Industrial Development in Developing Economies: Cases in Sub-Saharan Africa

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Introduction
The world today is characterized by extremely large income inequality among countries.

Sub-Saharan Africa (SSA) is particularly stagnant.

The escape from poverty through economic development is a common goal of developing economies.
Why Poor?

High dependence on production and export of primary products.

Increasing scarcity of land and other natural resources because of population pressure (Hayami and Godo, 2005).
Agriculture share, 1961-2011 (% of GDP)

- **US**
- **Japan**
- **Korea**
- **China**
- **Kenya**
- **Ghana**
- **Ethiopia**
- **DRC**
Development strategies under population pressure

**Induced innovation:** Changes in technologies and institutions are induced towards saving resources and using more labor (Hicks, 1932; Hayami and Godo, 2005).

**Agricultural development:** Shift from resource-based to science-based agriculture (Boserup, 1965; Hayami & Kikuchi, 2000; Yamano et al., 2011).

**Although Green Revolution alleviates poverty, it has only limited impact on employment** (David and Otsuka, 1994). Development of non-farm sector is increasingly important (Otsuka et al., 2009).

**Industrial development:** Promote labor-intensive industries (Lewis, 1954; Fei & Ranis, 1964; Sonobe & Otsuka, 2006; 2011).
Green Revolution is possible in SSA (Njagi, Mano and Otsuka, 2013)
Case of Mwea Irrigation Scheme in Kenya

General beliefs on SSA.

- Large scale irrigation projects are not successful.
- Markets do not function.
- Farmers apply little fertilizer.

The above is not true in Mwea.

- Irrigation scheme is fairly well managed.
- Markets are functioning and responsive, with the existence of a large number of rice traders and millers.
- Farmers achieve high productivity due to high utilization of fertilizer.
<table>
<thead>
<tr>
<th>Rice variety</th>
<th>Yield (ton/ha)</th>
<th>SSA</th>
<th>Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basmati</td>
<td><strong>5.0</strong></td>
<td>2011</td>
<td>2007</td>
</tr>
<tr>
<td>Bw196</td>
<td><strong>7.4</strong></td>
<td>2007</td>
<td>2010</td>
</tr>
<tr>
<td>MV1&amp;2</td>
<td>2.9</td>
<td>2007</td>
<td>2010</td>
</tr>
<tr>
<td>MV 1</td>
<td>2.1</td>
<td>2010</td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>4.2</td>
<td></td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>3.1</td>
<td></td>
<td>2010</td>
</tr>
<tr>
<td></td>
<td>3.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Promote labor-intensive industries (Mano et al., 2012)
Improve management skills to revive stagnant industries

Micro and small enterprises are a major source of employment and income in developing countries, but they are often stagnant (Mead & Lieadholm, 1998; Tybout, 2000).

Recent empirical studies have identified problems within firms, especially those regarding management (Bloom et al., 2010; Bruhn et al., 2010).

Management is increasingly recognized as a major determinant of productivity (Syverson, 2011; Bloom and Van Reenen, 2007, 2010; Ichinowski et al., 1997).
Cluster-based Industrial Development

3 phases: (I) initiation (II) quantity expansion (III) quality improvement

Phase (III) requires infusion of a lot of new knowledge. The general human capital of the entrepreneur assumes importance here.

Because of rampant imitation, private benefits of improvement is smaller than social benefit.

Small entrepreneurs’ managerial skills are good to run only a small enterprise. They have difficulty even at the very beginning of (III).
By providing a managerial training program as a pilot project, we can learn

- what they know and what they do not know.
- who are more willing to learn.
- who learn more.
- who put the knowledge into practice.
- how soon the full effect of knowledge transfer is felt.
- whether one can teach entrepreneurs entrepreneurship.
- how useful this kind of knowledge transfer is.
### Table. Number of enterprises

<table>
<thead>
<tr>
<th>Year</th>
<th>Garages</th>
<th>Metal work</th>
<th>Others</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>4,958</td>
<td>807</td>
<td>2,204</td>
<td>7,969</td>
</tr>
<tr>
<td>2002</td>
<td>6,222</td>
<td>990</td>
<td>2,618</td>
<td>9,830</td>
</tr>
<tr>
<td>2003</td>
<td>7,847</td>
<td>1,139</td>
<td>2,844</td>
<td>11,830</td>
</tr>
</tbody>
</table>

Source: The Suame branch of the Ghana National Association of Garages (GNAG), which collects tax from entrepreneurs.
Early 2005: Survey on 167 randomly-selected metalwork entrepreneurs.

Nov. 2007: Training program on 53 randomly-selected entrepreneurs.

Nov. 2008: Survey on 139 entrepreneurs.
Characteristics of sample entrepreneurs

The average sample entrepreneur is a 45-year-old male from the local area.

