an important factor that can contribute to increased and effective adoption of improved technologies by medium and small farmers. It is widely recognized amongst agricultural stakeholders at all levels, including key parts of the government, that the public role needs to shift away from the distributive one of providing private goods (inputs) with public money. Instead there is a need to use scarce funds to provide non-capturable public goods such as improved research, extension, and institutional development that facilitates investment in the sector. Uganda is already heading in the right direction here with higher budgets dedicated to research and extension other than inputs, but there is much more to be done.

254. **Private sector investment in Uganda agriculture—whether by smallholders on their own plots or by large-scale investors—has been modest compared to Kenya, Tanzania, or Ethiopia.** On the smallholder side, this appears to be linked to difficulties in securing finance and uncertainties about whether land invested in can be retained. As was seen above, less than 20% of land can be said to have secure tenure of the type required as collateral for formal loans. The guaranteed market for quality maize provided by long-term World Food Program (WFP) procurement in Uganda, coupled with sudden availability of contiguous larger plots of land from peace in the North has enabled significant private sector supply response to the governments liberalization of maize markets, but insecurity of usufruct rights has limited this expansion as well.

255. **The combination of Uganda's natural resources and agricultural skills place it in a strong position to expand rural incomes widely and to stimulate overall economic growth by selling into a new commodity boom** taking place based on regional demand (for products such as confectionary, fish, maize, animal feed, vegetable



oil, and dairy), and perhaps globally in the case of high value traditional (coffee, tea) and non-traditional (for example fish, cocoa, spices, flowers). Even domestically, but especially regionally and definitely globally, agricultural value chains are rapidly becoming higher value, more processed, longer, wider, and more anonymous. They are also becoming more demanding in terms of quality and reliability of shipments. Private firms in Uganda as well as elsewhere in the region have serious problems securing reliable supplies of raw material. Farmers on the other hand have increasing difficulty achieving market recognition for their products sold on spot markets.

256. **Capitalizing on this opportunity will require securing supply chains through more extensive vertical coordination of smallholders into higher value supply chains in a way that they have both the incentive to produce more and better, and the tools to do so.** Examples in Uganda and around the world show that the private sector working in collaboration with producer organizations and individual smallholders is the best way to show progress here. This also supports better post-harvest handling, particularly storage, at smallholder and aggregation/warehouse levels that would reduce post-harvest losses and improve prices received by smallholders. There is a need for skills and capital transfers, and for branding that the smallholder supplier can benefit directly from. The Government on the other hand needs to support vertical coordination efforts through ensuring a level playing field, promoting the formation of farmer groups and producer organizations, facilitating information flows, improving infrastructure, and removing regional barriers to trade.

257. **The analysis above identified in some detail serious issues with the regulatory system applied to agriculture.** The quality of agricultural inputs available in smaller quantities to smallholders is a particular problem. Evidence shows that this includes but is not limited to inputs distributed for free to farmers by Operation Wealth Creation. Doubts about the quality of seed and fertilizers being sold or otherwise distributed are a serious barrier to encouraging investment by producers. They also directly harm productivity and explain why Uganda has one of the lowest inorganic fertilizer use rates in the world. In large, part the weakness of the regulatory system is directly related to the state of the public institution base in agriculture. Even if this is solved—and that seems to be the way things are headed—agricultural quality, safety, grading and labeling activities will need to be seriously overhauled and expanded before the label “Made in Uganda” will strengthen sales of the items in question.

258. **ICT development and its extension to rural areas is critical to overcoming the twin tyrannies for business growth of general remoteness and having a multitude of very diverse, and widespread small farms as suppliers.** These tyrannies create high transaction costs for firms attempting to work with smallholders, and vice versa. Rapidly expanding high value agricultural supply chains require good connectivity between suppliers and integrators for passing market and technical information in both directions in near real time. It also requires building trust amongst different actors along the supply chain, in a fundamentally distrustful world. Vertical coordination works best over time for all parties when market incentives are transparent, competition reigns, and both side have recourse in the case of non-performance.

