

Key Steps to Improve Agribusiness Competitiveness Part II: Research & Development, Logistics and Marketing

Agriculture is central to emerging market economies. In Africa it accounts for as much as 65 percent of employment and 32 percent of output. Globally, two-thirds of the world's poor—some 750 million people—work in rural areas. But as economies expand and production shifts to manufacturing and services, agriculture's share of employment and GDP decreases. At the same time, the broader agribusiness industry—business activities performed “from farm to fork”—is playing a more important role in growth and development. Improved land rights, better regulation of input and output markets, and better access to seeds and fertilizer are all critical to this transition.

In Part II, the emphasis is on a shift of R&D spending from the public sector to private enterprises in middle-income countries focused on market opportunities related to advanced technologies and knowledge transfers. And a new emphasis on agricultural marketing, logistics, and market data is helping to integrate small farms into agricultural value chains, with higher prices for their products, greater productivity growth, and more sustainable overall development.

Agriculture research and development (AgR&D) has remained at low levels in many emerging economies for decades. One way to achieve productivity growth is to improve soft and hard infrastructure, and to allocate more resources to public and private food and agriculture research and development.

Research and Development and Agricultural Extension

Global gross domestic public and private expenditures on AgR&D in 2011 totaled \$69.3 billion (in purchasing power parity), equivalent to just 5 percent of worldwide investment in all forms of R&D.¹ Developed countries' share of AgR&D spending fell from 69 percent in 1980 to 55 percent in 2011, while the share of middle-income countries (MICs) increased from 29 percent to 43 percent over the same period. Recent data indicates that MICs including China, Brazil, and India, are investing more in public-sector AgR&D than are high-income countries.

The share of research that has been done by private firms in MICs has also increased, to 35.5 percent on average, from 16 percent in 1980. And China has become a leader in private-

sector spending (with more than \$6 billion), with private firms contributing 57 percent of national AgR&D. One reason for this has been the transfer of some multinational companies' agricultural R&D facilities to China.²

The concentration of AgR&D spending in advanced and middle-income countries, at 70 percent of total AgR&D investments, is a serious global issue. Less-developed economies, particularly in Sub-Saharan Africa (SSA), continue to be underinvested. The result is dramatically reduced capacity to attain higher levels of agriculture productivity and sustain fragile natural resources in these countries. The Food and Agriculture Organization of the United Nations estimates that net annual investments of approximately \$11 billion in agriculture are needed if the SSA region is to address its food security concerns by 2050.³

Despite constrained African government budgets, targeted government intervention, particularly through infrastructure investments and efficient regulatory policies, can incentivize private sector involvement in AgR&D and help boost rural development. Of the 49 largest multinational corporations in the agro-food sector, 21 have been active in SSA, while

94 African companies in the Jeune Afrique ranking have worked in at least one segment of the agro-food value chain.⁴

Overall, private investors, who are more attuned to market opportunities, have an important role to play in the provision of AgR&D, and eventually in technology innovations in the sector. Private-sector spending on AgR&D is catching up with public-sector spending, but both sectors are important because they frequently support different yet complementary types of research.⁵ Extension investments, regulatory frameworks, incentivized innovation, and technological risks are the vital next steps to applying new innovations to farming.



Farmer Simon Obwoya, foreground, makes note of crop conditions and checks market prices.

Source: *The Guardian*

There are two main categories of agricultural technology. **Materials technology** involves the transformation of tools, agrichemicals, seed varieties, and other inputs into a final output. **Knowledge technology** involves the skills of farmers in managing and converting various inputs into final outputs, and applying the latest advances in materials technologies. Some African countries such as Kenya, Rwanda, and Tanzania have recently taken measures to improve agricultural research as an essential part of material technology and educate farmers in innovative practices as knowledge technology.

