FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

INNOVATION LAB FOR FOOD SECURITY POLICY

Synthesis Report I

Advancing Research, Policy, and Capacity for Food System Transformation

Synthesis of Achievements from the Feed the Future Innovation Lab for Food Security Policy

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March 2019

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Acronyms

AMSEC	Agricultural Mechanization Services Enterprise Centers (Ghana)
BFAP	Bureau for Food and Agricultural Policy (South Africa)
CARD	Center for Agricultural Research and Development
CSP	Sahelian Pesticide Committee
ECOWAS	Economic Community of West African States
FMARD	Federal Ministry of Agriculture and Rural Development (Nigeria)
FSP	Food Security Policy
GFSS	Global Food Security Strategy
IAPRI	Indaba Agricultural Policy Research Institute (Zambia)
IFPRI	International Food Policy Research Institute
KM	Kaleidoscope Model
LUANAR	Lilongwe University of Agriculture and Natural Resources (Malawi)
MoAIWD	Ministry of Agriculture, Irrigation, and Water Development (Malawi)
MoALI	Ministry of Agriculture, Livestock and Irrigation (Myanmar)
MoFA	Ministry of Food and Agriculture (Ghana)
MSU	Michigan State University
NAPAS	New Alliance Policy Acceleration Support (Malawi)
NAPP	Nigeria Agricultural Policy Project
ReNAPRI	Regional Network of Agricultural Policy Research Institutes
SUA	Sokoine University of Agriculture (Tanzania)
UNZA	University of Zambia
USAID	U.S. Agency for International Development

ACKNOWLEDGMENTS

The authors are grateful to the many colleagues from the International Food Policy Research Institute, Michigan State University, and the University of Pretoria who provided input into previous drafts, and who shared their experiences with research, policy engagement, and capacity-building efforts as part of the Food Security Policy project. They also thank Mywish Maredia and Xinshen Diao for supporting the process of drafting this synthesis, as well as David Atwood, Kristy Cook, and Paul Dorosh for providing feedback during a workshop presenting the main messages.

EXECUTIVE SUMMARY

Since 2013, the Feed the Future Innovation Lab for Food Security Policy (FSP) has combined multidisciplinary research on emergent issues facing food systems with policy analysis to provide an enabling environment for improved food security, particularly in Africa and Asia. Supported by the U.S. Agency for International Development (USAID), FSP is implemented through a consortium of three research institutions: Michigan State University (MSU), the International Food Policy Research Institute (IFPRI), and the University of Pretoria. These policy research institutions, together with local institutions, have provided data and analysis that national and subnational governments and regional bodies can use to generate informed policies around food and food security. This engagement has involved supporting national governments' and regional organizations' agri-food system–related policy processes with evidence generated through applied research on food systems.

This paper reviews FSP's achievements from 2013 to 2018 and discusses some of the key lessons learned while also documenting the project's vast range of publications, presentations, policy briefs, and other outputs. FSP aimed to strengthen food security policy through three mutually reinforcing mechanisms. First, research drawing on survey data and primary fieldwork in diverse locations has contributed empirical content on frontier issues related to agri-food system and nutrition transformation, especially in an era of rapid urbanization, climatic shocks, and technological innovations. Novel findings emerged in areas such as diet change, post-farm processing and distribution, and land and labor markets. Second, by developing a strong conceptual understanding of the drivers of policy change in local policy processes, FSP pursued diverse forms of engagement with policymakers to influence outcomes ranging from rice policy in Myanmar to coffee prices in Rwanda to produce cess rates in Tanzania. Third, FSP provided a natural lab for experiments in building capacity for policy research, with a variety of approaches pursued in different country settings and targeting different audiences. These approaches included strengthening university networks for policy research and dialogue, partnering with independent or quasi-independent policy analysis institutes and think tanks, and implementing various forms of training for a broad range of stakeholders to strengthen capacity for policy research and dialogue.

During the five years of the project, many lessons were learned about the transformative processes occurring in Africa and Asia and how best to support national governments, regional organizations, and international donors to formulate informed policies, implement reforms, and reconcile trade-offs across different food security objectives. Key among these lessons were (1) the importance of building long-term relationships with a broad range of policy champions in order to enhance credibility and trust, and (2) recognizing that achieving food security requires looking at agriculture holistically, taking into account linkages with, and implications for, other sectors. Furthermore, spanning a variety of capacity-strengthening approaches, rather than simply providing training courses alone, is essential to address the mixture of research, financial, and organizational challenges faced by local institutes and universities. Collectively, FSP demonstrates how a multidisciplinary research consortium that leverages existing country offices and local partnerships can effectively operate in an increasingly complex food security landscape to support policy reforms and refinements.

I. INTRODUCTION

Globally, food systems are changing quickly. Understanding the future of food security increasingly requires going beyond the farm to consider how the ways in which food is processed, distributed, and marketed affect the ability of different consumers to access it and generates externalities along the length of food commodity value chains. Food security has never purely been an agricultural issue, and it is becoming even less so. To design effective policies and programs to ensure access to food for all, policymakers must understand how macroeconomic trends, climatic shocks, trade shocks, changing demographic patterns, new industrial strategies, and technological innovations intersect with farmers' more traditional concerns about soil quality, input use, and market access.

These changes raise new questions that to date have not had a sufficient, empirical basis to answer. For instance, how does the structural transformation of economies in developing countries, and the attendant decline in the significance of agriculture as an economic sector, affect supply and demand patterns for food as well as for land markets? What determines whether workers moving out of agriculture, particularly younger generations, find sufficiently remunerative employment so that their households are food secure? How does urbanization affect food preferences and consumer demands for food safety? Can competitive agro-industries be established in developing countries to benefit from growing demand for processed and packaged foods?

Addressing these and other relevant questions about food systems, their performance, and the ways in which they are changing requires rigorous, locally informed research and enhanced attention to the significance of policy and of broader policymaking systems. Authoritative statements, laws, regulations, administrative actions, and funding outlays all make policies happen. In a normative sense, policy is a statement of how a local, national, or regional community intends to prioritize its actions and deploy its financial, human, or institutional resources to achieve a vision of development for its citizens (Clark 2002). Consequently, the quality of the policymaking process is critical for correctly identifying and safeguarding citizens' common interests. Such policy processes are inherently political, as they require that decision makers be responsive and accountable to various, sometimes opposing constituencies. Moreover, these processes typically involve uncertainty about the best approach for achieving common interests around a specific issue, such as food. Hence, research is a crucial input to ensure that any policy process is grounded in an objective understanding of the issues of concern.

Since 2013, the Feed the Future Innovation Lab for Food Security Policy (FSP) has combined multidisciplinary research on emergent issues facing food systems with policy analysis to provide an enabling environment for improved food security. Supported by the U.S. Agency for International Development (USAID), FSP is implemented through a consortium of three research institutions: Michigan State University (MSU), the International Food Policy Research Institute (IFPRI), and the University of Pretoria.[1] These policy research institutions, together with local institutions, have provided data and analysis that national and subnational governments and regional bodies can use to generate informed policies around food and food security. This engagement has involved supporting national governments' and regional organizations' agri-food system–related policy processes with evidence generated through applied research on food systems. This evidence enabled participants in those processes to consider the merits of various policy options with a stronger conceptual and applied understanding of the issues at stake. As outlined in Box 1, FSP efforts targeted five main activity areas, with a regional emphasis on Africa and Asia.

[1] The FSP Innovation Lab is a Leader with Associates (LWA) award funded under a cooperative agreement through USAID's Feed the Future Initiative. Its activities are supported with core funding from USAID's Bureau for Food Security through the Leader award, and from USAID country missions and regional offices through buy-ins and Associate Awards.

Box 1. Overview of the organization of the FSP Innovation Lab Project

To strengthen agri-food system–related policy processes and to expand knowledge and capacity for effective policy design and implementation, the initial design of FSP specified five activity areas:

- **Component 1:** Country/regional-level collaborative research on farms, firms, and markets and formulation and analysis of policy options.
- **Component 2:** Country/regional-level capacity building for policy formulation and implementation (data, analysis, advocacy, consultation, coordination, implementation).
- **Component 3:** Global collaborative research on how best to strengthen policy processes and build policy capacity.
- **Component 4:** Engagement in global policy debates on food and nutrition security based on field-level research and analysis that is done in a manner that deepens and strengthens the basis on which food policy debates take place.
- **Component 5:** Engagement on a strategic analytical agenda and support to donor policy and strategy.

In addition, FSP's research and applied policy efforts singled out four cross-cutting themes—gender, youth employment, nutrition, and climate change—for specific attention, as appropriate. Country- and regional-level activities (i.e., Components 1 and 2) have received core funding as a precursor to, or together with, USAID Mission buy-ins or Associate Awards.

For more information, please visit: http://foodsecuritypolicy.msu.edu/.

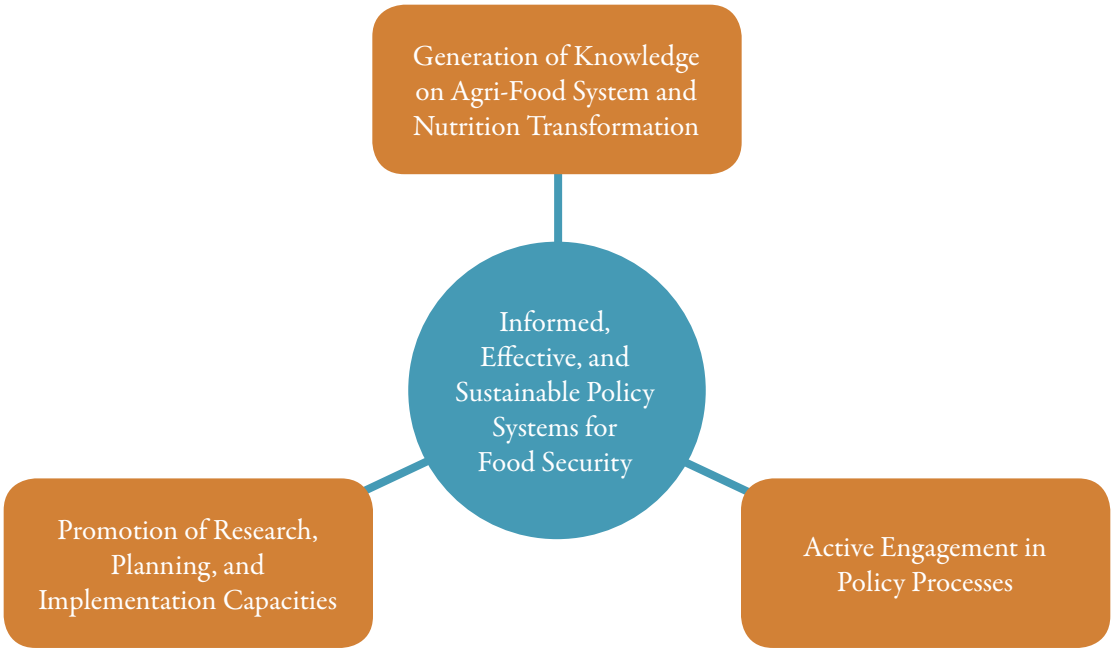
The FSP team includes researchers with expertise in agricultural economics, nutrition, political economy, and economic modeling, and it leverages country offices, staff, and collaborators in approximately a dozen countries in Africa and Asia.[2] Many of these countries were part of USAID's Feed the Future initiative, and some are included in Feed the Future's successor, the Global Food Security Strategy (GFSS). In most, individual consortium partners had established strong relationships with government, research, and university partners years before FSP began. This existing credibility and trust were critical assets for the consortium in its efforts to combine medium- to long-term research on important global issues with demand-driven and locally informed requests at the country and regional levels. The quality of FSP outputs has been validated through peer-reviewed outputs (see Annex) as well as workshops, seminars, and collaborative projects with national, regional, and international donor partners.

This synthesis paper reviews FSP's achievements from 2013 to 2018 and discusses some of the key lessons learned. The FSP project has contributed to building more informed, effective, and sustainable policy systems for food security in three ways (Figure 1). First, research, often drawing on primary fieldwork in diverse locations, has contributed empirical content regarding agri-food system and nutrition transformation. Section II provides details on these research insights, particularly for diet change, post-farm processing and distribution, and land and labor markets. Second, by developing a strong conceptual understanding of the drivers of policy change in local policy processes, FSP was able to pursue diverse forms of engagement with policymakers. These policy process–focused activities have influenced the enabling environment for policy, from agenda-setting through design, adoption, and implementation to evaluation. Section III shows how this was achieved and describes some of the lessons learned about policy engagement in different settings.

Finally, the sustainability of policy systems requires a cadre of skilled researchers and policy analysts within civil society and government. Section IV reviews the capacity-building activities and partnerships that FSP fostered, including university networks and collaborations with local research institutes. Section V concludes.

[2] These include Ethiopia, Ghana, Malawi, Mali, Mozambique, Myanmar, Nigeria, Rwanda, Senegal, South Africa, Tanzania, and Zambia.

Figure 1. Conceptualizing the Interrelated Objectives of FSP



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II. PUSHING THE KNOWLEDGE FRONTIER ON AGRI-FOOD SYSTEM TRANSFORMATION

2.1. Overview of Agri-food System Transformation

Agri-food system transformation—one component of a broader structural and rural economic transformation—involves complex interactions among a country's enabling environment, markets, and competing food supply channels (Figure 2). At the farm level, the rapid growth of urban food markets induces a shift from smallholder-based subsistence production (Figure 2, Supply Channel 1) to commercially oriented agricultural production on small, medium, and large farms (Figure 2, Supply Channel 2). As fewer farm families are available to feed growing urban populations, the required increases in farm productivity foster growing demand for purchased inputs, mechanization, and improved farm management practices.