ICT development and its extension to rural areas is critical to overcoming the twin tyrannies for business growth of general remoteness and having a multitude of very diverse, and widespread small farms as suppliers.

259. **In this context, ICT technology, including frontier technologies like BlockChain, are critical to cutting the costs of uncertainty, asymmetries of information, search, monitoring, enforcement, and securization of information on transactions amongst large numbers of small, widely dispersed players.** Countries and supply chains that move first from a "zero-sum-game" model of industrial organization to one of "mutual benefit" will have a leg up in competing for one of the main prizes in contested global food markets at present, which are Africa's own major cities. The combination of public databases on key agricultural variables and solutions, and greatly expanded private connectivity, will be at the center of boosting national competitiveness.

260. **There is an urgent need for high-level consideration of what data pertaining to food and agriculture is most needed, how it can be collected cost-effectively, and analyzed in near real time.** The Uganda National Panel Surveys (UNPS) supported by the World Bank's Living Standards Measurement Surveys were a step in the right direction in providing household level data from sample surveys. Even information as basic as average farm size and how it was changing was missing before these. However, the surveys are aging, and they do not have sufficiently broad coverage for all purposes. For example, Uganda now possesses a reliable system to supply maize to the WFP for shipping to alleviate hunger in South Sudan, but people can die of starvation in the Northeast of the country without the warning signs that could have prevented this showing up in any official database. Undertaking regular IPC assessments, strengthening Early Warning Systems and ensuring resources for action are available sufficiently in advance of crises is needed. The technology for collecting, collating, and analyzing big data has moved on considerably in recent years, and it is far more feasible to implement under Ugandan conditions.

261. **The critical threats of climate change and soil degradation require much greater attention.** While countries such as Uganda may not have created the problem of climate change, they are in the group likely to be most affected. The analysis above reviewed the compelling evidence of the centrality of agricultural incomes directly and indirectly to poverty alleviation. Continued mining of soil and biomass, coupled with rural population expansion, can by themselves prevent the transformation of Ugandan agriculture for shared prosperity. Estimates of the economic losses from soil erosion, compaction, and plant nutrient loss in the last decade range from about 4 to 12% of GDP annually, and the problem has been getting worse (GoU MAAIF et al 2010; Nkonya et al. 2016). A big part of the problem lies in the fact that greater agricultural productivity, greater resilience of household livelihoods to climate change, and more successful adaptation of farming systems rarely result from a technology or other intervention applied to a single farm.

262. **Rather, climate smartness tends to be a landscape-level issue, requiring those up-slope to do one thing, and those down-slope something else, and for a way for the collectivity to compensate those who have to work more for the benefit** of others. Climate-smart agricultural systems also have to take into account how livestock systems need to change; which is especially important for Uganda. As in the food security case

outlined above, big data advances will be critical to attacking climate change and sustainability issues. Advances here in implementation at both the central level (the databases) and the field level (engagement and reporting) will be central to monitoring vulnerability, to identifying issues, and to bringing knowledge to bear in specific cases.

263. Uganda appeared to be making progress on dealing with degradation of the productive landscape for agriculture after the elaboration in 2010 of the comprehensive national Strategic Investment Framework for Sustainable Land Management 2010 – 2020 (MAAIF et al 2010). This set out a series of commendable goals and specific target indicators, including having land use plans in place for 75% of the surface area of the country by 2020 and 15 micro-watershed management plans funded and in place. It is presently not clear that all the objectives set out in the national Framework will come near to being met, in large part due to a lack of a viable overall financing mechanism to bear the substantial cost.



VIII.

