Global Food Policy and Food Security Symposium Series

Africa’s Food Systems in 2030

Paul Collier, Director, Centre for the Study of African Economies
Oxford University

Derek Byerlee, Independent Scholar
Director, 2008 World Development Report

February 5, 2013
Stanford University
African Food Systems to 2030: Toward Inclusive Business Models

Derek Byerlee
Stanford University
Feb 5th, 2013
Agricultural Growth is Especially Effective for Poverty Reduction and Food Security

- **Asia**
  - Example of Green Revolution
  - Institutional reforms in China
- **But**
  - High rural inequality reduces effectiveness
  - And slow progress in Africa

GDP growth from agriculture benefits the income of the poor 2-4 times more than GDP growth from non-agriculture (WDR 2008)
Opportunities and challenges
- Markets, jobs, productivity, and prices

Inclusive business models
- Recognize critical role of private agribusiness for
  - Increasing farm incomes and/or generating jobs
- Emphasize emerging success stories

Elusive quest for enabling policies
Overall optimistic but recognize great heterogeneity within Africa
Two Opportunities and Two Challenges
Opportunity 1: Transformation of Food Markets by 2030

- **African urban food markets up 4x**
  - High value & processed foods, feed
  - New supply chains—mkt logistics
- **Potential of regional markets**
  - Now 5-10% of trade
- **Global markets**
  - Higher prices

*Byerlee et al., 2013*
Opportunity 2: Accelerating Food Supply

- Comparative advantage from natural resources (in most countries)
  - 240 M ha uncultivated land
  - Less than 20% irrigation potential tapped
  - Yields a fraction of potential
- Much improved macro policies
  - Reduction of high agric. tax (50%)
- Strong private sector interest
  - Local investors, FDI, investment funds
Challenge 1: Creating 25 M Jobs Annually by 2025

Source: Losch, Fréguin-Gresh and White 2012.
Challenge 2: Improve Competitiveness to Exploit Comparative Advantage

Share of world agric exports

Total Agric Imports and Exports, SS Africa

FAOSTAT
Challenge 2: Lagging Productivity Growth

Sources of Agricultural Growth (%/yr)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SS Africa</td>
<td>TFP</td>
<td>Inputs</td>
<td>Irrigation</td>
<td>Land area</td>
</tr>
<tr>
<td>Developing countries</td>
<td>TFP</td>
<td>Inputs</td>
<td>Irrigation</td>
<td>Land area</td>
</tr>
</tbody>
</table>

Source: Fuglie, 2012
Reflected in High Production Costs
Rice: Thai vs SS Africa, 2011

Translates into High Food Prices (Also Protection!)

Source: FAO GIEWS—Average wholesale prices
Inclusive Business Models
Recognize Complementary Assets

‘Smallholder’ farmers
(Family mgmt. & labor)
- Land
- Labor
- Local knowledge & skills

Agribusiness
(company, hired labor)
- Access to markets and technology
- Capital
- Specialized skills
Business Models Based on Smallholder Production

Smallholder production
- Land
- Labor
- Local knowledge & skills

Agribusiness
- Capital
- Access to markets and technology
- Specialized skills
Business Models Based on Agribusiness Production

Smallholders
- Land
- Labor
- Local knowledge & skills

Agribusiness Production
- Capital
- Access to markets and technology
- Specialized skills
### Key Determinants of Business Models: Relative Transactions Costs

<table>
<thead>
<tr>
<th>Favor Small Scale</th>
<th>Examples</th>
<th>Favor Large Scale</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labor intensive</td>
<td>Hort, dairy, tea</td>
<td>Coordination with</td>
<td>Sugar, oil palm, tea, hort exports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>processing/shipping</td>
<td></td>
</tr>
<tr>
<td>Difficult access to land (for outsiders)</td>
<td>Food staples</td>
<td>Compliance with standards/traceability</td>
<td>Export hort., ethanol</td>
</tr>
<tr>
<td>Ability to enforce contracts</td>
<td>Export hort., oilseeds, poultry</td>
<td>Ability to fully mechanize</td>
<td>Grains, oilseeds</td>
</tr>
<tr>
<td>Local knowledge</td>
<td>Food staples</td>
<td>Pioneering risks</td>
<td>New crops, new areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Access to finance for fixed K</td>
<td>Greenhouse hort, irrigated rice</td>
</tr>
</tbody>
</table>
Commercial Smallholders only One Pathway out of Poverty

1. Improve market access; establish efficient value chains
   - Demand for agricultural and nonfarm products
   - Income effects

2. Enhance smallholder competitiveness; facilitate market entry
   - Demand for agricultural products
   - Transition to market