In post-farm segments of food commodity value chains, the spatial shift toward urban markets propels rapid growth in assembly markets, storage, food processing, packaging, warehousing, transportation, distribution, and retailing (Figure 2, Supply Channel 2). Growing demand for packaged, prepared, and convenience foods attracts private sector investment in food processing technology and in product branding and marketing. These shifts have important implications for employment, nutrition, food safety, and public health.

Opportunities for trade emerge during this transition in growing regional food markets and, internationally, in off-season fruit and vegetable markets overseas. In contrast, expansion of global brands and market penetration by global agribusiness open emerging markets to increased competition, whether from meat and poultry processors in China and South America,

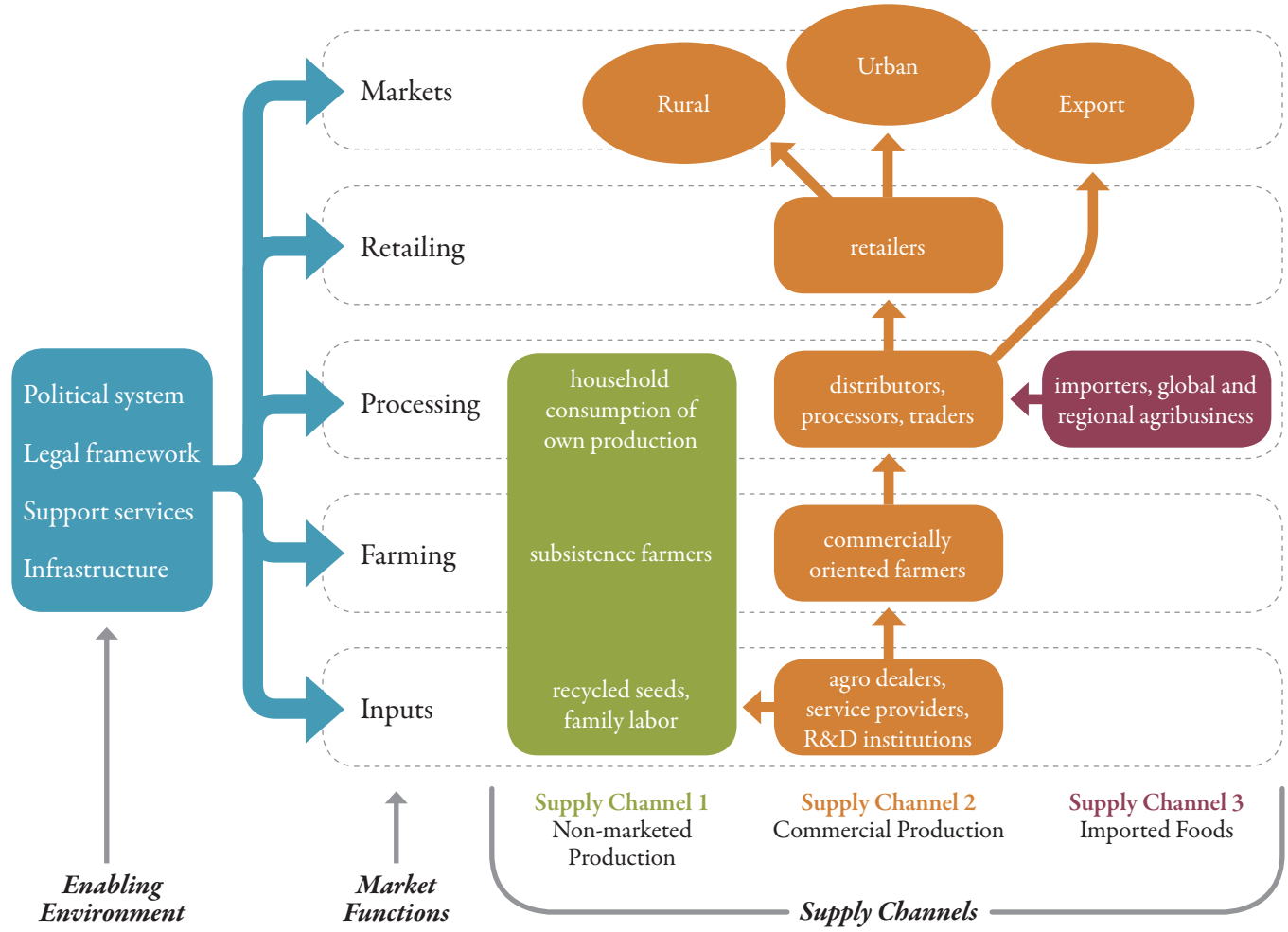
milk and packaged food processors in Europe and North America, or large-scale international supermarket chains such as Carrefour and Walmart (Figure 2, Supply Channel 3).

In combination, these structural changes create enormous investment opportunities for local entrepreneurs in farming, input supply, and post-farm segments of the agri-food system. Challenges also emerge in the form of natural resource pressures, climate change, shifting patterns of agricultural pests and human diseases, competition from imports in domestic markets, food safety concerns, and continuing high levels of hunger and undernutrition in many countries even as levels of obesity and nutrition-related noncommunicable diseases are rising. In response, policymakers and implementing agencies face increasing pressures to adopt appropriate policy responses to ensure that agri-food systems can address these challenges appropriately and are sufficiently dynamic to meet the growing global demand for sufficient, high-quality food.

2.2. Key Research Findings on Africa's Agri-food System Transformation

Over the past five years, FSP researchers have documented the transformation of agri-food systems, with a major focus on sub-Saharan Africa and, in Asia, Myanmar. Although early FSP work summarized previously observed trends in Asian food systems, more than three-quarters of the team's analytical work has centered on rapid changes in sub-Saharan Africa. As in Asia during prior decades, a combination of forces, including improved farming technology, growing urbanization, and rising per capita incomes, are triggering diversification of household food consumption out of staple grains into higher-value foods and nonfoods. Moreover, shifts in overall demand patterns in Africa are driving structural

Figure 2. Agri-Food System Value Chains



Source: Authors

economic transformation, as domestic labor and capital respond to growing demand for nonfarm goods and services. Land and labor pressures to meet these new demands lead to more intensive farming technologies that economize on both key factor inputs. However, the food system transformation in Africa started later than in most of Asia. Moreover, the transformation in Africa is occurring at the same time as significant changes in communication technologies, population demographics, biotechnology, climate, and market penetration by global agribusiness companies are shaping and sometimes complicating the policy responses of developing countries.

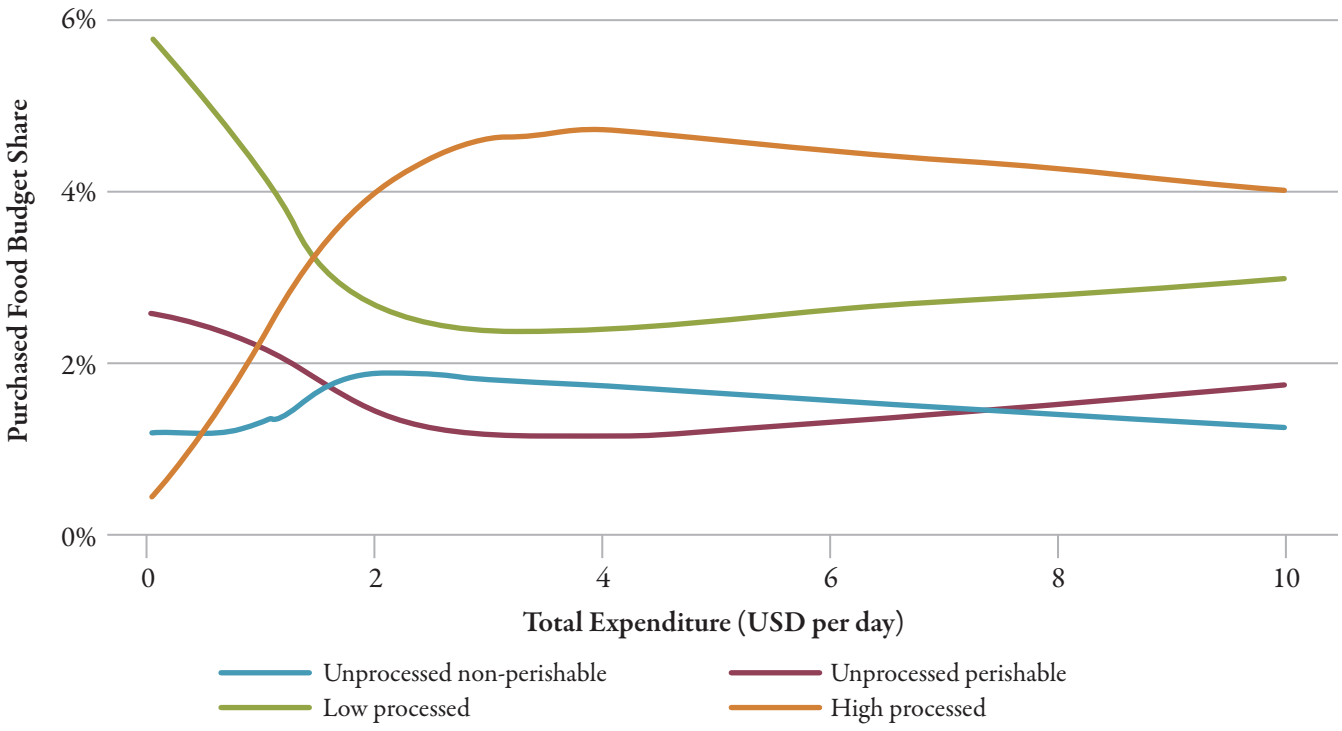
In recent years, four dimensions of agri-food system transformation have received most attention in the policy research literature: diet changes, post-farm processing and distribution, farming, and factor markets.

2.2.1. Diet changes

Rapid urbanization means that even the world's two most rural continents will soon become majority urban—Asia by 2020 and Africa by 2030 (UN-DESA 2014). Already, urban markets in sub-Saharan Africa account for more than half of all marketed food in the region. Coupled with recent steady increases in per capita income, urban markets are driving rapid change in consumer diets (see Minten et al. 2017; Reardon et al. 2015a; Tschirley et al. 2015a, 2015b).

Diet change under rising incomes, as predicted by Bennett's Law, involves a shift from starchy staples such as sorghum, maize, rice, and cassava, to higher-value foods such as meat, milk, dairy, fresh fruits, and vegetables. In addition, urban and higher-income consumers purchase a rising share of their food in the form of processed, packaged, and prepared foods. As urban markets grow, supply lines lengthen, leading to supply-side pressures for improved food packaging, preservation, and quality, while increased female workforce participation and lengthy commute times boost demand-side pressure for prepared and convenience foods. Data from Africa's least urbanized region of eastern and southern Africa indicate that dramatic changes have already occurred in the share of purchased food that is highly processed, even among poorer households (Figure 3). This research highlights the unexpectedly early and surprisingly rapid change in diets and the corresponding food system responses in Africa.

Figure 3. Changes in Share of Total Purchased Food (%), Categorized by Household Welfare, Eastern and Southern Africa



Source: Dolislager (2018).

A nutrition transition occurs as diet change and accompanying reductions in physical activity associated with urban lifestyles translate into growing rates of overweight, obesity, diabetes, hypertension, and cardiovascular disease. Growing numbers of overweight people and their attendant noncommunicable disease burdens—on top of continuing high levels of undernutrition, including micronutrient deficiencies—place a triple burden on overstretched public health systems. In a majority of African countries, more women are now overweight than underweight (Haggblade et al. 2016a). As a result, public health and food safety are emerging major policy issues.

2.2.2. Quiet revolution in post-farm processing and distribution

Diet change drives rapid growth in the post-farm segments of the value chain. Handling an estimated sixfold increase in marketed food volumes over the past 40 years, a growing network of African agribusiness intermediaries procures agricultural commodities from farmers and then transforms and delivers an expanding array of food products to urban and rural consumer markets (Reardon et al. 2015b).

Although many African cities have developed modern retailing and supermarket systems, increasing evidence points to a "quiet revolution" in wholesaling, processing, and logistical operations driven by emerging small and medium-sized agribusiness firms entering these supply chains (see Reardon 2015; Reardon et al.2015a, 2015b, 2017). Retail inventories have catalogued a growing array of new domestic brands of processed and packaged foods, ranging from yogurt and sorghum in Senegal to local brands of maize meal, mixed meals, and rice in Tanzania to commercial ready-to-eat injera, the traditional staple flatbread, in Ethiopia. Retail inventories in Tanzania, for example, identified over 60 domestic brands of maize meal (Snyder et al. 2015). The revolution in domestic supply chains primarily stems from local food system responses that tailor packaged and prepared foods for local consumer palates.

Domestic processors and traders continue to supply the bulk of Africa's growing urban food supplies. Increased trade in food products has nonetheless accompanied the transformation of local agri-food systems. Since 1990, the share of net food imports in total domestic quantities supplied has risen from 10 percent to 14 percent in Africa, from 6 percent to 8 percent in Asia, and from 6 percent to 9 percent in Latin America and the Caribbean (Reardon et al. 2017). While some African policy makers see the increase in net import share as unambiguously negative (drawing down scarce foreign exchange reserves and capturing market share from local farmers and food processors), it also presents several positive opportunities, including greater income and employment opportunities from potential increases in intra-African trade and the processing, marketing, and transport opportunities associated with increased food trade in general. In order to help African farmers and agribusinesses compete effectively in growing regional food markets, African subregional organizations like the Economic Community for West African States (ECOWAS), the Common Market for Eastern and Southern Africa (COMESA), and the East African Community are working to reduce trade barriers and to promote increased intraregional trade.