Recommendations for Sector Reforms, Investment, and Policy Action

1. Strengthening the renewal of the institutional base

> *Continued volatility in approaches to agricultural extension and the distribution of free inputs pose a systemic risk to the sector. The 2016 NRM Manifesto suggests that extension services are an important political 'project' that is expected to deliver by the 2021 elections.*

264. **Supporting the re-emerging extension service is key.** Support for making the current system functional should be linked to close monitoring of what is being achieved. Continued volatility in approaches to agricultural extension and the distribution of free inputs pose a systemic risk to the sector. The 2016 NRM Manifesto suggests that extension services are an important political 'project' that is expected to deliver by the 2021 elections. There appears to be a commitment to develop agricultural extension through the newly established Directorate of Extension that is directly under MAAIF. However, during earlier periods, the respective responsibilities of MAAIF and of sub-national governments for government extension services remained unclear, and financing remained insufficient. Problems of insufficient operating funds appear to repeat themselves.

265. **The current extension system should move away from the subsidized distribution of sub-standard inputs, and should be rebuilt to increase its efficiency and effectiveness.** Extension services can play a critical role in fostering the adoption of gender-sensitive, climate-smart land and water management practices, and thus in enhancing the resilience of smallholders to climatic and market-related risks. The provision of inputs alone without transferring knowledge, however, can create unintended consequences such as the depletion of soil health and biodiversity. This practice also creates poor incentives for the private sector, and reduces the competitiveness of much needed small and medium agribusinesses.

266. **Extension should be supported by adequate staffing, data collection systems and capacities, and could be amended by non-governmental approaches, investments in radio programs, and farmer field schools.** Improving the extension system should also entail enhancing the linkages between farmers' demands, agricultural research and advisory services, which to date have constrained the development and provision of technologies tailored to farmers' needs. Besides, since key policy and fiscal decisions are often not taken by the MAAIF, but rather the State House, it is critical to foster the engagement with its advisers and other stakeholders such as local governments. In its early days, NAADS was a model extension agency on a continental scale that used producer group feedback to design its community-specific interventions. There is a need to explore institutional memory and to get back to basics, in partnership with the recently established Directorate of Extension and

the research and innovation function provided by NARO. Specific recommendations in this area include to:

- Review the NAADS Act, as the core mandate of NAADS has changed from the provision of agricultural advisory services to the management of Uganda's agricultural input distribution chains, agri-business development, and strategic interventions in value chain development;
- Support the new agricultural extension strategy through ensuring that there is sufficient operational budget for the newly recruited extension staff in the directorate and at local government level, and encouraging non-state agricultural extension as provided for in the National Agricultural Extension Policy. Reducing the percentage of public expenditure that is used for the procurement and free distribution of inputs should release the much-needed resources to build an effective agricultural extension system.

267. **There could be an opportunity to emphasize and support better data collection for the sector.** MAAIF leadership and indeed the whole Ugandan senior leadership team may welcome having more and better data that can help to gauge emerging progress. The results on increasingly negative TFP above likely reflect real problems in the sector, but may also reflect serious ambiguities in the data. The same data source as for Figure 1 (FAO) shows aggregate annual TFP growth for all of East Africa for 2000 to 2014 to be of the order of 0.1%, or very low. This implies agricultural output growing at almost the same rate as inputs and land, which corresponds with casual impressions. But Uganda's measured decline in TFP of the order of 3% per annum in the 2000-2014 period is relatively unique. Getting to the bottom of this should be a national priority. Similarly, the national agricultural data reported by FAO and UBOS show the growth of agricultural output in constant 2004-2006 prices to be essentially stagnant between 2000 and 2014, rising slightly early in the period and declining after 2008 (see data source for Figure 1). This is hard to reconcile with the field-data based poverty survey results reported above showing substantial poverty alleviation based on a 6% p.a. increase in rural incomes in the 2006 to 2012 period (World Bank 2016a).

