Ghana Cocoa Supply Chain Risk Assessment

Agricultural Risk Management Team
Agricultural and Rural Development
The World Bank

World Cocoa Conference
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Elh. Adama Touré, Sr. Ag. Economist,
Agricultural risk matters

High vulnerability to agricultural risks with adverse impact on:

- Household incomes
- Poverty, Food Insecurity, Malnutrition
- Economic growth (GDP)
- Government’s fiscal balance
- Diversion of Development financing

Need for improved Assessment for better planning
ARMT’s Risk Management Framework
Risk Layering

**Layer 1**
- High Frequency, Low Losses
- **Risk Mitigation**

**Layer 2**
- Low Frequency, Medium Losses
- **Risk Mitigation** + **Risk Transfer**

**Layer 3**
- Very Low Frequency, Very High Losses
- **Risk Mitigation** + **Risk Transfer** + **Risk Coping**

*PROBABILITY*

*SEVERITY*
**ARMT’s Product Offering’s**

**Risk Assessment and Management**
- Agricultural sector risk assessment and management (Niger)
- Supply chain risk assessment and management (Cocoa in Ghana)
- Weather risk assessment and management

**Capacity Transfer**
- Capacity transfer and trainings (coffee price risk management, cocoa price risk management, cotton price risk management, weather index insurance etc.)

**Knowledge and Network**
- FARMD
- Risk in rice in Asia conference
- Paradigm shift in Ag. Risk Mgmt (KP)
- Risk and finance in coffee sector
Ghana cocoa production 1900-2008
## GHANA: Cocoa Supply Chain Risks

<table>
<thead>
<tr>
<th>Production risks</th>
<th>Stakeholders most affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swollen shoot virus</td>
<td>Farmers</td>
</tr>
<tr>
<td>Black pod</td>
<td>Farmers</td>
</tr>
<tr>
<td>Capsid</td>
<td>Farmers</td>
</tr>
<tr>
<td>Other pest, diseases, and weeds</td>
<td>Farmers</td>
</tr>
<tr>
<td>Drought/ dry spell</td>
<td>Farmers</td>
</tr>
<tr>
<td>Cocoa acreage loss (deforestation, mining, urbanization, etc.)</td>
<td>Entire supply chain</td>
</tr>
<tr>
<td>Bush fire</td>
<td>Farmers</td>
</tr>
</tbody>
</table>

### Market risks

<table>
<thead>
<tr>
<th>Market risks</th>
<th>Stakeholders most affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cocoa price volatility</td>
<td>CMC</td>
</tr>
<tr>
<td>Input price volatility</td>
<td>Farmers, input suppliers, and COCOBOD</td>
</tr>
<tr>
<td>Counterparty risk</td>
<td>LBCs</td>
</tr>
<tr>
<td>Exchange rate volatility</td>
<td>CMC</td>
</tr>
<tr>
<td>Interest rate volatility</td>
<td>CMC</td>
</tr>
</tbody>
</table>

### Enabling Environment risks

<table>
<thead>
<tr>
<th>Enabling Environment risks</th>
<th>Stakeholders most affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smuggling / cross border trade</td>
<td>CMC and Govt. of Ghana</td>
</tr>
<tr>
<td>Misappropriation of funds</td>
<td>LBCs</td>
</tr>
<tr>
<td>Logistics breakdown/ congestion</td>
<td>LBCs</td>
</tr>
<tr>
<td>Market regulation risks (social, env., quality, residue levels, etc.)</td>
<td>CMC</td>
</tr>
<tr>
<td>Policy risks (input policy, domestic processing policy, cocoa sourcing policy, land use policy, infrastructure policy, etc.)</td>
<td>The entire supply chain</td>
</tr>
</tbody>
</table>
### TABLE 4.3 - CODAPEC ESTIMATES FOR BLACK POD INFESTATION

<table>
<thead>
<tr>
<th>Year</th>
<th>Acreage Infested (in Ha, est.)</th>
<th>Acreage Sprayed (in Ha)</th>
<th>(p)⁺</th>
<th>Crop Loss* (in MT)</th>
<th>Price (US$/MT)</th>
<th>Loss/Gain (in US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1,039,725</td>
<td>976,332</td>
<td>0.94</td>
<td>117,593</td>
<td>$2,104</td>
<td>$247,415,456</td>
</tr>
<tr>
<td>2009</td>
<td>1,113,503</td>
<td>1,020,432</td>
<td>0.92</td>
<td>125,937</td>
<td>$2,400</td>
<td>$302,249,254</td>
</tr>
<tr>
<td>2010</td>
<td>1,156,622</td>
<td>1,156,622</td>
<td>0.9</td>
<td>130,814</td>
<td>$2,702</td>
<td>$353,459,227</td>
</tr>
</tbody>
</table>

**SOURCE:** CODAPEC Annual Report, 2009/10; Authors’ calculations

⁺‘p’ is a gross estimate of the proportion of estimated hectarage infested in relation to hectares actually sprayed. Since multiple applications could (and should) take place, the value can be >1. The low values for black pod spraying suggest that considerable under-dosage is taking place.