2.2.3. Farming

The expansion of commercially oriented farm production has accompanied three pronounced shifts in African agriculture. First, population growth, income growth, and urbanization have generated unprecedented growth in the demand for food. As a result, between 2000 and 2016, sub-Saharan Africa registered the highest rates of agricultural growth of any region of the world (4.6 percent real annual growth), roughly double that of the prior three decades (World Bank 2018). Consistent import parity pricing and policy reforms undertaken in the 1990s have combined to stimulate massive private investment in domestic production, marketing, processing, and retailing in the 2000–2015 period (Jayne et al. 2018). Despite this impressive production response, the unprecedented rate of population growth combined with urbanization and income growth has resulted in food consumption outstripping production, with a sevenfold increase in the value of food imports to sub-Saharan Africa, from US$6 billion in 2001 to roughly US$45 billion in 2016 (Jayne et al. 2018).

The second shift in African farming involves accelerated adoption of more input-intensive practices, including productivity-enhancing purchased inputs, such as fertilizer and improved seed, as well as labor-saving technology, such as herbicides, mechanized land preparation, and mobile mechanical threshers. Since the late 1990s, mechanized land preparation, tractor hire, and mechanical threshing services have grown substantially in Africa, propelled by tightening rural labor markets and emerging medium-sized farms unable to manage critical planting and weeding operations with

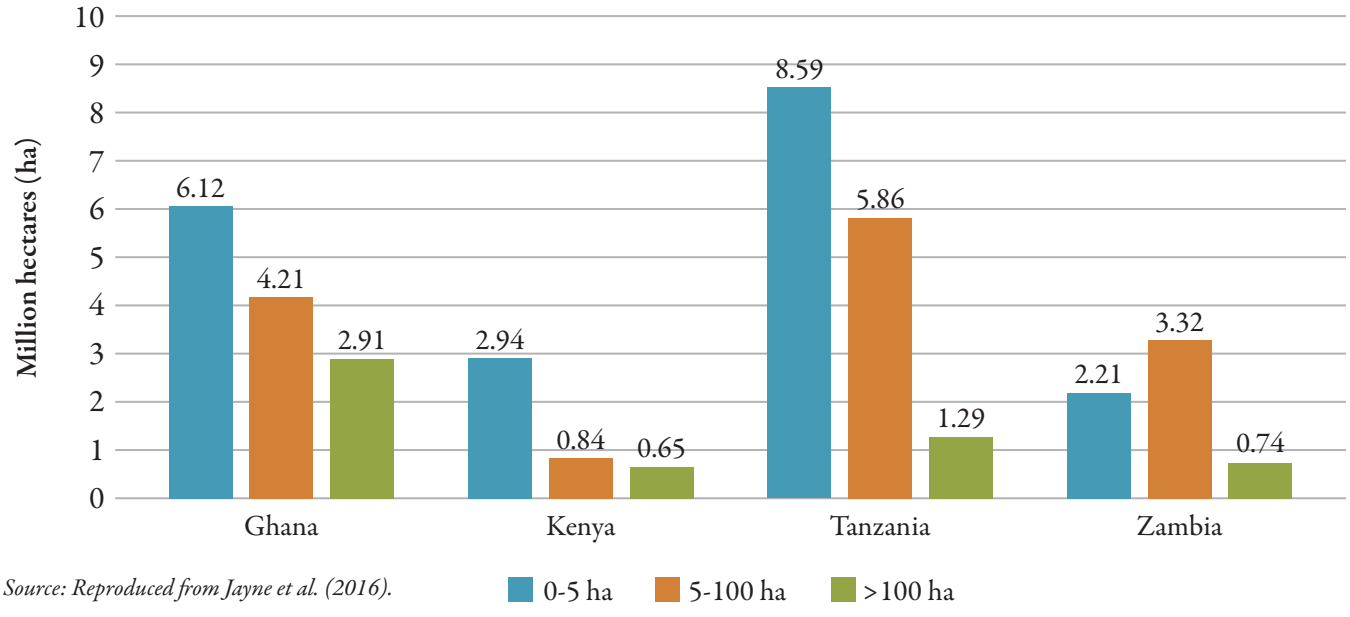
hand labor. Policymakers in at least nine African countries have focused on government-subsidized tractor rental schemes, which generally have failed. Private tractor owners have been more successful; by 2016, roughly one-third of crop-producing households in Ghana used mechanical tillage for land preparation, much of it through hiring-in tillage services from tractor-owning farmers (Diao et al. 2017).

In parallel, farmers' use of herbicides has increased rapidly in many parts of Africa since about 2005, in response to rising costs of labor for hand-weeding and simultaneously falling global prices for newly available generic herbicides (Haggblade et al. 2017c, 2017d; Tamru et al. 2017). By 2015, cereal farmers in southern Mali applied herbicides on more than half of their maize and sorghum plots. In doing so, they control weeds at half the cost of hand-weeding (Haggblade et al. 2017d). This growth in herbicide use has emerged without widespread subsidies. Nonetheless, the growing use of pesticides, including herbicides, insecticides, and fungicides, has drawn attention to feeble regulatory monitoring of product quality, safe usage of these products (with implications for food safety), and their potentially adverse impacts on the local environment.

Finally, African farming systems have experienced discernible shifts in the distribution of farm sizes. Driven by population growth and growing land scarcity, most African farm households are witnessing the gradual subdivision of their farms over time, causing African farms to become smaller; in several countries, the median farm size now is below two hectares (ha). However, FSP research has documented significant growth in the number of medium -sized farms (between 5 and 100 ha) starting around 2006. Although the international media has highlighted major acquisitions of African farmland by foreign investors in response to the prolonged surge in global food prices starting in 2007, African farmers, professionals, entrepreneurs, and civil servants have made similar but much more extensive investments in farmland for commercial production, largely under the radar. The amount of land acquired by these middle-sized African farmers far exceeds that obtained by foreign investors (Jayne et al. 2016).

The rise of commercially oriented medium-sized farms is especially clear in the region's relatively land-abundant areas, such as Zambia, central and northern Ghana, and Tanzania. But such patterns have also been documented, albeit at a slower pace, in more densely populated countries such as Malawi and Kenya (Jayne et al. 2014a, Jayne et al. 2016, Anseeuw et al. 2016). Overall, growing investment in commercial farming has led to a concentration in landholding and an increasing role in local food systems for middle-sized farms in Africa (Figure 4). Given current trends, FSP research suggests that medium-scale farms may soon own the largest share of farmland in many African countries.

Figure 4. Area Owned/Controlled by Small (0–5 ha), Medium (5–100 ha), and Large (>100 ha) Farms



Source: Reproduced from Jayne et al. (2016).

Concerns about foreign "land grabs" contributed to a renewed policy focus on land tenure, customary institutions, farming block investments, freehold land allocation policies, and land rental laws (e.g., Holden and Ghebru 2016). This new evidence suggests that these policy discussions need to expand their scope to consider the ramifications of the rise in indigenous medium-scale farmers on the agricultural sector, rural welfare, and local food systems.

2.2.4. Factor markets

Land markets. Greater labor mobility in Africa has been both the cause and consequence of the development of land rental and sales. Participation in land rental markets has risen dramatically over the past several decades (Chamberlin and Ricker-Gilbert 2016). Rural population growth and associated land pressures have resulted in fewer rural youth inheriting land, causing land markets to become a major pathway for engagement in farming by young Africans (Jayne et al. 2014b). The growing class of medium-scale farms, between 5 and 100 ha, has been facilitated by the growing commercialization of land, whereby land formerly allocated to local people by traditional authorities increasingly is being sold if there are buyers willing to pay the right price for it (Jayne et al. 2014b, Ghebru and Holden 2019).

These distributional shifts in landholding have accompanied a change in tenure status, involving a declining share of farmland under customary tenure, an increasing effort to strengthen individual land tenure, and expanding land rental markets (Jayne 2014). The political access of the new class of medium-scale investor farmers appears to be reshaping farm lobbying power as urban-based farming and agribusiness investors increasingly participate in policy debates. The equity implications of this emerging transition, as well as new pressures for public investment in farm blocks and basic rural infrastructure such as roads, banking, communications, and water to serve smallholder farmers, are all policy concerns.

More broadly, FSP research in a diverse range of settings has shown how titling reforms and greater security of property rights, especially for women and youth, can encourage long-term investments in land that contribute to agricultural productivity growth (Holden and Ghebru 2016, Kosec et al. 2018). For instance, in Nigeria, the larger the size of the expected land inheritance, the more likely that youth will stay in agriculture rather than migrating or getting involved in nonagricultural activities (Ghebru et al. 2018). Gender-disaggregated land work in Mozambique further highlights that the perceived risk of land loss is more of a threat to women's tenure security while the risk of a private land dispute is more likely for men (Ghebru and Girmachew 2019).

Labor markets. Food system transformation has triggered significant changes in labor markets. With the declining share of nonmarketed subsistence production, the share of labor used on producers' own farms begins to fall while the share of post-farm employment, both within and outside of the agri-food system, increases steadily during the transformation. Empirical estimates from eastern and southern Africa project a continued sharp decline in the share of the workforce engaged in farming from 75 percent in 2010 to 49 percent in 2040, an increase in the share engaged in nonfarm segments of the agri-food system from 8 percent to 13 percent, and an even greater increase in the share engaged in work entirely outside the agri-food system from 17 percent to 38 percent. Within the agri-food system, employment in food preparation away from home will grow the most rapidly in percentage terms, followed by food manufacturing, and then by marketing, transport, and other agri-food system services (Tschirley et al. 2015b).

From a policy perspective, the size distribution of enterprises that capture growing market shares in farming, input supply, and agro-processing strongly shape employment outcomes. As discussed below, policies favoring competitive responses by small and medium-sized firms can generate substantial employment within the agri-food system—much more so than if larger firms dominate these subsectors. Because women play major roles in most food processing and in the preparation of food consumed away from home, pro-employment policies in these areas of the agri-food system tend to favor gender equity (Tschirley et al. 2016).

2.3. Policy Implications

Africa's agri-food system transformation offers significant opportunities for agribusiness investment in commercial farming, input supply and services, commodity processing, distribution, and trade. Already, a quiet revolution is underway, financed in large part by small and medium-scale domestic investors. Yet, these emerging firms must compete in increasingly global

markets against large-scale international and established local agribusiness and food retailing firms. As a result, agri-food system transformation is placing pressures on policy institutions and public investment priorities. FSP researchers have engaged actively to inform ongoing policy debates in several specific policy arenas affected by the transformation processes.

2.3.1. Farming and associated inputs

Land policy. Growing pressure on land resources requires policies that can accommodate increasingly commercial agriculture and at the same time facilitate livelihood transitions for the large segment of rural residents who will have no place in commercial agriculture (Chapoto et al. 2013, Jayne et al. 2016). The major changes in farmland ownership over the past decade have resulted in the emergence of a politically connected class of urban-based, medium-sized farming and agribusiness investors that increasingly influence policy debates around land and land use (Jayne et al. 2016). Yet conversion of land from customary to statutory tenure risks compromising land-based safety nets upon which vulnerable rural households often rely. As a result, land tenure and rental market regulations, as well as the institutions that implement them, require renewed attention and increased policy oversight. Evidence from East Africa shows that low-cost land certification reforms appear to strengthen tenure security, on-farm investment, and land productivity while also deepening land rental markets (Holden and Ghebru 2016).

Fertilizer and seed. Multiple studies have over the years revealed inefficiencies with existing input subsidy programs in Africa. These studies also offered policy recommendations to employ technology, including e-vouchers and computerized beneficiary information, to improve targeting and facilitate greater diversity in production beyond staple crops (Jayne et al. 2018). This research showed how input subsidy programs could play a more catalytic role by supporting the dissemination and adoption at scale of climate-smart seed varieties, including drought- and heat-tolerant cereals and legumes (Jayne et al. 2017). Doing so will require, among other things, better coordination of public and private investments in site-specific adaptive research, as well as more extension staff to demonstrate the greater effectiveness of fertilizer when complemented with conservation farming practices.

Employment needs of a modern food system. To meet changing skill needs in the agri-food system and prepare students for a new job market, agricultural education and training institutions will need to adjust their curricula, staffing mix, and facilities. Over the past 40 years, such institutions have trained students primarily in sciences related to on-farm production, including agronomy, breeding, animal science, and agricultural extension, mainly for public sector employment. Looking forward to the next 40 years, agricultural education and training institutions will need to supply students with post-farm agribusiness skills for private sector employers (Kaneene et al. 2015). This institutional double pivot—from public to private sector clients and from on-farm to post-farm segments of the food system—will require a major shift in faculty skill sets, mindsets, laboratory and other training facilities, curricula, and systems for actively engaging with private sector agribusiness employers. These conclusions were incorporated by FSP researchers into high-level global outputs, such as the Chicago Council on Global Affair's 2018 report on *Youth for Growth: Transforming Economies through Agriculture*.[3]

Mechanization. Rising wage rates for farm labor, which typically accompany employment shifts into nonfarm and post-farm employment, particularly in peri-urban and nearby rural areas, pressure farmers to economize on human labor use in farming through increased use of farm machinery and herbicides (Haggblade et al. 2017c and 2017d: Tamru et al. 2017). FSP research on farm mechanization in Africa finds that most government-subsidized tractor hire promotion schemes have failed to produce commercially viable mechanization systems. Instead, the FSP findings points to the importance of agronomic research on minimum tillage systems; research and development efforts by agricultural research systems and local technical universities that focus on more affordable small agricultural machinery for local conditions; and improved technical training and extension support for farm machinery mechanics and private owners of farm equipment. Moreover, given the heavy seasonality in tractor use, for private farm equipment purchases to be commercially viable, farmers and nonfarm entrepreneurs who purchase tractors and other farm machines must be encouraged to provide machinery services for nearby farms and businesses (Diao et al. 2017).