While R&D is of critical importance to advancing agricultural productivity, many of the technologies developed in government and university laboratories in recent decades have not been useful on farms, or have not reached enough farmers in many emerging markets.⁶ Poorly functioning links—from R&D to distribution—often restrict the development and distribution of agricultural technologies within countries and across borders. Legal policies, regulatory policies, and institutional frameworks are to blame.

As a result, farmers face artificial constraints and higher costs that limit their ability to access and invest in existing and locally proven agricultural technologies. It should be

taken into consideration that, while some of the technology advances are transferable, most require a substantial degree of localization, a local R&D element, to ensure they work under local conditions. For example, in Sub-Saharan Africa the heterogeneity of agro-ecological conditions and crop production significantly limit the ability of “outside” technologies to improve regional productivity.⁷

The same is true for agricultural extension, which is designed to address market failures that prevent emerging country farmers from adopting the latest technological innovations and expertise. By bringing farmers up to speed on the latest seeds, fertilizers, pesticides, and cultivation techniques, the goal of agricultural extension was to reduce the gap between actual and potential agricultural productivity. The evidence that it has succeeded is mixed, at best. “Despite decades of investment in and experience with public extension programs, evidence of their impact upon agricultural knowledge adoption and productivity remains limited,” according to one well-known study.⁸

There are several other ways that the private sector can become involved in the distribution and development of advanced technology, particularly in areas of legal protection, or R&D intellectual property rights for businesses. In emerging market economies, mostly large firms adopt existing technologies from other countries, especially in sectors where the local industry is far from the technology frontier. The last mile of R&D is vital to ensure that new practices and products work locally and are adopted through extension efforts.

This is particularly important for pest control and irrigation technologies. Effective pest management and irrigation require close attention to local conditions, as well as greater private-sector access to both foreign and domestic research. However, legal and institutional barriers often prevent local adoption and adaptation of foreign research and technologies.

For example, the irrigated share of Africa cropland is less than a quarter of the world average, with only 4 percent of crop areas irrigated because of poor water management due to underdeveloped institutions and bad regulation.⁹ Meanwhile many studies show huge potential for irrigation in Africa, with average yield increases of up to 90 percent.¹⁰

Where this is the case, administrative and regulatory reforms can remove these barriers and facilitate the sharing of ideas and technologies across borders.¹¹ In some cases such cooperation is critically needed, particularly to prevent the spread of pathogens such as the virulent wheat stem rust strains in Uganda in the late 1990s that subsequently spread to Kenya, Ethiopia, South Africa, and elsewhere.¹²

Technology can bring major benefits, too. The Internet and mobile phones allow farmers to communicate directly with experts through text messages and emails for advice on farming methods and market access for their crops. The incremental cost of providing such advice is far less, and the information is much timelier, than that of an additional extension visit. Such technologies provide three-way communication between farmers, extension workers, and researchers who need to know which methods and technologies are most effective in boosting crop yields. These new technologies can add real economic value, either through savings or through increased revenues and profits.

There are several success stories related to these technologies in emerging markets. Kenya in particular has become a leader in Sub-Saharan Africa by offering local farmers information, insurance, and marketing services through mobile communication on Internet platforms and mobile payment systems such as M-Pesa, Drum-Net, and Kilimo Salama.

In one instance, three women entrepreneurs from Kenya's version of Silicon Valley founded an agribusiness software company called mFarm. It delivers critical information to farmers through text messages, including daily pricing information for 42 crops in 5 markets. It also offers group selling and buying tools that allow farmers to pool resources.¹³

Another example of the efficient application of mobile technology in agriculture is the Esoko Ghana Commodity Index (EGCI), established in 2005. EGCI is a rural communication platform that tracks wholesale and retail prices on a weekly basis. It is active in three African countries and has a variety of partnership agreements, including with public sector agricultural projects.¹⁴

Marketing

The agribusiness marketing chain typically consists of a primary market where farmers sell their product to wholesalers, wholesale markets where these products are sold to processors, and retail markets where consumers buy finished foods. There are often additional intermediaries in emerging markets, including village collectors who buy local farmers' output and resell it to wholesalers, as well as sub-wholesalers who operate between wholesalers and retailers.¹⁵

Farmers in emerging markets have much to gain from capturing some of the substantial value-added along the agribusiness chain, beyond their own primary production. Agro-processing generates between 40 and 60 percent of the total value-added "from farm to fork" in these countries and agro-industrial products account for up to half of total exports.¹⁶ Population growth, increased incomes, and urbanization are expanding these marketing opportunities throughout the value chain.