3. Improve livelihoods in subsistence agriculture and low-skill rural occupations
   - Income effects
   - Transition to market

4. Increase employment in agriculture and the rural nonfarm economy; enhance skills
   - Income effects
   - Transition to market

Source: WDR 2008 team.
# Structure of Maize Farmers in Zambia

## Smallholder Maize Farmers

<table>
<thead>
<tr>
<th></th>
<th>Top 50% sales</th>
<th>Bottom 50%</th>
<th>No sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of households</td>
<td>3</td>
<td>36</td>
<td>62</td>
</tr>
<tr>
<td>Total cultivated area (ha)</td>
<td>7.2</td>
<td>2.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Maize area (ha)</td>
<td>4.8</td>
<td>1.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Maize yields (t/ha)</td>
<td>3.4</td>
<td>2.1</td>
<td>1.2</td>
</tr>
<tr>
<td>Fertilizer (kg/ha)</td>
<td>247</td>
<td>175</td>
<td>64</td>
</tr>
<tr>
<td>Percent animal power</td>
<td>67</td>
<td>23</td>
<td>19</td>
</tr>
<tr>
<td>Percent tractor power</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Income per capita ($US/yr)</td>
<td>841</td>
<td>250</td>
<td>171</td>
</tr>
</tbody>
</table>

Emergent commercial farmers (70 ha)
Agribusiness farms > 1000 ha (irrigated)

**Horticulture:** Top 50% sales– 5 ha with 0.6 ha horticulture,
LS export hort > 25 ha

Source: Chapoto and Haggblade, 2012
Models based on Smallholder Production

1A: Atomistic in spot markets
1B: Collective Action for services
1C: Forward Integration
1D: Contract farming
Kenya—first country for SH hybrid maize adoption, 1970-85
West Africa—Increased production 8x, 1980-2010
But:

- Yield growth overall < half of other rainfed regions, and
- State driven and unsustainable in E&S Africa

Maize yields, 1961-2010

FYI

- Kenya—first country for SH hybrid maize adoption, 1970-85
- West Africa—Increased production 8x, 1980-2010
- But:
  - Yield growth overall < half of other rainfed regions, and
  - State driven and unsustainable in E&S Africa

FAOSTAT
Input vouchers (‘smart subsidies’)
- Malawi + -- Sustainable? Market smart?

Private sector R&D and input dealers
- Hybrid maize—Zambia, Fertilizer—Kenya, Machinery rental services?

New rapidly growing markets for feed
- Stimulating emergence of new supply chains with small-medium growers (Ghana)

Long term—Critical role of public goods/serv
- For decades has been less than half of Asia
Farmer organizations provide technology, advisory services and training

- “Interprofessionales” in Cote d’Ivoire with levy to support R&D and extension
- Could increase R&D on cash crops by 5x and farmer driven research agenda

Organized value chains through Innovation Platforms

- Maize in Burkina Faso, E & S Africa (scaleable?)
Vertically integrate to processing and marketing

- **Kenya Tea Development Agency Ltd**
  - Smallholder owned services—processing, R&D, extension (strong initial donor/gov. support)
  - Top exporter, 550 K smallholders provide 2/3 prod, high yields

- Emerging examples in dairy coops in E. Africa
Model 1D: Contract Farming

- Companies supply farmers inputs, technical advise and guaranteed price
- Favored by natural monopsony
  - Export hort, sugarcane, oilseeds, cotton
    - Cotton in Zambia—200K smallholders
- Tradeoffs in transactions costs to firms
  - Accessing land and supervising labor vs enforcing contracts and meeting standards
- Can it work for grains?
  - Olam—rice in Nigeria?, Ghana Maize Partnership
Models based on Agribusiness Production

2A: Stand alone enterprises
2B: Large scale with outgrowers
2C: Large-Scale with spillovers
2D: Large-Scale with community equity
3A: Stand-Alone Enterprises

- Sometimes large-scale is most efficient
  - Close coordination with processing
  - Demanding market standards
  - Pioneering risks—new crops in new areas
  - Often all—export hort, sugarcane/ethanol

- Can still be inclusive with good jobs and training
  - Senegal and Kenya export hort moving to large scale but creating good jobs for poor farmers
## Employment Benefits vary Widely