[3] Please see: https://www.thechicagocouncil.org/sites/default/files/report_youth-for-growth_20180322.pdf

Regulatory requirements for modernizing agriculture. Growing input use and private sector supply systems have advanced far more rapidly than has public sector monitoring and regulatory capacity. As commercially oriented farms use more fertilizer, pesticides, vaccines, and antibiotics, it will be ever more important to monitor product quality, public health, and environmental impact (Ortega and Tschirley 2016). Yet to date, public monitoring of the environmental and health impacts of increased chemical input use in Africa has been irregular and episodic. Counterfeiting and smuggling of unregistered inputs result in products of uncertain and often variable quality (Haggblade et al. 2017c, 2017d; Tamru et al. 2017). This regulatory void can undermine confidence in available products and stymie productivity growth. Farmers, consumers, public sector regulators, and registered private sector suppliers thus share a common interest in monitoring the quality, safety, and environmental impact of agro-chemicals, as farm input markets continue to expand in Africa's rapidly transforming agri-food systems.

2.3.2. Post-farm segments of the food system

FSP research suggests that three sets of policy questions dominate the post farm segment of agri-food system transformation: distributional implications of agribusiness investment, urban transitions, and public health.

Distributional implications of agribusiness investment. Who will capture the myriad investment opportunities in Africa's modernizing agri-food systems? Will foreign suppliers grow their domestic market share, or can local farmers and processors outcompete them? Among domestic suppliers, will large, medium, or small firms dominate?

A special focus of FSP work has looked at the relative competitiveness of small- and medium-sized food processing firms in local and regional markets. This competitiveness depends on the overall enabling environment within which these firms operate. Educational system reforms must therefore go beyond basic numeracy and literacy to improve the technical skills, including business finance and entrepreneurship, needed to for prospective African entrepreneurs to successfully compete in these rapidly growing agri-food systems.

Trade policy likewise shapes access to growing regional markets as well as the competitiveness of international food imports. Licensing, zoning, food labeling regulations, and import duties all influence the viability of small-scale agribusiness ventures. In contrast, policies that favor consolidation into fewer and larger firms will result in less employment growth from the ongoing agri-food system transformation. Investment climates that subsidize credit and capital investments encourage more capital-intensive production technologies and lower employment (World Bank 2005, Rahman 2014).

Urban transitions. Food system transformation poses massive challenges for cities. Rapidly growing middle-sized towns and large cities confront critical needs for new physical infrastructure, including wholesale and retail markets, new ownership and management models for these markets, sanitation, electrification, roads, and improved product standards (Reardon 2015). Policies facilitating agri-food system transformation will require heightened public attention in areas where governments historically have been weak: improving town and regional planning and integrating food systems into that planning; facilitating intraregional trade; and financing scientific research, higher education, and commercially viable rural financial systems.

Public health. Regulators face growing pressure from consumers and public health professionals to address growing concerns about food quality and safety (Ortega and Tschirley 2016). As farmers apply growing quantities of pesticides, questions about water quality and pesticide residues in foods place heavy demands on weak monitoring, laboratory testing, and enforcement agencies. Periurban production of green leafy vegetables using surface water raises concerns about contamination with human fecal bacteria and heavy metals. Longer value chains involving more seasonal storage increase risks of mycotoxin infestation in some grains and pulses unless farmers and traders follow proper crop drying and storage techniques.

Recent policy responses include moves toward harmonized regional pesticide registration, investments in laboratory testing facilities, and improved monitoring of public health and environmental impacts (Diarra and Haggblade 2017).

Emerging policies to address the public health problems resulting from growing numbers of overweight individuals include taxes on sugary drinks, reforms in school feeding programs, wellness incentives in life insurance policies, nutrition education programs, and food fortification and micronutrient supplementation regulations (Babu et al. 2016, Haggblade et al. 2016b, Hendriks et al. 2016, Popkin and Reardon 2018).

III. PATHWAYS OF POLICY ENGAGEMENT

The dimensions of agri-food system transformation described in the previous section are increasing pressures on governments both to ensure that the opportunities associated with these changes will benefit their citizens and to mitigate disruptions that may be associated with these changes. Given the need for effective policy responses, FSP researchers have examined the policy processes through which governments determine their vision for agri-food system development, regulate transformation processes, and accordingly allocate scarce financial, human, and institutional resources.

In doing so, the FSP consortium has advanced theory and practice on pathways to policy change in at least two key ways. First, FSP researchers have demonstrated that policy impact requires a deep understanding of the underlying policy processes at the regional, country, and subnational levels. Specifically, FSP contributed to the development of the Kaleidoscope Model of Policy Change, which outlines 16 key variables that researchers and policymakers can consider when identifying entry points for advancing policy changes, particularly around agriculture, nutrition, and food security issues. Second, through their high-quality research outputs as well as their established relationships with government actors, local research institutes, and donors, FSP team members have generated discussions, mobilized coalitions for reforms, and monitored changes in policy modalities. Each of these achievements is documented below, along with a brief discussion of several lessons learned about policy engagement.

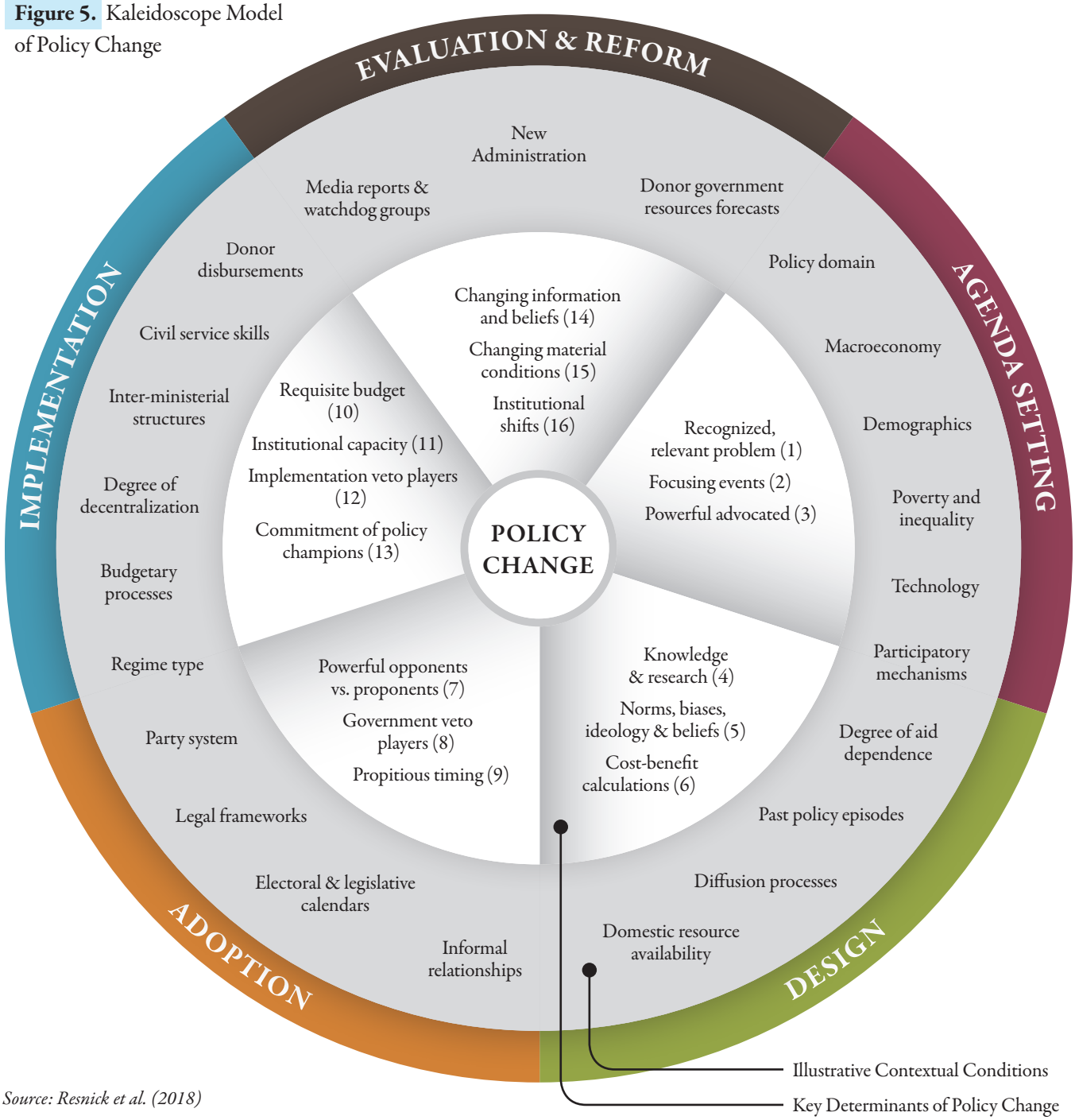
3.1. Kaleidoscope Model of Policy Change

What drives policy reform after long periods of inertia? And why does high-quality research nonetheless fail to generate needed reforms? FSP addressed these and other questions through the development of the Kaleidoscope Model (KM). Although the model recognizes that policy processes are complex and varied, it also demonstrates that there are some generalizable factors that explain the likelihood of policy change regardless of policy domain or country setting. By combining scholarship and evidence from research on public policy and political economy with experiences from the international development community, the KM highlights 16 core variables that are consistently identified as proximate drivers of policy change (Resnick et al. 2018).

Figure 5 presents the KM. The outermost circle of the model delineates the five common components of the policy cycle: agenda setting, design, adoption, implementation, and evaluation and reform. The middle circle in the figure provides an inexhaustive list of contextual conditions. These conditions often shape the 16 core drivers, listed in the next circle, which contribute to policy change at the center of the model. Just as shifting a kaleidoscope refracts light into a new pattern, focusing on a particular component of the policy process reveals a different constellation of key variables that are significant for driving change.

More specifically, at the agenda-setting stage, policy needs to address a *recognized, relevant problem* for key segments of the country's population. This requirement narrows the possible range of issues on the agenda, because only certain problems will resonate with decisionmakers. Because a relevant problem on its own rarely engenders a policy intervention, a second key variable is a *focusing event*, such as a crisis, election, or natural disaster. The presence of *powerful advocates*, whether in government, civil society, the private sector, or even the donor community, also helps to push the policy issue forward.

Figure 5. Kaleidoscope Model of Policy Change



Source: Resnick et al. (2018)

During the policy design stage, policy advocates propose a menu of solutions to address the policy problem. *Research and knowledge*, if perceived as legitimate and credible, can offer evidence of what policy or program design features will work best to achieve particular goals. *Norms, biases, ideologies*, and *beliefs* are related factors driving policy design, affecting the degree to which empirical research appeals to policymakers. Because policy designs shape the interest group dynamics that emerge and influence policy adoption, *cost-benefit calculations*, whether fiscal or political, must be taken into account as well.

Even after a set of reform designs has been proposed, it cannot be assumed that a policy reform will be adopted. One determinant of adoption is the *relative power of opponents versus proponents* who may emerge after the policy design has

been solidified. Their influence often will depend on their proximity to *government veto players*, or those individuals who must support a policy for it to be adopted. When and how quickly adoption occurs often involves a degree of *propitious timing*, which can depend on the legislative or electoral calendar.

Implementation occurs when there are administrative changes, public expenditure outlays, and the delivery of actual goods and services promised by the policy. A key requirement for implementation is access to the *requisite budget*; insufficient or late financing can stymie policy goals. In addition, a degree of *institutional capacity* is necessary among the agents responsible for rolling out the policy. This requires not only education, skills, and infrastructure, but also strong intersectoral linkages and empowered subnational bureaucrats, depending on the policy. *Implementing stage veto players* can emerge when those responsible for implementation may have an incentive to deviate from the intent of the policy or even hinder its implementation. To overcome some of these incentive, budgetary, and capacity challenges, the continued *commitment of policy champions* is critical.

At the evaluation and reform stage, policies may undergo small refinements or can be completely overhauled. One reason is the *changing information and beliefs* regarding the effectiveness of the policy. A second factor may be *changing material conditions*, such as decreased financial resources attributed to the macroeconomic environment. Finally, *shifts in the institutional setting*, such as a new government or ministerial turnover, can reshape the entire policymaking landscape, resulting in key policy changes.

To test the rigor of the KM, FSP researchers applied the model to policy processes in six countries in the domains of fertilizer subsidies, micronutrient interventions, and land governance. Box 2 summarizes some of the findings from that in-depth field work. To avoid conceptual ambiguity and measurement variation, a practitioner's guidebook (Haggblade and Babu 2017) and a peer-reviewed paper (Resnick et al. 2018) offer clear guidelines for operationalizing the variables and applying tools to guide the empirical applications of the KM, such as policy chronologies, circle of influence graphics, and a hypothesis testing table. The model has been described and disseminated in a variety of settings, including the 2015 meetings of the Regional Network of Agricultural Policy Research Institutes (ReNAPRI) in Mozambique; a USAID Agrilinks webinar and blog; policy seminars in Nigeria, Nepal, and Washington, DC; and journalist training workshops in Malawi and South Africa (Resnick 2016).[4] IFPRI also has used the KM to guide analysis of where and when its country strategy support programs have been successful in contributing to policy reform (Place and Hazell 2018).

[4] Links and documentation of some of these events can be found in "What Drives Policy Change? Insights from the Kaleidoscope Model of Food Security Policy," Feed the Future Innovation Lab for Food Security Policy, March 9, 2017, https://www.canr.msu.edu/resources/what-drives-policy-change-insights-from-the-kaleidoscope-model-of-food-security-policy; "Food Security and Nutrition Media Training Workshop: April 18 – April 22, 2016 Module Report," Institute for Food Nutrition and Well-being, University of Pretoria, August 25, 2016, https://www.up.ac.za/media/shared/661/food-security-and-nutrition-media-training-workshop-report-malawi-25-august-2016.zp102444.pdf; and Nokuthula Vilakazi, "Report on the Media Training for Food Security Policy Workshop held on 21st and 22nd June 2016, Brooklyn Guest House, Pretoria," Feed the Future Innovation Lab for Food Security Policy, November 2016, https://www.up.ac.za/media/shared/661/report-for-media-in-science-training-workshop_05-september-2-november-2016.zp102426.pdf.