The experience in high-income countries suggests substantial potential for downstream development of agribusiness marketing in many emerging markets. A 2013 report by the United Nations Industrial Development Organization found that in advanced countries, the processing of one ton of agricultural products added more than \$200 of value, while in low and middle-income countries it is less than \$50. In addition, in advanced countries 98 percent of agricultural production undergoes industrial processing versus just 30 percent in low- and middle-income countries.¹⁷

Yet governments often impose requirements that are discriminatory and protectionist.¹⁸ This holds true for marketers throughout the value chain. Local, regional, and global markets are constrained by weak and inconsistent sanitary and phytosanitary regulations, inconsistently applied and burdensome local and regional licensing and registration requirements, and time-consuming customs procedures.

Several government-owned purchasing programs or marketing boards have proved difficult to efficiently manage. Farmers using India's Mandi system are required to sell their produce to middlemen approved by each state's authorized Mandi (or market place). The system prohibits farmers from selling their produce directly to supermarkets or non-approved wholesalers in order to prevent private corporations from gaining dominance over the value chain. Yet under this system, middlemen have increased their profits by suppressing the prices farmers receive and increasing the prices they charge retail stores and their customers.¹⁹ As a result, minimizing intermediation and the creation of a national common market are official policy goals of the Indian government.

China also continues to have many of these structures, and Ghana and Cote d'Ivoire tightly control the marketing of cocoa to extract rents. Yet beyond these and a few other examples, direct public control over marketing through purchasing boards has significantly decreased globally. And the central issues now center on regulation and ineffective public services, including standards.

According to a recent World Bank Group report, "Inefficient agro-input and distribution systems, lack of financial services, and inadequate infrastructure (including quality roads and storage facilities), represent important issues that affect market access."²⁰ According to OECD estimates, some 75 percent of delays in African markets are due to problems with soft infrastructure, particularly legal and regulatory barriers.²¹ Another study found that each additional day that a product is delayed prior to shipping reduces trade by at least one percent and is equivalent to a country distancing itself from its trading partners by about 70 kilometers, on average.²²

Agricultural trading exchanges are another method through which the agribusiness sector can create jobs. Some countries have launched commodity exchanges to increase information exchanges between farmers and traders. They also seek to improve storage and increase access to finance. Most important, these exchanges offer a way for emerging market farmers and traders to hedge against risk through futures and options trading mechanisms.²³

The first modern commodity exchange in Sub-Saharan Africa outside of South Africa was launched nine years ago in Ethiopia. It now connects 3.5 million Ethiopian smallholder farmers to markets (see EM Compass Note 37, April 2017).²⁴

Information and communication technologies, or ICT, can improve market performance in a number of ways. As prices continue to fall, ICT will become more accessible to more farmers and others along the value chain. By increasing access to prices and other information, these technologies have increased farmer and trader incomes by as much as 24 percent and 57 percent, respectively, according to thirteen separate studies of emerging economies in Latin America, South Asia, Southeast Asia, and Sub-Saharan Africa.

Increased connectivity afforded by inexpensive mobile phones and the Internet is optimizing supply chain logistics, improving transportation logistics, and minimizing costly stock outs.

Growing ICT ecosystems enhance links between commodity exchange traders, buyers, and sellers of agricultural products. They also increase access to improved agricultural techniques, weather conditions, and commodity price futures.