268. **Supporting data collection, management, and use requires investments that go beyond projectized support, and hence also more coordination of development partners and between the core institutions responsible for agricultural statistics, including the DAES UBOS and MAAIF's statistics division.** District level agricultural statistics are scant or unavailable. Having better data about 'what works' can help to build demand for effective and sustainable government policies in the sector. Investments are likely to be needed both into generating/collecting data (e.g. about inputs used, yields, post-harvest losses, soil quality etc.), data analysis, and generating statistical products that can be accessed and used by a range of stakeholders. For policy makers seeking renewal in the sector, it will be critical to have timely information to steer policies in a pragmatic and evidence-based way. A specific recommendation here is to:

- Establish a core minimum set of statistics based on the Global Strategy for Agricultural Statistics, and include this in the set of official agricultural statistics; delineate the responsibilities between agencies for collecting the core minimum set of statistics; develop a coordination committee for agencies that produce agricultural statistics; and develop a calendar of statistical releases.

269. **Analysis also identified the very large gaps (in some years of the order of 50%) between budget allocations and actual spending.** The agricultural sector and its institutional base needs to be able to stay on top of actual funding, most particularly development partner funding that is frequently off-budget, and spending.

270. **It will be vital to improve coordination based on evidence and analysis between MAAIF and subordinate agencies such as NAADS and NARO, and the coordination of the sector with the MoFPED and the Presidency.** This will require deliberate institutional and human capacity building in MAAIF to carry out activities such as agricultural public expenditure reviews, policy analysis, policy monitoring and policy evaluations. Lessons can be learned from past experience with the World

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Bank-funded Agricultural Support and Monitoring Projects in the 1980s and 1990s, which worked well in Tanzania and not so well in Uganda. A follow up activity to the present report will be undertaken to look in more depth at the nature, distribution, impact, efficiency, and effectiveness of agricultural public expenditures in Uganda.

271. Agriculture is also more likely in the future to need to be able to deal with a variety of economic issues going beyond simple crop budgets, such as regional trade negotiations and the unintended impacts of a domestic natural resource boom from petroleum. Although MAAIF arguably had the institutional capacity to analyze such issues on a day-to-day basis and to advise management on brokering solutions over two decades ago, that is no longer true today. This need is only partially met by external research institutions such as the excellent think-tank Economic Policy Research Center (EPRC) that dates from the Structural Adjustment Era of the 1990s and which traditionally maintains close contact with the Ministry of Finance, Planning and Economic Development (MoFPED). It will be critical going forward for MAAIF to regain capability in partnership with its attached agencies to design and carry out agricultural policy analyses, monitoring and evaluations, and to dialog more effectively on these with its Government stakeholders.

- MAAIF should establish a unit within the Ministry charged with agricultural policy analysis, monitoring and evaluation. The unit should have direct access to the top management of the Ministry. It would need to be staffed by personnel with graduate training in economics and related disciplines, and be directed by a national who would be competitive for a senior position in international organizations dealing with agricultural policy. Development partners should consider ways to help with the high setup costs, including graduate scholarships, and with initial running costs.

272. Land tenure is another critical area for action where the public sector must lead. Commendable efforts involving mainly urban areas need to be more effectively extended to registering agricultural property rights. One way would be to address land tenure in pilot areas, using the fact that Uganda has a patchwork of legal and customary rules, norms, and mechanisms as an opportunity for such piloting. Second, one area of emphasis could be to support faster resolution of land disputes through support for relevant courts. Third, greater use could be made of GPS-data, and of technologies such as drones to reduce the time and cost for field visits and to generate data evidence about boundaries (especially where these are marked by live plants or stones that are subject to tampering). Faster adjudication would reduce the duration for which pieces of land are used less productively.

273. Land rights in rural areas are critical to rural finance for collateral purposes, but how the digitization of land registries is handled is fundamental to financial inclusion as well. Uganda currently has one-half million titles registered, but the overwhelming majority of these are urban. As titling is expanded to rural areas (the former six land registration offices around the country are now 13 and will soon be 21), more attention needs to be given both to digitalization (as is being done now) and how the system can be maintained as a living one with transactions around specific titles easy to update from anywhere in the country, and in a form that is tamper proof. Rwanda has made considerable progress in digitizing its already fairly complete rural land titling using BlockChain technology, as laid out above. This will radically cut the unit costs of smallholder loans and mortgages, in addition to building confidence in property rights. Rwanda is building a credible Center of Excellence in BlockChain technology in Kigali.