Box 2. Lessons from applications of the Kaleidoscope Model

As part of the empirical applications of the KM, semistructured interviews were conducted with a wide range of stakeholders in Malawi, South Africa, and Zambia regarding efforts to fortify foods with iodine, iron, and vitamin A. These interviews were complemented by a similar set of case studies in Ghana, Tanzania, and Zambia on fertilizer input subsidy programs, as well as state-level analysis of systematic land tenure regularization in Nigeria. The range of policy domains was critical for testing the robustness of the KM because these policy interventions vary in terms of their visibility, time frame to impact, opportunities for rent-seeking, and the required level of interministerial coordination. Three key findings emerge from the case studies. First, the private sector plays a significant role in food security policy, whether through delivering subsidized fertilizer, producing fortified foods, or generating required software for land registration. This suggests that government-centric models of policy processes need to be expanded to consider the growing role of nongovernment entities. Second, in countries that are more dependent on foreign aid, donors play a significant role in raising awareness of problems, influencing design modalities, shaping cost-benefit calculations, and providing required resources and technical support. Yet donor engagement is insufficient to generate change when there are powerful opponents to reform among the political elite. Finally, reform episodes have been more frequent in the arena of fertilizer subsidies than in other domains studied; the low visibility of micronutrient interventions and the complexity of land governance reforms have failed to generate the same levels of public attention and oversight that would contribute to policy reform. Some of the studies not only help validate the KM but also had policy influence. For instance, the South African micronutrition study served as an input into the South African National Food Security and Nutrition Plan of Action, 2017-2022.

Sources: Babu et al. (2016), Haggblade et al. (2016), Hendriks et al. (2016), Mather and Ndyetabula (2016), Resnick and Mather (2016), Resnick and Mason (2016), and Resnick and Okumo (2017).

The KM also partially informed the development of a Qualitative Assessment of Agriculture and Food Security Policy Processes. These assessments have been implemented with knowledgeable stakeholders, purposively selected, in at least six countries (Malawi, Mali, Nigeria, Senegal, Tanzania, and Zambia) to identify major constraints in national policy systems.[5] Selected stakeholders were asked their views of the quality of agricultural and food security policy processes, their opinions on the quality of the institutional architecture for agricultural and food security, the factors that affect policy and program agenda setting and design, and their degree of participation in agricultural and food security policy process events. A follow-up survey is intended in these countries to track changes in perceptions of the policy system over time. Such a structured, comparative approach is a useful contribution to understanding the enabling environment for agricultural and nutrition policymaking, while also revealing the (sometimes differing) perspectives of multiple categories of stakeholders, including government, civil society, the private sector, donor agencies, and researchers.

3.2. Applying the Kaleidoscope Model to Understand FSP's Policy Influence

To a large extent, the collective research of FSP has influenced one or more of the policy stages highlighted in the KM and validates the relevance of many of the core variables of the model. The following section lays out FSP's influence on the policies of national governments, regional organizations, and the donor community according to those policy stages.

Attention is first given to supply-driven research that identifies emerging issues that should gain greater importance on the policy agenda over time: the *agenda-setting* stage. Much of FSP's research has been with respect to policy *design*, refining options for policymakers, and giving them exposure to other country's experiences with different designs. Some FSP work and policy engagement has been aimed at influencing policy *adoption*, which requires sensitivity to stakeholder concerns. Many policies fail in achieving their intended goals at the *implementation* stage, but FSP has attempted to address binding

[5] Country reports are as follows: Malawi baseline (Benson et al. 2016), Malawi endline (Benson et al. 2018); Mali: (Traoré et al. 2017); Nigeria (Maredia et al. 2017); Tanzania (Lazaro and Maredia 2017); Zambia: (Ngoma et al. 2017).

constraints to implementation where possible. Finally, we present some key examples where FSP analysis helped to refine thinking about existing programs: the *evaluation and reform* stage. Because dissemination and communication are essential for generating policy influence across these different stages, Box 3 further summarizes the diversity of policy engagement modalities pursued by FSP.

Box 3: Modes of engagement used by FSP to improve research-policy linkages

Dialogues and symposia: In Tanzania, the Annual Policy Conference enables government, the private sector, researchers, and civil society to learn about FSP-supported research, to highlight progress toward reforms, and to identify new areas of policy priority. In Malawi, NAPAS initiated the Malawi Land Symposium series, which provided a platform for land and agriculture sector stakeholders to discuss issues related to land and agricultural commercialization. This platform enhanced the involvement of the Ministry of Lands and land sector stakeholders, which influenced the NAIP's focus on land tenure security.

Embedding policy advisor in a ministry: In Malawi and Tanzania, policy advisors have been embedded within the Ministry of Agriculture, while in Malawi, a policy advisor was also located within the Ministry of Planning. In Myanmar, the country project director has an appointment as policy advisor in the Department of Planning. This proximity to policymakers increases the ability of research to respond to short-term demands of high-priority policy issues while also increasing the likelihood that policymakers will access and digest rigorous research, potentially influencing their thinking.

South-South learning: A variety of forums have been held between policymakers from Africa and Asia in order to exchange experiences and promote cross-country learning on agricultural mechanization.

Parliamentary briefings: In Kenya, Myanmar, Nigeria, and Tanzania, making presentations to parliamentarians gives research findings an audience beyond the executive branch. Moreover, since parliamentarians in such countries typically lack access to research facilities, such briefings improve their capacity to exercise oversight.

Journalist briefings: The training of journalists, such as in Malawi, is critical to improve media awareness of food security issues. By providing subject-specific context for journalists, such training aimed to improve the accuracy and scientific content of their articles and identify leverage points to push policy reform. In Kenya, pre-conference meetings with journalists and their editors has allowed for in-depth coverage of research findings and increased the likelihood that findings are accurately framed. In Nigeria, there has been ongoing training with Senate Media on policy communications.

Action-oriented research: Involving government officials in the research process can increase the likelihood that findings are locally owned. In Ghana, government officials were integrated into the research team looking at mechanization, giving the Ministry of Food and Agriculture a first-hand assessment of the problems with its AM-SEC program. In Nigeria, agricultural policymakers from 33 state governments and the Federal Capital Territory of Abuja were exposed to a data and analysis training event hosted by FSP aimed at identifying priority crops. The resulting policy notes have been used by some state governments in negotiations with private sector actors.

3.2.1. Identifying emerging issues that shape the policy agenda

Given the dynamics of agri-food system transformation, the relevant problems that policymakers face and the range of advocates interested in addressing these issues are changing as well. For instance, urbanization's impacts on diets and the processed food sector are driving a revolution in wholesaling, retailing, processing, and logistical operations between farming and consumption. Although government policymakers and donors largely have overlooked these developments, FSP cross-country analyses in Ghana, Mali, Mozambique, Nigeria, and Tanzania are now helping policymakers to recognize promising agro-processing investment prospects (see Ijumba et al. 2015, Liverpool-Tasie et al. 2018 Thériault et al. 2017). In addition, FSP work on diet transformation (Tschirely et al. 2015a, 2015b) has influenced a number of international organizations, such as the Food and Agriculture Organization and the World Bank, and was integrated into portions of the 2016 Rural Development Report of the International Fund for Agricultural Development.

Urbanization is also affecting patterns of land ownership in Africa. As noted earlier, medium-sized farmers have expanded their landholdings within the region, and many of these farmers reside in urban areas (Jayne et al. 2016). Research documenting this trend has received attention in widely read international media outlets,[6] and influenced high-level decision makers in the African Development Bank, the World Bank's African Agricultural Policy Unit, and the Alliance for a Green Revolution in Africa. National governments and the private sector have shown interest as well. In Tanzania, for instance, tractor companies and banks see growth opportunities for their businesses from these medium-sized farmers and may target these potential customers. At the same time, the trend raises important political economy questions, especially because a significant portion of these "emergent" commercial farmers are also government civil servants (Sitko and Jayne 2014). To determine the extent to which medium-scale farmers are acquiring land, and the implications of this for their smallholder farmer neighbors, FSP has developed a full list of medium- and large-scale farms in Kenya, Senegal, and Zambia.

Beyond urbanization, international trade has affected the availability of modern farming inputs in Africa. Notably, international patents on several pesticides used globally expired over the past decade, resulting in the emergence of low-cost Asian suppliers and significantly greater access for African farmers to generic versions of these agro-chemicals (Haggblade et al. 2017). This in turn has caused a massive expansion in pesticide use across West Africa (Diarra and Haggblade 2017). There are now more than 100 different types of pesticides in the subregion; in Côte d'Ivoire alone, traders supply over 100 different brands of the herbicide glyphosate. Yet regulatory capacity has not kept pace with the rapid proliferation of pesticide products. As a result, unregistered and counterfeit pesticides now account for as much as 35 percent of pesticides sold. FSP researchers have assisted local regulators by undertaking laboratory analysis of registered and fraudulent pesticides, conducting laboratory training at regional laboratories, and by presenting key findings at regional regulatory meetings hosted by the Sahelian Pesticide Committee (Comité Sahélien des Pesticides; CSP). FSP collaborators are conducting outreach with regulators, farmer groups, and traders to improve farmer awareness of fraudulent products and to improve systems for monitoring pesticide quality and their impact on the environment and on human health (Assima et al. 2017, Haggblade et al. 2017a).

3.2.2. Leveraging research to inform policy design

As noted earlier, the KM emphasizes that research plays a strong role in influencing policy design. This influence has been achieved mainly through data generation, tool development, and identification of policymakers' biases.

Data generation activities under FSP have been prominent, particularly where there have been significant data vacuums. After decades of political isolation and conflict, Myanmar lags behind most countries in Asia on almost every development metric. When FSP began its work there, empirical information about agriculture and the rural economy was scarce. Consequently, the program conducted the following primary data collection activities:

- The Mon State Rural Household Survey gathered information from 1,700 households on household consumption and assets, migration, farm enterprise budgets, and dietary diversity.
- In parallel, a "rapid reconnaissance" survey of inland (freshwater) fish farming in the Delta region inventoried all segments of the value chain and included structured interviews of 251 persons involved in the sector.
- A subsequent series of studies on aquaculture in the Delta region, the Myanmar Aquaculture-Agriculture Study, examined how proximity to a large urban center (Yangon) drives rural wage rates and mechanization. This study measured spillovers from the large aquaculture subsector to the off-farm parts of the rural economy.
- In the Central Dry Zone, a survey of 1,600 households was conducted to examine how access to water affects farm productivity and diversification. The performance of key pulses and oilseed value chains was analyzed using this data.
- A subsequent similar study of 1,600 households in Shan State focused on the maize and pigeonpea value chains.

[6] See "Africa Has Plenty of Land. Why Is It So Hard to Make a Living from It?" Economist, April 28, 2018; and Jeffrey Gettleman, "Loss of Fertile Land Fuels 'Looming Crisis' across Africa," New York Times, July 30, 2017.

Results of each of these studies in Myanmar were widely disseminated to government officials, parliament, civil society, and donors. The results were used to support the development of the government's Agricultural Development Strategy launched in June 2018 and contributed to the removal of its restrictive policies on paddy land use (see also section 3.2.2).

In Senegal, one of the most comprehensive datasets on the country's agricultural sector was compiled on all segments of the value chains for several major agricultural products—coarse cereals, rice, and horticultural products—and the major agricultural inputs of seed, inorganic fertilizer, and farm equipment. The data were collected with the support of FSP researchers by the Local Analysis Network, a flexible structure created in December 2015 to bring together researchers from several centers and university departments to undertake policy-relevant work requested by the Ministry of Agriculture and Rural Equipment. Research scientists from the economic unit of the Senegalese Institute of Agricultural Research; the Division of Analysis, Forecasting, and Agricultural Statistics within the Ministry of Agriculture; the Consortium for Economic and Social Research, and the Department of Economics of Cheikh Anta Diop University (University of Dakar) are current active Local Analysis Network members. Notwithstanding the initial difficulties in getting the institutions involved to cooperate, the network is operational and has significantly increased its effectiveness in addressing research and policy questions.

Data generation is also key when a government directly requests support in marshaling evidence to guide decisions around a specific policy concern. This has happened frequently in Nigeria. For instance, the Federal Ministry of Agriculture and Rural Development (FMARD) requested input to its Agricultural Sector Food Security and Nutrition Strategy (2016–2025). In-depth fieldwork in Bauchi and Kebbi states in April 2017 aimed to better understand the determinants of chronic malnutrition in northern Nigeria, complemented by an analysis of the 2008 and 2013 Nigeria Demographic and Health Surveys.[7] Similarly, in 2018, the permanent secretary from FMARD requested research input into the country's newly planned agricultural extension strategy. In response, the Nigeria Agricultural Productivity Project (NAPP) organized multiple workshops to learn more about the challenges within the extension system and to offer recommendations to improve the existing extension policy.[8] In Kebbi state, Nigeria, FSP researchers also worked with policy actors from the state Ministry of Animal Health, Livestock, and Fisheries to conduct a meso-inventory of actors along the fish value chain. The findings showed that while there has been rapid growth in the number of fish farms, fishers, and fish traders, there was a small reduction in fish processing and almost no growth in fish farm inputs (e.g., local hatcheries and feed mills). These patterns, however, vary significantly across different geographical zones in the state (Gona et al. 2018). The data collected through the study helped inform a N300 million (about USD 870,000) initiative launched by the Kebbi state government for interventions aimed at stimulating growth in aquaculture and meeting growing fish consumption by Nigerian households.