<table>
<thead>
<tr>
<th>Commodity</th>
<th>Jobs/1000 ha</th>
<th>Invest $/ha</th>
<th>Invest $ per job</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horticulture</td>
<td>1000+</td>
<td>Var.</td>
<td>Var.</td>
</tr>
<tr>
<td>Oil palm + proc, Indonesia</td>
<td>350</td>
<td>$4,000</td>
<td>$11,400</td>
</tr>
<tr>
<td>Sugar-ethanol (manual)-Braz</td>
<td>700</td>
<td>$14,000</td>
<td>$20,000</td>
</tr>
<tr>
<td>Sugar-ethanol + power (mech)—Sierra Leone</td>
<td>200</td>
<td>$40,000</td>
<td>$200,000</td>
</tr>
<tr>
<td>Sorghum Sudan—semi-mechanized</td>
<td>53</td>
<td>$900</td>
<td>$17,000</td>
</tr>
<tr>
<td>Wheat-soybean irrig--Zambia</td>
<td>16</td>
<td>$6,000</td>
<td>$375,000</td>
</tr>
<tr>
<td>Soy—fully mechanized-Braz</td>
<td>18</td>
<td>$3,600</td>
<td>$200,000</td>
</tr>
</tbody>
</table>
Semi-mechanized farming schemes 1970s
  - Investors from Gulf and state credit
Converted up to 11 M ha to large farms
  - Average over 1,000 ha
Problems well documented
  - Trampled on rights of local pastoralists, land conflicts
  - Low productivity and soil mining—lacked technology

Extremely low yields
Potential for large-scale irrigated rice

- High upfront investment costs ($15K/ha)
  - 2011—37 companies investing (>2000 ha)—some successes (e.g., Tilden, Samford)
    - (But highly protected)

- Rainfed farming in very low density areas
  - High transactions cost of hired/migrant labor favors mechanization
  - Issues—land rights, transport costs, technology
    - Pro-Savannah—Mozambique (Brazil--Japan)
**OPPORTUNITY**

- Value of SE Asian exports of PO > All agric exports Africa
  - Africa imports $3.5 Billion!

- Billions $ at stake
  - Big Asian companies investing in Africa (> $3 M ha)
  - 200-300 jobs/1000 ha

- Much potential for smallholders
  - 40% Indonesia now SH

**RISE OF OIL PALM IN SE ASIA**

![Expansion of Oil Palm](image-url)
Linked to nucleus estate and processor

- Oil Palm—already successful models (GOPC)
- Sugarcane in Southern Africa
- Horticulture in Kenya

State support needed to reduce costs of setting up outgrowers
New public-private partnerships for irrigation with spillovers
- Zambia PPPs for irrigation
- GADCO in Ghana

Transfer of technology, skills and services
- Emergent Asset Management—Export hort.

2D: Community equity in companies
- Tea Companies, Tanzania and Rwanda, Sugar, Za.
Elusive Policy Issues
Access to Land and Finance

1. Land markets—secure and transferrable rights for communities and investors
   - Refocus from ‘land grabs’ to smallholder access to land to scale up
   - Rapid low cost recording of customary or individual rights (Ethiopia, Rwanda, Moz.)

2. Access to finance—reducing risks and increased flex (even for LS!)
   - Partial credit guarantees, insurance, and risk analysis. Flex on collateral
### Technology, Information, Skills

- **Weak and fragmented R&D and extension**
  - Farmer empowerment (CI, Uganda)
  - ICT for extension (Kenya)

- **Low education**
  - 70% youth in ag < prim educ.

- **Business skills**
  - Songhai Center
  - Market Matters

---

**Figure 6.10: Agribusiness training is needed at many levels**

<table>
<thead>
<tr>
<th>Students</th>
<th>Academic institutions (BSc, MSc, PhD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agribusiness Executives</td>
<td>University distance education programs</td>
</tr>
<tr>
<td>SMEs/Entrepreneurs</td>
<td>NGOs offering business development services</td>
</tr>
<tr>
<td>Farmers</td>
<td>Government SME development programs</td>
</tr>
<tr>
<td></td>
<td>Agricultural extension services</td>
</tr>
</tbody>
</table>

Source: Reproduced from Mabaya, Christy, and Bandama (2010).
4. Developing Regional Markets

- Small, fragmented and volatile national markets
  - High costs of border crossings (+ 100s of km)
  - Increases food price instability
  - Reduces incentives for input industries

- Streamline and liberalize regional trade
  - Eliminate arbitrary import/export bans
  - Common standards and regulations
    - e.g., seed markets but slow
Exciting opportunities for African agriculture
- Market growth, private interest and improved policies

Much to learn from emerging business models for more inclusive growth
- Both successes and failures

Role of state?
- Level the playing field—invest in public goods/services, avoid cheap land and capital
- Facilitate smallholder inclusion in business models
- Role of ‘elite’ transformation teams to overcome state failures?