Uganda currently has one-half million titles registered, but the overwhelming majority of these are urban.

274. Uganda should explore options for accelerating the transition from undocumented customary land tenure in rural areas to a digitized system of land records facilitated and protected by up-to-date ICT technology in this area. This should cut overall costs by leapfrogging infrastructure and paper intensive intermediate steps. It is recommended that a Ugandan technical delegation travel to Rwanda to explore how that country is managing the transition.

2. Removing distortions of incentives and implementing improved regulations for inputs

275. **There is widespread recognition that using up to half the total agricultural budget for procuring agricultural inputs, often of very low quality at high prices, and then distributing them free of charge is both an ineffective and harmful practice.** Low quality inputs create dissatisfaction among recipients, and lack of willingness to adopt offered technologies. The pre-emption of the domestic market for inputs discourages Ugandan private sector firms from filling the need to have a quality-based and reliable agricultural input system. An agriculture that promotes overall high growth and rapidly alleviates poverty in Uganda in the coming decades will need to use improved seeds and quality fertilizers. It is hard to see how this can occur outside a system where the incentives of input suppliers are rigorously aligned with those of farmers and traders. This will require a private sector approach, supported by more effective public effort at defining what quality is, how it should be labeled, and enforcing regulations. It is advisable that the government considers:

- Reducing the proportion of the agriculture budget that is used to finance the free distribution of agricultural inputs. Alternative approaches to promote increased adoption of inputs amongst smallholder farmers include the use of smart subsidies and e-Voucher systems that encourage purchase of quality inputs from registered agro-input dealers rather than through centralized procurement and distribution.

276. **The Government might also consider achieving its equity support objectives through social protection linked to desirable soil and water management behaviors, or perhaps the distribution of inputs that improve longer-term sustainability, such as basic micro-irrigation equipment, rather than seeds and fertilizers.** Accurate monitoring of how inputs are used and their impact on farmers' incomes would improve targeting, strengthen governance, and help discourage the distribution of sub-standard items. Should a decision be made to move to social protection, modern practice offers good examples of using transfers to encourage more climate-smart uses of agricultural productive landscapes, such as contour bunds and tree planting or assisted natural regeneration.

277. **The regulatory burden should be shifted from controlling registration (such as licensing of traders), to controlling actual operations through random sampling, in addition to regular controls of seed companies.** Successful initiatives such as AgVerify should be supported. Recommended actions include to:

- Enhance licensing procedures and import processing for improved inputs and new seed varieties to reduce delays and to foster agribusiness development at the farming input level. Importation of fertilizers and their registration is highly burdensome, and clear reforms have been identified (EBA 2017) that could reduce the time and cost involved;
- Finalize the National Seed Policy that has been drafted but not yet been approved.

278. **The assessment of trade incentives above shows both the success of Uganda's trade liberalization for items like maize and coffee, and the extent of work still to do.** In the current world environment for cotton, price supports and high protection is likely an inefficient use of resources that will not be able to turn things around. On the other hand, countries such as Mozambique demonstrate how non-traditional crops such as sesame and pigeon pea—which thrive on cotton lands—have major growing markets in Asia. Tea farmers produce a quality crop, but are not getting the full benefit from it. Rice is a particularly important issue. The impact of high rice protection (90%) on urban consumers is a matter for the Government to consider. The fact that so much of it is re-exported outside EAC also suggests that both input subsidies and the implicit tax on urban consumers is neither a food security policy, nor an efficient use of resources. Overall, the analysis shows that Uganda has much to gain by repurposing transfer payments like input subsidies to road and communications activities that cut the cost of agricultural trade, especially in the Northern and Eastern regions.