Because governments often face multiple demands on their resources, in addition to generating needed data, the development of new tools through FSP support has further contributed to policy design. One example is the FSP's Senegal Agricultural Policy Project's web-based monitoring and evaluation system for Senegal's Ministry of Agriculture and Rural Equipment, with an accompanying instruction manual and training course for staff to manage the new system. To make the system accessible to users everywhere, including farmers and agri-businesses, a mobile application for agricultural information sharing has been developed and tagged to the web-based information system. A key achievement of the system is that data and analysis can be shared across all units of the ministry as well as with other government agencies, thereby facilitating the coordination of agricultural information and investment planning.

Another tool used to guide strategic planning around agriculture and food systems is the Rural Investment and Policy Analysis modeling framework for prioritizing agricultural value-chains and investments. This was first used in Malawi to inform the Ministry of Agriculture, Irrigation, and Water Development's (MoAIWD) inputs into the National

[7] "New Study on the Determinants of Chronic Malnutrition in Northern Nigeria," IFPRI Nigeria Strategy Support Program, May 2017, http://nssp.ifpri.info/2017/05/02/new-study-on-the-determinants-of-chronic-malnutrition-in-northern-nigeria/.

[8] "Working towards a Robust Extension Policy in Nigeria: Training Workshop Delivered in Abuja in 20 & 21 February 2018," IFPRI Nigeria Strategy Support Program, February 2018, https://nssp.ifpri.info/2018/02/26/working-towards-a-robust-extension-policy-in-nigeria-training-workshop-delivered-in-abuja-on-20-21-february-2018/.

Agricultural Investment Plan for Malawi, formally launched in June 2018.[9] It has also been applied in Tanzania to inform the government's agro-processing strategy (Benson et al. 2017).

Two tools were developed under FSP to help support GFSS monitoring and to help create country strategy documents to guide U.S. investments in GFSS countries. One is the AgGDP+ indicator, which is derived from a granular analysis of national accounts data to highlight that the contribution of agriculture to the economy goes beyond just production on the farm. Instead, AgGDP+ is the sum of agriculture's contribution to the national economy throughout the value chain, including through processing for downstream agriculture-related manufacturing, as inputs used in farming and processing, the portion of the trade and transport sector that moves agriculture-related products, and the food services sector (see Benfica and Thurlow 2017). AgGDP+ can help donors and governments better track both the direct and indirect channels through which agriculture contributes to food security, income growth, and employment. FSP also created an Excel-based tool and scorecard methodology that will allow USAID to track progress annually in GFSS countries in three domains: level of need, country commitment, and country capacity. Along with nuanced in-country analysis, progress along these domains can inform USAID about whether GFSS countries are improving in these domains vis-à-vis their peers.

As the KM suggests, research in the form of data and tools can be insufficient to motivate policy change without considering the norms, biases, ideologies, and beliefs of decision makers. In Ethiopia, ideology around land governance, specifically against the emergence of agricultural land markets, is pronounced, and certain donor community recommendations to privatize land have failed to gain traction. FSP work on land has pursued a more amenable approach, recommending that Ethiopia revisit the current restriction on land rental markets as specified in the federal land proclamation, which imposes size and durational restrictions in order to discourage long-term migration to urban areas. Building on existing analyses, which showed that the restrictive policy was having the opposite effect on migration, FSP research recommended that the proclamation be amended to allow for longer-term leases, following what some regions in Ethiopia were already doing. The recommendation was then submitted by a technical unit within the Ministry of Agriculture to the minister, where it is under consideration by the government that took office in 2018.

Exposing decision makers to policy design examples from other subnational or country settings, especially ones that are viewed as credible or aspirational comparisons, can be effective in unblocking biases. South-South knowledge sharing on agricultural mechanization helped shift the mindsets of Ghanaian and Nigerian policymakers through a tour to Bangladesh in 2015. A South-South forum on agricultural mechanization hosted in Ethiopia in 2017 further exposed African policymakers to case studies of innovation from Asia. Among other things, they learned from these experiences that power tillers and small tractors could also be used on dry land, rather than solely on irrigated land, thereby addressing a long-held bias that large tractors are the preferred technical approach to promoting agricultural mechanization (Clay et al. 2016).

3.2.3. Facilitating stakeholder engagement to overcome barriers to policy adoption

Although FSP research has influenced the content of many agriculture-related policies and strategies, the program also has made ongoing efforts to improve the likelihood that such policies would be adopted. As indicated in the KM, reducing the balance of opponents to proponents can enhance policy adoption. Large-scale consultations with a variety of stakeholders are a key way to achieve this, as they increase ownership of the policy across diverse interest groups.

For instance, in Myanmar, after the November 2015 elections and the installation of a new government, FSP collaborated with donors, the private sector, and the Myanmar National Economic and Social Advisory Council to draft an agricultural strategy white paper, titled "From Rice Bowl to Food Basket." One of the main messages of the paper was that the government should allow farmers to have the freedom to choose which agricultural products to produce rather than requiring owners of paddy land to exclusively farm rice (NESAC 2016). Due to the government's concern about achieving self-sufficiency in rice production, those living on paddy land historically could not plant more profitable cash or

[9]NAIPs specify the finances and human and institutional resources necessary to operationalize a country's National Agricultural Policy.

industrial crops. Through FSP's consultations with a broad range of stakeholders in the incoming democratic government, the restrictions on crop choice on paddy land were soon lifted (Htoo and Soe 2017). Furthermore, the Ministry of Agriculture, Livestock and Irrigation (MoALI) internalized many of the broader messages of the paper and integrated key findings into Myanmar's first agricultural policy, which was published in 2018, including the need to "change from a rice centric policy to a food basket system" (MoALI 2018: 14).

Similarly, in mid-2014 in Malawi, FSP, together with MoAIWD, began developing the conceptual priorities that would guide the content of the National Agricultural Policy. In 2015, FSP and MoAIWD hosted consultations with over 800 stakeholders across the country to review the draft National Agricultural Policy. This level of consultation was unprecedented, and it demonstrated the government's commitment to engage in mutually accountable policy processes. The president of Malawi launched the country's agricultural policy in late 2016.

Also in Malawi, FSP researchers developed and applied the Integrated Framework for Gender Analysis of Nutrition Policy, which determines whether national nutrition policies truly address underlying gender structures or simply focus narrowly on women (Mkandawire and Hendriks 2017; Mkandawire et al. 2017). Through a policy dialogue held in 2016 to assess gender mainstreaming in the National Nutrition Policy 2016–2020, stakeholders from multiple government agencies and civil society reflected on gender biases. As a consequence of this interaction, the language in a subsequent draft of the policy was changed to reflect that men had an equally key role as women in promoting nutrition.

3.2.4. Identifying bottlenecks to implementation

Implementing policies as they were intended is one of the most challenging areas of policy reform, especially in developing countries where capacity and resources are weak. In Malawi, for example, there have been improvements over time in policy reform processes and evidence-based policy formulation that have resulted in technically sound policies and strategy statements. Yet FSP researchers working with Malawi's Ministry of Agriculture (under the NAPAS: Malawi project) found that effective policy implementation is still weak.[10] Likewise, in Nigeria, while there is excitement about and demand for NAPP research, the team has not seen much change in the federal government's policies on the ground. For instance, even after IFPRI completed a comprehensive study in 2016 in response to a government request for support in the transformation of the Agricultural Research Council of Nigeria (Babu et al. 2017), the legislative bill that would implement the suggested reforms remains pending in the National Assembly.

Nevertheless, FSP has recognized some cases where implementation success could be enhanced if potential barriers, such as those highlighted by the KM, were addressed in advance. Work done on pesticides in West Africa involves many varied implementation constraints, including porous borders, diverse government incentives, and multiple regulatory structures. Yet FSP researchers have identified that, as the KM indicates, financing is a binding constraint to improved oversight. As such, they are working with the Permanent Interstate Committee for Drought Control in the Sahel, the CSP, ECOWAS, and donors to formally review financing options for these various regulatory agencies.[11] In addition, FSP research on fraudulent pesticides in West Africa points clearly to lapses in enforcement of pesticide registration regulations and quality assurance monitoring (Haggblade et al. 2019). FSP researchers are also guiding the African Union's Land Policy Initiative by developing rigorous indicators in 12 pilot countries to track progress against commitments made by the countries under the African Union's Declaration on Land Issues. By quantifying progress in implementation, there is greater scope for identifying why implementation has proceeded more effectively in one country than in another.

In Tanzania, FSP helped to improve the implementation of the produce cess, a tax levied since 2003 on the sale of crops at a maximum of 5 percent of the farmgate price. The 166 local government authorities of Tanzania had discretion over the rate used, which created a range of different rates across the country. Farmers, civil society, and agribusiness groups all criticized the tax. At the request of the Ministry of Agriculture and the President's Office–Regional Administration

[10] Interview with NAPAS team member. The New Alliance Policy Acceleration Support: Malawi (NAPAS:Malawi) project is funded by the USAID/Malawi mission as an Associate Award under the FSP project.

[11] From the most recent semi-annual report.

and Local Government agency, FSP drafted a detailed analysis of which crops contribute the most to the cess and the key constraints to administering the tax (Nyange et al. 2014). This led to recommendations to reduce the cess from a maximum of 5 percent to 3 percent and to recommend a pilot that would minimize revenue leakages by collecting the tax through an electronic payment system. In 2015 and 2016, FSP helped implement this recommendation by reviewing the Finance Act for Local Government Authorities and helping to train tax agents (Mwambulukutu et al. 2016).

Institutional capacity is another top constraint that requires both long-term training and novel administrative configurations. In Tanzania, the project is guiding the Ministry of Agriculture to establish a Market Intelligence Unit to, among other things, advise the government on import and tariff policies. Ultimately, FSP feels that the Market Intelligence Unit will increase the use of evidence in the government's agri-food marketing and trade policy decisions. In Myanmar, the pursuit of new institutional options has faced some bottlenecks. FSP proposed the creation of an Agricultural Policy Unit within the department of planning of MoALI to evaluate sector-specific policy options and guide policy implementation. The ministry accepted this proposal, and the FSP-Myanmar project director is now one of three international advisers supporting the Unit. However, because the Department of Planning does not have ministrywide convening power, it has been unable to attract other senior analysts to MoALI. Additional institutional innovations will be needed to overcome these constraints.

3.2.5. Pursuing evaluations for policy refinements

Among FSP's notable strengths are its long-term relationships and ongoing engagement within countries. This has enabled researchers to track the implementation of key policies over time and update information about how well a policy is achieving its stated goals.

Such established relationships and long-term in-country engagement have benefited the team's evaluations of subsidy programs in southern Africa, including Zambia's Fertilizer Input Subsidy Program (FISP-Z) and Malawi's Farm Input Subsidy Program (FISP-M). In Zambia, FSP partner MSU began studying the efficiency of earlier versions of the FISP-Z as far back as 1997, producing a large body of rigorous research over the years. MSU's findings and frequent outreach to policymakers, along with support from the Indaba Agricultural Policy Research Institute (IAPRI), eventually convinced Zambia's government to make a change. In 2015, Zambia transitioned to a pilot e-voucher, which has since been expanded nationally. FSP partners, including IAPRI, continue to monitor the program in order to refine it over time.[12]

In Malawi, the project brief on "Re-designing the Farm Input Subsidy Program for Malawi," along with the trust established between NAPAS and the Minister of Agriculture, influenced MoAIWD to initiate reforms of its subsidy program. In 2015/16, two reforms were introduced: (1) a tenfold increase in FISP-M recipients' contribution to fertilizer costs, and (2) having the private sector source and distribute about 30 percent of the subsidized fertilizer directly to recipients, thereby reducing the burden on the government budget. In the 2016/17 season, these reforms were enhanced, with the private sector distributing 60 percent of the fertilizers and a pilot introduced to target more productive smallholder farmers.

Similar long-term relationships in Mali, coupled with recent detailed farm-level surveys, have enabled FSP researchers to document significant problems with implementation of the government's e-voucher fertilizer subsidy reforms underway over the past three cropping seasons. Currently, FSP researchers are actively engaging with key stakeholders—including Mali's Ministry of Agriculture, the World Bank's West Africa Productivity Program (WAPP), and the Mali Farmer's Association (APCAM)—to broker a consensus understanding about the status of e-voucher reform efforts and consolidate stakeholder hypotheses about why these pilot reform efforts have stumbled. Through this empirically based shuttle diplomacy, FSP researchers aim to lay the foundation for further informed policy adjustments based on common understanding of the existing paper and pilot e-voucher subsidy systems.

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[12] Interview with Zambia buy-in team member. See also Hambulo Ngoma, "A Policy Reform Boosts Business and Promotes Diversification: The E-Voucher Program in Zambia," Feed the Future Innovation Lab for Food Security Policy, December 8, 2017, https://www.canr.msu.edu/resources/a-policy-reform-boosts-business-and-promotes-diversification-the-e-voucher-program-in-zambia.

Since 2016, FSP has participated in at least 10 policy roundtables in Rwanda, engaging with the country's government on policies to improve the coffee sector. Rwandan coffee is highly regarded globally, and over the past decade postharvest value added has risen substantially, yet coffee productivity remains relatively low. After surveying coffee producing households, FSP researchers attributed this low productivity to a lack of commercial incentives for smallholder producers, who on average receive prices for their coffee that are 25 to 30 percent lower than what their counterparts elsewhere in the region receive. Research showed that sustaining prices for high quality cherry in the range of 300 Rwandan francs per kilogram would give farmers a fair return on their investment. Thus, FSP recommended that the government ease the floor price for coffee cherry up to this price (Clay et al. 2016a, 2016b; Clay and Bizoza 2018). This research and the policy roundtables have led to modifications of the government formula for setting coffee cherry prices—demonstrating that impact can be made in a short time if meetings focus on a specific policy issue. Furthermore, it shows the importance of long-term relationships, as MSU had worked on specialty coffee sector development in Rwanda a decade before.