Logistics

Logistics connect every link along the food value chain and are a critical driver of competitiveness and sustainable economic development.²⁵ Yet many emerging markets have inadequate logistics systems, relying on value chains that are not equipped to monitor and maintain the quantity, quality, timing, and traceability of stored grain and other foodstuffs. While empirical evidence is scarce, it is estimated that somewhere between a third and half of food produced is lost between initial production and final consumption.²⁶ The greatest losses occur with perishable fruits and vegetables and livestock products.

Effective logistics require improved electrical power infrastructure and grain warehousing infrastructure, both of which are currently dominated by public provision. The introduction of greater private participation in the grain storage sector would allow governments in many countries to improve operational efficiencies, reduce waste damage, and introduce best practices for better quality and food safety control. There have been several economically viable public-

private partnership projects in grain storage in such countries as Pakistan, India, Philippines, Nigeria, and Oman.²⁷

Better, more accessible roads and rail—another potential area for public-private partnerships—would facilitate faster delivery, as would the warehouse component of a well-developed “cold chain” for transport of refrigerated meat and perishable fruits and vegetables.

Reducing transit times and transport costs is a way to achieve efficient cross-border transport of agricultural products. Governments can help by harmonizing and simplifying regulations and trade protocols, and by reducing the number of choke points where shipment delays and theft may occur. Investors need such consistent and effective policies if they are to minimize these and other risks along the agribusiness value chain.²⁸

Conclusion

Modernizing developing countries’ agriculture sectors will continue to require a tremendous amount of private sector investment. It will also need to overcome ineffective government regulation, which often impedes such investment in many countries. There is little doubt that the private sector tends to be nimbler and better equipped to manage the rapid pace of change in agriculture and agribusiness.

Like other industries, agriculture will continue to undergo profound changes as new technologies are adopted, including genomics and information and communication technologies. The opportunities and risks that these changes create can best be managed with greater input and participation by private enterprises in order to innovate and create new products and markets. Because the public interest in a safe and secure food supply will remain constant, governments will continue to have an important role to play, yet that role may primarily entail a greater focus on enabling competitive markets and innovative, productive agribusiness firms.

ABOUT THE AUTHORS

Tom Walton is a Consultant at Defour Group LLC and Adjunct Professor of Finance at Lawrence Technological University. He served as a Special Advisor for Regulatory Affairs, United States Federal Trade Commission, and was Vice Chair of the Business Research Advisory Council to the United States Bureau of Labor Statistics. He also represented GM for the advisory council to Resources for the Future. (Tom.f.walton@gmail.com)

Vadim Grishin is a Consultant at IFC and Adjunct Professor at Georgetown University. He was Executive Director for Russia at the World Bank Group and Senior Adviser at the IMF. He also served as economic adviser to the Deputy Prime Minister and Minister of Finance of Russia. (vg155@georgetown.edu)

ACKNOWLEDGMENTS

The authors would like to thank the following colleagues for their review and suggestions: Jim Emery, Head, Sector Economics and Development Impact, Economics and Private Sector Development, IFC; Gene Moses, Strategy Officer, Agribusiness and Forestry, Global Manufacturing, Agribusiness and Social Services, IFC; and Thomas Rehmann, Senior Economist, Thought Leadership, Economics and Private Sector Development, IFC.

ADDITIONAL EM COMPASS NOTES ABOUT PRIVATE SECTOR OPPORTUNITIES IN AGRIBUSINESS

This is the second of two notes covering opportunities for private enterprise in emerging markets as agriculture evolves towards agribusiness. The first note addresses competition and competitiveness (EM Compass Note 49); the second note (this note) addresses research & development, logistics and marketing. Please see also two additional notes about opportunities for private enterprise through Climate Smart Agribusiness: *Precision Farming Enables Climate-Smart Agribusiness* (EM Compass Note 46) and *From Farm to Fork: Private Enterprise Can Reduce Food Loss Through Climate Smart Agriculture* (EM Compass Note 47).

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