279. **Finally, while the development of energy exports from Uganda offers great promise, experience world-wide shows the importance for agriculture—and thus the great majority of the population—in how mineral revenues are handled, especially with regard to impacts on the real exchange rate.** The specifics of this issue go beyond the remit of this report, but it should be clear that the "how" is as important as the "whether" in assessing the likely impact on agriculture. Expanded fiscal spending can be of great benefit, but it is also possible to handle increases in spending in a way that creates impossible disincentives to agriculture.

3. Enhancing Total Factor Productivity growth, including through innovation in ICTs

280. **Growth in agricultural production has been largely driven by an increase in the area under production, peace and security, and some increase in the use of inputs.** There has not been much change in labor productivity in agriculture, and this is largely due to the seasonal nature of agricultural activities and limited opportunities for non-farm employment and enterprise. Intensification and diversification of agriculture along with an expansion of sustainable agri-food systems could result in improved labor productivity. The aggregation of farmers into producer organizations will improve their access to inputs and markets, and increase their opportunities for vertical integration in the value chain. There has also been negligible growth in total factor productivity (i.e. excluding labor, land and inputs) of agriculture in Uganda. The promotion and adoption of new technologies and improved farming practices could make a major impact on productivity growth.

281. **On the public investment side, a pivotal area of intervention is the definition and implementation of a set of policies on Infrastructure and ICT Emerging Technologies. On top of this, the effective functioning of the market depends on modern infrastructure that is capable of supporting emerging technologies and services.** It is imperative that Uganda builds and sustains such an infrastructure. It is important that responsible policymakers understand the link between ICT, trust building in markets, and growth. Some specific initiatives identified by the World Bank's ICT team include:

- Optimize the connectivity to the undersea fiber optic cables and scale up the National Backbone Infrastructure (NBI) to cover the whole country to simplify the mode and speed of service delivery to the public.
- Encourage participation of the private sector in ICT infrastructure development, put in place mechanisms for quality assurance in infrastructure development and encourage Internet Service Providers (ISPs) to provide access to the network-based services to even the most remote locations in the country.
- Develop rural investment incentives to facilitate the expansion of the national postal infrastructure.
- Put in place mechanisms for bringing all regulatory functions under one roof; develop legislation that addresses privacy and data protection as well as intellectual property rights; and review existing legislation to cater for the ever-increasing sophistication of cyber-crime and other forms of information security.
- Advocate for curriculum review to include ICT related laws; and hasten enforcement and awareness of ICT related laws.

282. **Three immediate options seem promising for improving communications with farmers.** First, radio broadcasts about good practices and technologies are far cheaper than sending out staff, and can more easily reach large numbers. Such programming can be regionally targeted to different production zones. Other features could be added, including targeting female farmers, call-in programs to allow farmers to raise questions and problems – including disease outbreaks, and others. Programs could also be used to inform farmers when extension workers are planning to visit a particular area. A second option could be to involve schools and school teachers in outreach efforts. School teachers are in principle present in all localities as 'agents of the state'. Third, the Central Government could set performance targets for local governments with regard to reducing post-harvest losses or effectively addressing land disputes. This would incentivize local governments to be more pro-active in addressing local collective action challenges.

4. High-level engagement in facilitating regional agricultural trade

283. **The rapid growth of regional agricultural trade over the past two decades, as shown above, highlights the potential for agriculture to continue to provide significant contributions to growth,** in addition to its more usual roles of rural poverty alleviation and food security. The analysis suggested that Uganda's current agricultural trade, although growing, remains well below its fundamental potential. Further progress will require three initiatives in particular, beyond the general improvements from better communications discussed above.