Finally, as farm sizes grow and the agricultural labor force shrinks, the demand for mechanization services among farmers in Africa has risen substantially in recent years. Consequently, at least nine African countries have established subsidy programs to support the hiring-out of mechanized farming services. In Ghana, the Ministry of Food and Agriculture (MoFA) has overseen the Agricultural Mechanization Services Enterprise Centers (AMSEC) program for more than a decade. For several years, FSP has been examining the impact of the program on the uptake of farm machinery by Ghanaian farmers (Houssou et al. 2013). In early 2018, the MoFA asked FSP researchers to evaluate AMSEC in anticipation of a second phase of the program. Officials from the MoFA Agricultural Engineering Service Directorate joined FSP researchers in conducting an intensive field study and learned firsthand about the inefficiencies of subsidized agricultural mechanization service provision. As a result, the directorate took ownership of FSP's recommendations that the government should (1) remove or reduce import tariffs and duties on spare parts and tractor attachments and (2) provide training to owners and operators of tractors and other farm machines and to the mechanics that service them (Diao et al. 2018). Directorate officers made these recommendations to high-level MoFA policymakers.

3.3. Lessons Learned about Policy Engagement

The wide-ranging policy achievements under FSP have involved project participants learning several lessons on how to effectively navigate complex policy settings.

3.3.1. Recognize and adapt to political and ideological realities

Politics and ideology permeate many policy decisions, and failing to recognize vested interests ex-ante can undermine the influence any research results might have on those decisions. Based on years of engagement in FSP countries, the team has learned some ways to address this problem.

First, awareness of the electoral cycle can help determine when to advocate for reforms. In Tanzania, the ASPIRES (Agricultural Sector Policy and Institutional Reform Strengthening) team recognized that implementing the e-payment system for the produce cess would be more effective after the 2015 general election. If carried out beforehand, implementation challenges could have been used as political fodder, derailing momentum for reform. Likewise, in Mali, the FSP team recognized that releasing the results of its fertilizer subsidy study before the 2018 presidential election would not result in much reform if policy champions of subsidy reform lost their races. Waiting until afterward and building relationships with a new set of government actors made it more likely that needed reforms would be adopted and have a longer implementation period. Elections can also undermine government partners' openness to policy reforms that FSP and its partners are researching. For example, as Nigeria's 2019 general election approaches, the NAPP project implemented under FSP may make little progress on the policy reforms that the project has been supporting with new evidence and analyses.

Although the timing of elections is relatively predictable, other major political events are not and have had unintended consequences for FSP's work. A notable example is the Rakhine crisis that erupted in August 2017, which drastically changed Myanmar's international image, consumed the energies of its highly centralized political leadership, and hampered further agricultural policy reforms. In contrast, the abrupt resignation of Ethiopia's prime minister in early

2018 and selection of a seemingly reform-minded successor brought a potential opportunity for FSP to push for land policy reforms. Nonetheless, the team recognizes that advocating for privatized land ownership, which some donors have encouraged in the past, is unproductive given the regime's ideological preference for public land ownership. Instead, FSP researchers are urging donors to support relaxing restrictions on the duration of land rental contracts, which could be a first step in moving away from a wholly public land ownership system.

Work on gender and nutrition in Malawi has shown that ingrained gender biases of decision makers hinder their ability to effectively mainstream these cross-cutting issues. These biases are often deeply entrenched as a result of traditional socialization and strong advocacy from some groups. Thus, policymakers sometimes window dress their policy statements with progressive terminology rather than craft policies that take into account, for example, gender considerations or that factor in how women, as caregivers, play a critical role in improving nutrition, which in turn is critical for human and economic development. In order to design and implement effect policies on gender and nutrition, such biases need to be addressed and their supporting belief systems challenged.

3.3.2. Adopt a 360-degree perspective

Achieving food security requires looking at the role of agriculture holistically, taking into account linkages with and implications for other sectors. The produce cess case in Tanzania is a good example: the tax has negative effects on the prices received by farmers and is disliked by the Ministry of Agriculture, but it has been a critical source of flexible revenue for local governments. For the government to marry its objectives of improving food security while delivering on its commitment to decentralization, FSP needed to find a compromise position, engage with multiple ministries, and focus on improving the design and administration of the tax rather than eliminating it completely.

Achieving food security requires looking at the role of agriculture holistically, taking into account linkages with and implications for other sectors.

Another example is found in Nigeria where, in early 2018, NAPP brought together different ministries, including agriculture, commerce, health, and water, to help revise key policy documents. This meeting improved interministerial engagement and collaboration in some unexpected ways. For example, FMARD noted in this meeting that it had some money for training farmers but could not afford seed starter kits; officials from the Ministry of Commerce immediately shared that they had a fund just for that purpose.

3.3.3. Commit to long-term engagement with a broad range of policy champions

Policy influence requires long-term commitment for at least two reasons. First, building relationships of trust and credibility with policymakers takes a great deal of time and energy. Such investments can be risky when electoral changes and ministerial turnover occurs. Many FSP country projects have experienced at least one turnover of political party during the life of the project. This often means having to forge new relationships—for example, with a new minister of agriculture or permanent secretary—and demonstrating the importance of FSP research all over again to people who may have only limited recent experience in the agricultural sector. This happened even in Tanzania, where the ruling party has remained the same since independence, after a new president was elected in 2015. He launched a series of anticorruption initiatives, resulting in considerable staff turnover in government agencies. These dynamics emphasize the importance of forging relationships with a broad swathe of policy champions rather than just a few high-level government officials.

The second primary reason for long-term commitment is pragmatic: in many of these settings, policymaking takes a long time and often happens in fits and starts. Three or four years may pass before amendments are made or implementation begins. If donors want to claim policy impact, then project funding cycles need to consider these long time-lags between policy design, adoption, and implementation.

3.3.4. Demonstrate responsiveness to short-term needs

In parallel to making a long-term commitment, credible relationships are also reinforced through a willingness to shift research priorities when there are immediate demands from either government or donor partners. This occurred in Myanmar in 2016, when rice paddy prices crashed, and again in 2017, when India imposed an import ban on two of Myanmar's largest pulse crops (black gram and pigeonpea). By mobilizing relevant research capacities across the FSP consortium, whether using market models in simulations, value chain expertise, or survey analysis skills, FSP has been able to take advantage of such crisis-related policy windows to influence the policy process. Such rapid support efforts have enabled governments to avoid costly, ill-informed, and ineffective short-term interventions in favor of longer-term market-driven adjustments. In doing so, FSP researchers have built good will with host governments and strengthened their reputation as a reliable, objective partner for evidence-based policy advice.

3.3.5. Partner with more than the usual suspects

Although national ministries and executives may be ultimately responsible for policy adoption, generating evidence and momentum for needed policy changes requires engagement with a wider array of actors. In Kenya, Malawi, and Nigeria, working with and training journalists has increased the potential of reaching a broad range of citizens, which is critical for reinforcing donor and government commitments to mutual accountability. Programs in Kenya, Nigeria, and Tanzania work with parliamentarians, and include training courses on policy communications. This can improve legislative oversight over agricultural policies and increase the likelihood that these reflect constituency preferences. Working with the private sector and identifying policy bottlenecks has been a critical component of the research on herbicides in Mali, as well as on mechanization in Ghana. Finally, the federal structure of Nigeria requires engaging with state-level governors and ministries of agriculture. Determining where and how national and subnational agricultural policies are complementary may become more important given that quite a few FSP countries, including Ghana, Kenya, Myanmar, and Zambia, are pursuing or considering devolving certain agricultural functions to the subnational level (Resnick 2018).

3.3.6. Appreciate the political leverage of local knowledge . . . with caveats

Research findings in other policy domains emphasize that local academics, universities, and institutes often are much more credible with domestic policymakers than are their externally based counterparts (Parks et al. 2015). As elaborated below, FSP team members have sought out or built on already strong partnerships with such local policy analysts when working in a particular country. In Myanmar, the traditional reverence for national academics has meant that their endorsement of the results of joint policy research will generate considerably stronger policy traction than would be the case if expatriate FSP researchers had tried to make headway on policy reforms with the same research insights on their own. In Zambia, despite the government's initial reluctance to be criticized by a local institute, IAPRI's strong reputation has made it a trusted and valued government partner. Given MSU's strong engagement in the creation of IAPRI, the institute is supportive of FSP research in Zambia and provides FSP researchers with important points of entry into policy processes there.

However, respect for local knowledge is neither unlimited nor universal. In some FSP countries, policymakers and government officers may view specific institutions or particular local researchers as sources of opposition to the government's political and development agendas. Not surprisingly, such organizations and individuals have less influence over the policies of the sitting government. Understanding such institutional and personal relationships and their dynamics in advance is essential for knowing whose local knowledge is perceived by sitting governments as more "legitimate."

IV. CAPACITY STRENGTHENING AND PARTNERSHIPS FOR RESPONSIVE POLICY SYSTEMS

The sustainability of policy impact depends on many factors, including the capacity of key research partners and their institutions to provide information and analysis in ways that support sound policy formulation, the ability of government staff to communicate the policy implications of research to decision makers, the effectiveness of civil society and private sector advocacy groups, and the capacity of government to implement policies. Yet, just as global dynamics have influenced the nature of agri-food system transformation in recent years, changes in developing countries with respect to communication technology, education levels of researchers and government officials, and the array of civil society actors necessitates novel thinking about how to approach capacity building. FSP provides a natural lab for experiments in building capacity for policy research, with a variety of approaches pursued in different country settings and targeting different audiences. This section details these approaches, focusing specifically on FSP efforts to enhance the capacity of research institutes, universities, and civil society to engage in local policymaking processes.

4.1 Capacity Strengthening Modalities

FSP explored three supply-side approaches for strengthening capacity within policy systems: (1) strengthening university networks for policy research and dialogue; (2) partnering with independent or quasi-independent policy analysis institutes and think tanks; and (3) implementing various forms of training for a broad range of stakeholders in order to strengthen capacity for policy research and dialogue. The FSP activities and the lessons learned in each of these three areas are summarized below.

4.1.1. Networks with universities

A fundamental goal of networking with universities is to build the human capital that will enable future policy research. In Nigeria, capacity building is a central component of NAPP (the Nigeria Agricultural Policy Project), with the main model used being networking with universities. Teams consisting of an FSP researcher, a Nigerian faculty member, and a Nigerian graduate student analyze key research themes. In this way, FSP researchers ensure that their analysis is locally informed and guided by policy relevance, while the Nigerian counterparts gain exposure to new research skills and the opportunity to publish in international outlets. Currently, NAPP is working with 15 universities and institutions in the seven Feed the Future focus states and the Federal Capital Territory (Abuja). In turn, some Nigerian students have the opportunity to attend courses at MSU, which further enhances their research skills. While NAPP also conducts short-term trainings, such as on econometric analysis methods, it embeds these in the university partnerships, which are viewed as a good approach to building sustainable capacity.

FSP also has established partnerships with specific universities in Tanzania and Myanmar. In Tanzania, FSP collaborates with faculty from the Sokoine University of Agriculture (SUA) on research related to agricultural transformation. Collaborative research helps to narrow the gap in perspectives between the government and the university, countering stereotypes such as the perception of government staff that university faculty are not "practical" in the research they conduct and feelings among university staff that the government does not support them. Under this project, SUA faculty are less involved than FSP personnel in policy dialogue, although in general the government draws on SUA faculty as a pool of policy analysts or resource persons. In some cases, the experience with and exposure to government gained by these faculty members has earned them appointments to senior government positions. SUA faculty have also participated in short-term training courses organized through FSP.

In Myanmar, FSP developed relationships with Yezin Agricultural University. The Department of Agricultural Economics is one of the university's stronger departments, and its faculty undertake limited research in addition to supporting their

students' master's and doctoral degree research. FSP supported three short courses at Yenzin: a three week cost-benefit analysis course for a mixed group from MOALI (the Ministry of Agriculture, Livestock and Irrigation), Yezin, and a local partner (Centre for Economic and Social Development), followed by two policy analysis courses co-organized by the university, the MOALI Department of Planning, and IFPRI staff.

4.1.2. Partnerships with local research institutes and think tanks

FSP researchers have partnered extensively with local research institutes and think tanks. Experiences varied by country in ways that suggest how the organizational structure, funding, leadership, and incentives have affected each institute's success and long-term viability. For instance, in Kenya, the Tegemeo Institute of Agricultural Policy and Development's status as a unit within Egerton University brought both advantages and disadvantages. Tegemeo benefited from some financial and in-kind support from Egerton, which is publicly funded. Tegemeo staff were paid higher salaries than their Egerton counterparts, but Egerton had authority over Tegemeo's hiring decisions. Over time the salary disparities created friction between the faculties of Tegemeo and Egerton's agricultural department. Also, among donors, only USAID contributed to Tegemeo's fixed costs (e.g., long-term PhD training of research staff, farm household surveys, vehicles, business office facilities). Other donors chose to provide either short-term support for particular studies of interest to them or to fund selected Tegemeo researchers as independent consultants. These approaches did not contribute to the continuation of the activities (e.g., household surveys) that made it possible for the institute to fulfill its long-term role of providing evidence-based policy guidance to the Kenyan government.

The Tegemeo experience in Kenya raises several key issues: (1) how to strike an effective balance between affiliation of policy research institutes with public universities and institutions to promote a sense of government ownership, while also retaining enough independence to make competitive hires and operate without interference and control over the research findings; (2) how to provide staff compensation sufficient to retain internationally competitive research staff within a public university system; and (3) how to address the free rider problem of donors seeking valuable local policy analysis but being unwilling or unable to contribute to the costs of maintaining the institute's long-term viability. Despite the challenges described above, Tegemeo produced some important policy work, made alliances with international universities that contributed to quality outputs, and held many well-attended and acclaimed policy conferences in Kenya. Moreover, Tegemeo was integrated into some of the government's key agricultural initiatives, and was valued by both donors and Egerton University, which benefited from indirect cost recovery on grants that were passed on to Tegemeo.