*Nominal potential loss @ 30% with an average yield of 377 kg/ha.*
# Cost of MIRID/CAPSID

## TABLE 4.4 - CODAPEC ESTIMATES FOR MIRID/CAPSID INFESTATION

<table>
<thead>
<tr>
<th>Year</th>
<th>Acreage Infested (in Ha, est.)</th>
<th>Acreage Sprayed (in Ha)</th>
<th>(p)*</th>
<th>Crop Loss* (in MT)</th>
<th>Price (US$/MT)</th>
<th>Loss/Gain (in US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1,705,115</td>
<td>1,660,998</td>
<td>0.97</td>
<td>64,283</td>
<td>$2,104</td>
<td>$135,251,086</td>
</tr>
<tr>
<td>2009</td>
<td>1,708,815</td>
<td>2,106,929</td>
<td>1.23</td>
<td>64,442</td>
<td>$2,400</td>
<td>$154,613,581</td>
</tr>
<tr>
<td>2010</td>
<td>2,212,200</td>
<td>2,185,255</td>
<td>0.99</td>
<td>83,400</td>
<td>$2,702</td>
<td>$225,346,638</td>
</tr>
</tbody>
</table>

**SOURCE:** CODAPEC Annual Report, 2009/10

*Nominal potential loss @ 10% with an average yield of 377 kg/ha.

* 'p' is a gross estimate of the proportion of estimated hectarage infested in relation to hectares actually sprayed. Since multiple applications could (and should) take place, the value can be >1. While some infested areas get recommended doses of spraying, some receive less than optimal and some might not receive any spraying at all. The low values for spraying suggest that considerable under-dosage is taking place.
# Cost of Cocoa Swollen Shoot Virus

## TABLE 4.6 - CSSVDU OUTBREAK ESTIMATES

<table>
<thead>
<tr>
<th>Year</th>
<th>Outbreak Area (in Ha)</th>
<th>Crop Loss+ (in MT)</th>
<th>Price (US$/MT)</th>
<th>Loss/Gain (in US$)</th>
<th>Ex-gratia payments to farmers (in US$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>14,898</td>
<td>5,617</td>
<td>1,790</td>
<td>$10,054,430</td>
<td>$264,780</td>
</tr>
<tr>
<td>2008</td>
<td>40,849</td>
<td>15,400</td>
<td>2,104</td>
<td>$32,401,600</td>
<td>$527,480</td>
</tr>
<tr>
<td>2009</td>
<td>23,844</td>
<td>8,989</td>
<td>2,400</td>
<td>$21,573,600</td>
<td>$1,131,050</td>
</tr>
<tr>
<td>2010</td>
<td>20,452</td>
<td>7,710</td>
<td>2,702</td>
<td>$20,832,420</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**SOURCE:** Cocobod Annual Reports

+ Loss assumes average production of 377 MT/ha, and 100% crop loss due to removal of trees.
**FIGURE 4.15 – AVERAGE MARKET VALUE OF COCOA OUTFLOWS, 2007/08-2010/11**

*Lost Revenue* - US$46.4mn

*Subsidy to Ivorian Farmers* - US$0.5mn

*Lost Revenue* - US$72.5mn

*Subsidy to Ivorian Farmers* - US$45mn

**SOURCE:** Industry Sources; Cocobod Annual Reports

* Calculated based on 29% of FOB price multiplied by estimated volumes smuggled (in MT). See Annex A1.