284. **First, while regional trade has allowed beneficial diversification of agricultural exports away from over-dependence on a few traditional commodities, to date it has not widely promoted the benefits of specialization and division of labor normally associated with trade.** The one notable exception to this amongst non-traditional exports may be the development of the trade in aflatoxin-controlled maize built around WFP procurement practices in Uganda. More policy attention in concertation with private sector and farmer organization stakeholders would be beneficial to identifying synergies amongst research, extension, transport infrastructure, fiscal, grading, and other policy issues for attention, and regional consultations to credibly support non-traditional agricultural export industries. Furthermore, the current boom and even more so the anticipated further growth is related to more highly processed food items. This raises questions about what foods are beneficial to import for processing and sending on as higher value exports, especially given Uganda's strategic location between East and Central Africa. Cereals, starches, and animal source foods in particular are important inputs to food processing, including for export, but are often protected either naturally by poor infrastructure or as a matter of policy vis-à-vis domestic producers.

285. **Second, more specific attention needs to be devoted to reducing transport and other transfer costs for agricultural commodities entering regional trade.** The analysis of price incentives above identified pervasively high gaps between what reasonable transportation and other transfer costs should be for agricultural commodities and what they actually are in many cases. The best solution to this is better market information for producers and a reduction of unnecessarily high costs for transporters, such as expensively taxed fuel and equipment, and unofficial road taxes.

286. **Third, reliability and trust are critical to market development, and arbitrary trade actions destroy this capital.** During the 2008 global food price crisis, Uganda closed its borders to its neighbors with respect to exporting maize. This is still vividly remembered in countries such as Rwanda that are net maize importers and are trying to become self-sufficient in maize at relatively high cost. Border closures and hinderances to agricultural trade, including arbitrary ones imposed at short notice by local officials, unfortunately are not only a thing of the past, and happen in both Uganda and its neighbors. The region is now at a turning point where countries have a new opportunity to build trust to go ahead together more quickly than separately. However, this will not happen without leadership from the top in regional engagement to promote trade.

5. Greater public attention to the linked threats of climate change and soil degradation

287. **Rapid population growth particularly in rural areas, climate change and unsustainable land use drive soil erosion, that is, the loss of soil nutrients and hence of biological and productive capacity.** The degradation of soils arising from agriculture expansion into other land uses such as forests or pastureland, unsustainable land use practices and overgrazing on Uganda's cattle corridor are wreaking havoc on Uganda's economy and escalate poverty. Soil degradation is not only a challenge for sustainable development and biodiversity conservation, but also to climate change mitigation and adaption. When soil is degraded, soil carbon can be released into the atmosphere, making land degradation one of the biggest contributors to climate change. If the GoU is to meet its ambitious climate change targets as manifested in its INDC, the interlinkage between unsustainable land use, soil erosion, biodiversity loss and climate change needs to be understood and measures undertaken to reverse this alarming trend.

288. **Improving agricultural water management in Uganda is vital to increasing the resilience of agriculture.** The following measures should be considered: (a) integrate institutions for policy-making, regulation of irrigation services and development investment planning, and support of service provision; (b) undertake policy and institutional development to improve the enabling environment for the implementation of the 2017 National Irrigation Policy; (c) incorporate pertinent global and regional lessons from good practice irrigation and 'water-smart' agriculture investments; (d) pursue large-scale irrigation management reform by exploring and piloting different management options (building on pilots within the country and beyond) involving

beneficiary communities and the private sector in irrigation infrastructure and service delivery; (e) balance large-scale irrigation development for commercial agriculture with rehabilitation and modernization of existing schemes, as well as the improvement of irrigation system management involving beneficiaries; (f) scale up low-cost pressure pipes, drip or solar pump irrigation, and other sustainable water management and conservation technologies and practices to enhance agricultural water productivity and achieve multiple-win results for smallholder farmers; (g) scale up the use of ICT for weather forecasting and early warning as well as soil moisture measurement and monitoring.

289. **To enhance productivity while fostering low-emissions and climate-resilient agriculture, climate-smart land and livestock management practices are needed.** To date, CSA adoption at scale is confronted with various challenges, spanning from physical inputs such as land, human resources, equipment, infrastructure and finances, to non-physical barriers such as policy and regulatory environments; knowledge and skills; or technologies and innovations. Since, moreover, perceptions of climate risks and adaptation strategies differ across gender, gender-sensitive approaches to CSA are required. Finally, a lack of coordination among CSA-related entities such as research institutions and line ministries, as well as a focus on the subsidized distribution of sub-standard inputs on the side of the current extension system currently hamper the upscaling of CSA.