Zambia has made great progress in developing capacity for African-led agricultural policy analysis, including establishing what is arguably one of the region's strongest agricultural policy research institutes, the Indaba Agricultural Policy Research Institute (IAPRI). A major lesson from Zambia is that it is possible to develop local capacity for policy analysis within a decade if there is effective leadership and if development agencies, international universities, local universities, and governments work together for a sustained period. In 1990, agricultural policy analysis capacity in Zambia was among the lowest in the region. In 1999, USAID initiated an agricultural policy project headed by Michigan State University, which over the course of 12 years sent four Zambians to MSU in East Lansing, Michigan, for MS or PhD training and hired several Zambian recent PhD graduates from other US and European universities to join the project in Lusaka. The project built a core team of Zambian agricultural policy analysts who worked together with senior MSU faculty based long-term in Lusaka, supported by long-term funding from USAID. By 2010, the USAID and Swedish International Development Agency missions in Lusaka were working with MSU to transform the project into an autonomous, Zambian-managed policy institute, which ultimately became IAPRI. The full transition—erecting the institutional structure, identifying effective leadership, and building government support for the institute—took two

It is possible to develop local capacity for policy analysis within a decade if there is effective leadership and if development agencies, international universities, local universities, and governments work together for a sustained period.

additional years. MSU has continued to work with IAPRI to strengthen the hard and soft skills sets of junior staff.

IAPRI has also tried to establish a formal relationship with the University of Zambia (UNZA), but to date this has not gone beyond having the dean of the UNZA Faculty of Agriculture serve on the IAPRI board of directors. Such an affiliation may help IAPRI to gain a reliable local funding base through Government of Zambia allocations to UNZA. IAPRI's senior leadership resisted formal affiliation with UNZA, citing concerns over autonomy, ability to respond nimbly to opportunities without depending on university structures to access funds and/or staff, and worries over fitting into university salary structures that were far below international market rates for trained MS and PhD agricultural economists. (These problems have been avoided under IAPRI's current status as a private company.)

Several observations about sustainable capacity development have emerged from the Zambian experience. First, IAPRI faced crucial challenges at the outset, and if the institution had not continued to obtain strong funding and capacity support, it might not have survived. Even though it was fully managed by Zambians, some of whom formerly served in senior government positions, government trust in the new institution did not come automatically. Although the government was accustomed to criticisms of its policies by international organizations, it often seemed surprised at the degree to which the new local institute continued to expose the shortcomings of government policies. As IAPRI was funded by donors and is still supported by international university partners, the government sometimes took the position that IAPRI's research was influenced by external interests. It took time and a number of tests for IAPRI to show that its analysis and perspectives were not influenced by the external interests of donor governments. Over time, these concerns have subsided, and the Ministry of Agriculture now treats IAPRI as a trusted and valued partner, frequently asking IAPRI to carry out both short- and long-term policy analysis on its behalf.

In Malawi, the Centre for Agricultural Research and Development (CARD) was set up in 1994 at Bunda College (now the Lilongwe University of Agriculture and Natural Resources [LUANAR]), with support from USAID. CARD's level of activity and engagement with the government declined after the period of active USAID support. Efforts are being made to revive CARD, but for this to succeed incentives would need to change to encourage LUANAR/CARD researchers to work through university-managed projects rather than as independent consultants, and an agreement would have to be negotiated within LUANAR regarding the level of university support for CARD and the sharing of revenues from external grant funding brought in by CARD.

4.1.3. Training

Country- and regional-level projects under FSP have involved a range of training activities, including short-term training and mentoring and on-the-job training. Two types of short-term courses have been particularly innovative in involving civil society, researchers, and policymakers. In Malawi, Nigeria, and South Africa, the media play a critical role in bringing research results into policy debates and reaching the broader public. FSP therefore organized training courses with journalists in these countries who work on agriculture, nutrition, and development issues. In Malawi, the weeklong training program in 2016 conveyed technical information about these issues to a group of journalists working in print, radio, and television media so that they could write about these issues in ways that were both correctly and easily understood by readers. By the end of the course, participants had prepared articles on food security issues that were ready for publication. During 2017, staff from MSU's Global Center for Food Systems Innovation and Knight School of Environmental Journalism collaborated with FSP on more training activities in Malawi, including field trips for journalists to agricultural research stations, an open meeting with LUANAR faculty and administrators, and follow-up one-on-one coaching on the preparation of agriculture-related stories in Malawi media outlets. The open meeting at LUANAR brought to light some reasons for poor relations between the media and university faculty, with journalists being perceived by university faculty as always asking for contributions on short notice and misquoting them, and faculty being perceived by journalists as never being willing to respond to their inquiries.

In Nigeria, IFPRI's media engagement manager led a "master class" with members of the press in 2018, looking at the role of journalists in influencing agricultural policy, ways to write policy notes, and proper online platforms for disseminating stories. IFPRI's plans to establish a platform for African journalists on food security issues will help foster this community

over time.

A second type of training focused on building policy research and analysis skills. This type of training often involved a combination of short courses and longer-term mentoring of local staff involved in field research and policy analysis activities. The University of Pretoria's Bureau for Food and Agricultural Policy (BFAP) provided this type of training in partnership with the member institutes of ReNAPRI. In Malawi, BFAP co-led a five-day training at CARD in 2017 on market analysis and modeling, with participants from five government ministries, the private sector, civil society, and universities. The training aimed to teach policy analysts in Malawi to use partial equilibrium models to inform market outlook projections at the national and regional levels, particularly for commodities other than maize. The training drew on a model developed by the Food and Agricultural Policy Research Institute at the University of Missouri, which had been adapted by BFAP. Earlier on, BFAP staff had conducted similar trainings at SUA in Tanzania, and the Center for Studies of Agri-food Policies and Programs in Mozambique. In Tanzania, low turnover rates of SUA faculty increased the payoff of trainings. Apart from compiling the databases and developing the modeling system, one of the main objectives of the partial equilibrium modeling process is to build consensus through active dialogue and interaction between analysts, policymakers, and private sector players on the results and policy implications of alternative future scenarios examined by the model.

In Myanmar, FSP provided value chain analysis training to 62 employees of Burmese civil society organizations in the Community Development and Civic Empowerment Program at Chiang Mai University, Thailand. Other training for the Myanmar project under FSP included sessions on survey design, questionnaire translation and pre-testing, enumerator supervision, and logistical support, as well as the use of STATA software to enable data cleaning and analysis. The project also provided diagnostic support and communications training, policy advocacy and policy analysis to members of the Food Security Working Group.

A third type of short-term training conducted by FSP focused on strengthening the management capacity of selected policy research institutes. Examples include training conducted for collaborating institutes in Malawi, Mali, Myanmar, Tanzania, and Zambia on the preparation of USAID-specific reports, human-resource management procedures, grant management, and management of in-country cash expense funds.

The provision of practitioners' guidebooks and publicly available databases for policymakers and academics to use is one way in which FSP can make a lasting impact long after the project ends. As noted earlier, developers of the Kaleidoscope Model generated a guidebook for applying the model to other countries and policy domains (Haggblade and Babu 2017). A complementary tool is the PMCA approach to improve the engagement of key actors in the agricultural policy systems of developing countries. PMCA focuses on four sequential components: Policy inventory, Mapping of stakeholders, Constraint identification, and feasible Actions (Sitko et al. 2017).

Policy incoherence in the domain of food security is frequently lamented, but few tools exist to understand the extent of the problem. As such, another key FSP contribution has been the creation of an electronic database to track policies, legislation, and strategies related to food security. This has been done at the country level for Malawi, facilitating Malawian policymakers' understanding of the extent to which their National Agricultural Investment Plan corresponds to other relevant policy documents, such as the continental Malabo Declaration on Accelerated Agricultural Growth and Transformation and the Malawi Growth and Development Strategy III (Olivier et al. 2017; Hendriks and Olivier 2018). The methodology underlying the database has now been scaled up to examine complementarities and contradictions with international, African Union, Southern African Development Community, and ECOWAS instruments. This tool, along with the Integrated Framework for Gender Analysis mentioned earlier (see section 3.2.3), has been used to train policymakers from ECOWAS countries to better ensure coherence across food, nutrition, gender, and agriculture goals within the national agriculture investment plans.

4.2. Lessons Learned with Capacity-Building Modalities

By spanning a variety of capacity-building approaches, FSP can balance the weaknesses of some with the strengths of

others. Historically, training courses have been the most common approach to capacity building. Training courses are most effective when they are undertaken by a given cohort of trainees, so that they build skills over time and eventually form a community of practice, and when classroom-based training is complemented by opportunities to apply the material on the job. Also, training programs for civil servants should include not only the training of junior and/or midlevel staff (including long-term degree training for those likely to move into senior leadership positions), but also shorter trainings to teach senior decision makers how to make use of the new skills acquired by their recently trained staff members.

Supporting university staff for the entire duration of a project, rather than for just one- or two-week periods, offers more sustainability, especially when such support brings together faculty and younger graduate students. Such partnerships should not undermine faculty members' attention to their teaching and mentoring responsibilities. Moreover, because university professors do not have a comparative advantage in addressing issues that require a quick turnaround, their expertise should be directed to longer-term issues or evaluations of existing policies on the ground.

In contrast to university faculty members, who typically have heavy teaching loads, the staff of local independent research institutes tend to have greater flexibility to respond when urgent policy analysis needs arise, and often have greater freedom to work with a wide variety of actors, including civil servants, parliamentarians, the private sector, and the press. However, policy influence depends largely on the quality of such institutes' leadership, their ability to retain competent staff by having competitive pay structures, and a sustainable fundraising strategy. Several of the policy research institutes that FSP engaged with had gone through changes in leadership as well as phases of expansion and contraction due to fluctuations in external funding, both of which led to ups and downs in their track records and reputations as trusted and valued sources of timely, policy-relevant information and analysis.

V. CONCLUSIONS

Any engagement in the food security policy arena requires a degree of humility. Knowledge gaps about agri-food system transformation and the best ways to achieve food security will remain sizable as global dynamics in technology, trade, communication, and demography continue apace in the coming years. Policymaking, even when rigorous and timely research is available, will never be entirely evidence-based. And building capacity will require not only training individuals about methods and data, but also addressing weaknesses in the financial and administrative management of local institutions and providing strategies to enable them to retain independence and credibility in sometimes difficult political environments.

With its three-pronged focus on research, policy, and capacity, FSP has made important advances over the past five years in both Africa and Asia.

Nevertheless, with its three-pronged focus on research, policy, and capacity, FSP has made important advances over the past five years in both Africa and Asia. Specifically, FSP research has advanced thinking about how rapid urbanization is changing diets and contributing to the growing consumption of ultra-processed foods in low-income countries. This creates notable policy trade-offs by, on the one hand, undermining nutrition and public health goals while, on the other hand, contributing to a growth in domestic supply chains and employment possibilities as emerging small and medium-sized agribusinesses enter these supply chains. Growing demand for food generated by demographic pressures has also contributed to more input-intensive practices and labor-saving technologies, including mechanization and herbicide use. In some countries, there has been a push toward greater commercialization of farming, leading to a new class of medium-scale investors. These distributional shifts in landholding have occurred in parallel with a wave of titling reforms, especially in Africa, that were intended to protect property rights and encourage agricultural productivity.

Integrating this FSP research into policy action by national governments, regional organizations, and international donors has been facilitated by long-term engagement with key stakeholders and acquiring a firm understanding of underlying policy processes. In some cases, this integration has involved providing new data and tools to help governments identify policy challenges and appropriate interventions. In others, it has depended on uncovering implementation gaps that impede well-meaning policy designs from having the intended impact. In still others, it involved monitoring and evaluating extant policies to suggest key refinements. In these different circumstances, FSP researchers learned the importance of adapting policy recommendations to political and ideological realities, recognizing where agricultural policies had trade-offs with other development objectives, and committing to long-term engagement with a broad range of policy champions, including subnational governments, civil society, and the private sector.

In many instances, policy engagement was further facilitated by partnering with local research institutes, think tanks, and universities and enhancing their capacities, through training courses, co-creation of research outputs, and exposure to new tools, to conduct and communicate rigorous analysis. Through experimenting with various capacity-strengthening modalities, the FSP team learned that training courses are most effective when they are complemented by opportunities to apply material on the job and when they include staff across levels of seniority. Collaboration with university staff offers many benefits, but care must be taken to ensure that such collaboration does not become a distraction from faculty members' teaching and mentoring responsibilities. Research institutes are more likely than university professors to respond to short-term policy needs, but their ability to exert policy influence depends on the quality of such institutes' leadership, their ability to retain competent staff with competitive pay structures, and a sustainable fundraising strategy.

By documenting these and other achievements over the five years of FSP, this paper offers lessons about what works, where, and when for USAID and other stakeholders in the international development community that share the goal of advancing informed, effective, and sustainable policy systems to achieve global food security. Successful policy engagement will continue to require a blend of tailored human and organizational capacity building, with focused research on the knowledge frontier, to enable developing countries to resolve complex policy challenges on their journey to self-reliance.

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ANNEX: PEER-REVIEWED FSP PUBLICATIONS

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This study is made possible by the generous support of the American people through the United States Agency for International Development (USAID) under the Feed the Future Innovation Lab for Food Security Policy Grant No. AID-OAA-L-13-00001. The contents are the responsibility of the study authors and do not necessarily reflect the views of USAID, the United States Government, Michigan State University, IFPRI, or the University of Pretoria. This report has not undergone any peer review process.

Published by the Department of Agricultural, Food, and Resource Economics, Michigan State University, Justin S. Morrill Hall of Agriculture, 446 West Circle Dr., Room 202, East Lansing, Michigan 48824, USA

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