^ Calculated based on differential between Ghana farmer price and average CDI farmer price multiplied by volumes smuggled (in MT).
<table>
<thead>
<tr>
<th>Probability of Event</th>
<th>Negligible</th>
<th>Moderate</th>
<th>Considerable</th>
<th>Critical</th>
<th>Catastrophic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly probable</td>
<td></td>
<td>Capsids</td>
<td>Cocoa price risk</td>
<td>Black pod</td>
<td></td>
</tr>
<tr>
<td>Probable</td>
<td>Cocoa acreage loss</td>
<td>Exchange rate</td>
<td>Other pests, diseases, weeds, etc.</td>
<td>Input price volatility</td>
<td>Counterparty risk (i.e., Input supplier, farmer, LBCs)</td>
</tr>
<tr>
<td>Occasional</td>
<td>Interest rate</td>
<td>Dry spell</td>
<td>Policy risk</td>
<td>Market regulation risk</td>
<td></td>
</tr>
<tr>
<td>Remote</td>
<td></td>
<td>Bush fire</td>
<td>Counterparty risk (i.e., CMC/buyers)</td>
<td></td>
<td></td>
</tr>
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Constraints

• Aging trees
• Aging farmers
• No credit at farmer level
• Limited availability of affordable inputs (i.e., chemicals and fertilizers)
• Limited availability of land
• Insufficient physical infrastructure
• Limited farm extension support
• Land tenure/share-cropping arrangements
Potential Threats

- Invasive alien species (e.g. Frosty-pod, witches broom, cocoa pod borer, vascular streak dieback (VSD))
- Shipment rejection due to pesticide residue/mycotoxins
- Loss of ability to sell forward
- Dutch disease and appreciation of cedi
- Climate change
TABLE 5.1 - MEASURE OF RISK VULNERABILITY

- Anticipated Losses from Risk Event
  - Black pod
  - Smuggling
  - CSSVD

- Existing Capacity to Manage Risk
  - Exchange rate volatility
  - Regulatory Risks
  - Logistics breakdown

- Other factors
  - Drought/dry spell
  - Counter-party risks
  - Input price volatility
  - Bushfires
  - Loss of acreage
  - Mirids/capsids
  - Cocoa price volatility

- Interest rate volatility
## Priority Measures for Risk Management

<table>
<thead>
<tr>
<th>Identified Risks</th>
<th>Proposed Mitigation</th>
<th>Proposed Risk Transfer Tools</th>
<th>Proposed Risk Coping</th>
</tr>
</thead>
</table>
| **Swollen shoot virus** | • Better agronomic practices  
• Real time communication system for farmers to notify CCSVD about the outbreak  
• Collaborate with international / domestic commercial tracking teams  
• Make the current system of tree cutting and ex-gratia payment more transparent, credible, efficient, and timely.  
• Mass campaign / awareness building |                                                                                                                                                                                                                                   | • Make the current system of tree cutting and ex-gratia payment more transparent, credible, efficient, and timely. |
| **Black pod**      | • Better agronomic practices  
• Farm level rather than top-down decision making about fungicide application  
• Use private sector distribution channel for open sale of fungicide to improve availability  
• Strengthen their extension mechanism  
• Timely delivery of Not-for-Sale fungicide to farmers  
• More efficient spraying techniques |                                                                                                                                                                                                                                   | • Better agronomic practices  
• Efficient application of fungicide and spraying techniques  
• Timely delivery of Not-for-Sale fungicide |
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| **Capsids**      | • Better agronomic practices  
                  • Strengthen the extension mechanism  
                  • More efficient spraying techniques  
                  • Availability approved compounds in open market  
                  • Approve a range of compounds in each chemical group for better resistance management and coping with changing regulations in consumer markets  
                  • Awareness campaigns (PPP) to promote use of approved products  
                  • More effective oversight and regulation enforcement of the existing products in the market | • Better agronomic practices  
                  • Efficient application of fungicide and spraying techniques | |
| **Smuggling**    | • **Inward**: Use of options in anticipation of increased volumes in a falling market  
                  • Acknowledge the problem and engage with Ivorian counterparts  
                  • Investment in smuggling control/policing for inward volume flow  
                  • **Outward**: Improved investment for policing/smuggling control  
                  • Dialogue with Ivorian counterparts | • |
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<tr>
<td>Cocoa price volatility</td>
<td>- More precise crop forecast (incorporating cross-border informal trade)</td>
<td>- Explore the use of futures contracts to combat liquidity constraints</td>
<td>- Professional management of existing COCOBOD’s price stabilization fund</td>
</tr>
<tr>
<td></td>
<td>- Increase share of specialty market</td>
<td>- Explore the use of options to protect unsold crop</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Increase share of forwards contracts</td>
<td></td>
<td></td>
</tr>
</tbody>
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Next steps for risk management

- Discuss and share
- Build consensus
- Develop an implementation plan
- Coordinate and collaborate
- Generate and/or allocate resources
- Execute the plan