290. **The extension system should move away from subsidized input provision, and focus on the dissemination of context-specific, gender-sensitive and climate-smart technologies.** To this end, ensuring that extension staff have adequate capacity and knowledge of CSA is critical. The existence of a strong agricultural research sector in Uganda presents an opportunity for more extensive research on relevant and cost-effective CSA practices. In addition, there is a plethora of civil society and religious groups such as Farming God's Way who could help in scaling up CSA to the millions of farmers who have firm religious values (FAO 2016).

291. **The GoU could further explore more collaboration opportunities with various stakeholders towards a coordinated approach to CSA for the country.** This could entail the setup of a multi-stakeholder platform to identify and prioritize the most cost-efficient CSA practices – at the farm and at the landscape level – as well as to develop 'farmer friendly' financial incentives. CSA provides opportunities for novel financial instruments to foster agricultural technology adoption, including climate and value-chain finance, both of which can be harnessed to deliver CSA benefits to smallholders. To attract funding and to create synergies between CSA-related actors, coordination between ministries and with institutions like the Climate Change Department of MWE should be fostered. Besides, the private sector and financial institutions could be more involved in the design, implementation and incentivization of CSA, for instance through the development of climate-smart loan products for traditional and non-traditional lenders, as well as of climate-smart value chains and certification schemes.

292. **Ensuring adequate and timely access to credible weather information as well as early warning messages for smallholders across gender is critical to foster food security and resilience.** This requires enhanced linkages and better coordination among the National Emergency Coordination and Operations Centre (NECOC), private sector entities such as telecommunication companies, the government, extension agents, academia and civil society – for instance through the setup of a national early warning committee. The incorporation of climate forecasts into nationally available EWSs and tools should be supported, which requires specialized training on the use of forecast models and tools. Technical and financial capacities should be better aligned across national and local governments to facilitate the out-scaling of relevant EWSs and tools. In addition, vulnerable households and communities should be supported in developing emergency response mechanisms at the local level.

Recommendations

- Create a multi-stakeholder platform including relevant Government ministries, regions, research organizations, farmer groups, private sector firms, and development partners, to identify technical themes and viable pathways for implementation of climate-smart agriculture at scale.
- Roll out the draft National Irrigation Policy and detailed implementation requirements and promote deeper inter-ministerial cooperation in planning.
- Develop farmer water user groups and irrigation management institutions; and include the private sector in consultations with user groups on input supply, extension needs, and post-harvest handling.

- Improve diffusion of regional food price information and early warning alerts to a much wider audience of stakeholders and more closely to real time.
- Relaunch the search for viable financial instruments to underpin whole landscape (watershed) restoration plans as foreseen in the 2010 national Strategic Framework for Sustainable Land Management.

293. **Considerable analytical work has been done over the last decade on agricultural issues in Uganda, as revealed in background analysis has been done for this report,** including 16 written contributions from across Global Practices in the World Bank as demonstrated by those mentioned in the acknowledgements. Yet, while technical, economic and social dimensions seem to have been covered extensively by Ugandan and international researchers as well as development partners, it seems that the institutional and policy dimensions of Ugandan agricultural development have been covered to a significantly lesser extent. It appears that especially analyses on agri-food-related public and sector expenditure would inform future decisions on the efficacy and efficiency of spending towards Uganda's strategic sector development objectives, and it is therefore that an Agriculture Sector Expenditure Review has been brought underway by the Ministries of Finance, of Agriculture and the World Bank in 2018. Moreover, a comprehensive Functional Review of the agricultural administration would constitute a necessary future analysis to enhance strategic, operational, budget and human resource management in the agricultural administration.

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