10 years of schooling and 3 years of apprentice training.

Operating the business of metalworking for 13 years.
Training

Module 1: business planning and marking, 3 hours x 3 days

Module 2: production and quality management, 3h x 5 days

Module 3: bookkeeping and costing, 3h x 5 days

3 Ghanaian instructors. 2 got MBA in UK, and the other was trained in Japan.
Empirical strategy

Use “randomized invitation to the training program,” $Z$, as IV for “actual participation,” $D$.

Analysis of Covariance (ANCOVA) regression (Frison and Pocock, 1992; McKenzie, 2011):

$$Y_{iA} = \alpha + \beta D_i + \theta Y_{iB} + X_{iB} \gamma + \varepsilon_i.$$  \(\text{(*)}\)

where $Y_A$ is the post-training outcome, $Y_B$ the average outcomes in the pre-training period, $X$ a vector of entrepreneur’s characteristics in baseline.
Estimated training effect on the survival probability (IV-LPM)

<table>
<thead>
<tr>
<th></th>
<th>(i)</th>
<th>(ii)</th>
<th>(iii)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrumented D</td>
<td>0.095***</td>
<td>0.086**</td>
<td>0.091**</td>
</tr>
<tr>
<td>(0.03)</td>
<td>(0.03)</td>
<td>(0.03)</td>
<td></td>
</tr>
</tbody>
</table>

Model (i) controls for characteristics of the firm.

Model (ii) additionally controls for whether the firm is implementing the management techniques recommended in the training program.

Model (iii) additionally controls for the sales revenue in baseline.
## Estimated training effects on business practices and performances (ANCOVA)

<table>
<thead>
<tr>
<th>Business practices</th>
<th>Business performances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visiting customers</td>
<td>Record keeping</td>
</tr>
<tr>
<td>Record analysis</td>
<td>Record analysis</td>
</tr>
<tr>
<td>Record keeping</td>
<td>Sales revenue</td>
</tr>
<tr>
<td>Record analysis</td>
<td>Value added</td>
</tr>
<tr>
<td>Sales revenue</td>
<td>Gross profit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Instrumented D</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.24**</td>
<td>0.35***</td>
</tr>
<tr>
<td>0.35***</td>
<td>0.42***</td>
</tr>
<tr>
<td>11.34</td>
<td>8.96</td>
</tr>
<tr>
<td>4.23</td>
<td></td>
</tr>
</tbody>
</table>

| (0.06)                  | (0.07)               |
| (0.06)                  | (13.60)              |
| (13.60)                 | (8.19)               |
| (7.83)                  |                      |
Entreprneurs in a survival cluster are unfamiliar with the business practices which are standard in developed countries and other developing countries.

Participation in a rudimentary management training program improves the survival of the enterprise and the business practices.

Training effects on accounting-based business performances considerably vary across participants.
Introduce new labor-intensive industries (Mano et al., 2011)
## Export of Ethiopia and Cut Flower Export of Top Exporters (million USD)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Coffee</th>
<th>Cut Flower</th>
<th>Kenya</th>
<th>Columbia</th>
<th>Ecuador</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Ethiopia</td>
<td>482</td>
<td>255</td>
<td>0</td>
<td>91</td>
<td>583</td>
</tr>
<tr>
<td>2002</td>
<td>Ethiopia</td>
<td>415</td>
<td>160</td>
<td>0</td>
<td>100</td>
<td>672</td>
</tr>
<tr>
<td>2004</td>
<td>Ethiopia</td>
<td>615</td>
<td>237</td>
<td>2</td>
<td>232</td>
<td>703</td>
</tr>
<tr>
<td>2006</td>
<td>Ethiopia</td>
<td>1043</td>
<td>426</td>
<td>25</td>
<td>275</td>
<td>967</td>
</tr>
<tr>
<td>2008</td>
<td>Ethiopia</td>
<td>1601</td>
<td>562</td>
<td>104</td>
<td>446</td>
<td>1094</td>
</tr>
<tr>
<td>2010</td>
<td>Ethiopia</td>
<td>2580</td>
<td>774</td>
<td>159</td>
<td>396</td>
<td>1240</td>
</tr>
</tbody>
</table>
Growth of Ethiopia’s cut flower export

Abundant labor: 90% of farm workers work at 1USD per day.

Favorable environment: high daily temperature & cool nights, wide underdeveloped highlands near the airport, and good access to EU.

Strong initiative of the government.

Shift of production from Kenya, to avoid environmental issues and post election violence in 2007, as well as other countries.
Grand conclusion: Induce development path consistent with changing comparative advantages

Insightful and competent entrepreneurs can identify the appropriate industries with comparative advantages.

The government should set the correct market signals for them, and provide general managerial knowledge and basic infrastructures. The social infrastructures include roads, electricity, water, and communication systems, without which no modern industries can develop.
References