Global Food Security and Safety Challenges: *Go beyond Productivity*

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Global and regional Global Hunger Index scores, with contribution of components
- 815 million people – 1/9 – suffer from hunger.

SDG2 (2nd Sustainable Development Goals)
--“Zero Hunger” by 2030.

- Even more – 1/3 – suffer from some form of malnutrition (WFP).
“Food security exists when all people, at all time, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preference for an active and healthy life.”

- the 1996 World Food Summit (WFS)
Challenges

• Malnutrition

• Food safety incidents

• Resource Scarcity and Environmental Stress
Malnutrition

“Triple burden of malnutrition”:

- **Hunger**: undernourishment
- **Hidden hunger**: micronutrients deficiencies
- **Overweight and obesity**
• **Hidden hunger**

More than **two billion** people globally, primarily in developing world.

• **Overweight and obesity:**

  - overweight and obese children increased by:
    70% in developing countries  (from 1990 and 2010)
    30%  in developed countries
Food safety incidents

- **Two billion people** are affected globally by food safety incidents each year (WHO)

Data compiled by GRAIN from government and UN sources, 2008-2010 (except Australia=2005)
Resource Scarcity and Environmental Stress

- Greater competition for land and water
- The environmental impacts of agricultural expansion
- Climate change

Long-term Sustainable Food Security
Can we feed the 8.5 billion population well in 2030?
Productivity Growth

Table 16.4. Agricultural output and productivity growth for global regions by decade.

<table>
<thead>
<tr>
<th>Region</th>
<th>Agricultural output growth (annual %)</th>
<th>Agricultural TFP growth (annual %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All developing countries</td>
<td>3.15</td>
<td>2.97</td>
</tr>
<tr>
<td>Sub-Saharan Africa</td>
<td>2.95</td>
<td>1.19</td>
</tr>
<tr>
<td>Latin America &amp; Caribbean</td>
<td>3.05</td>
<td>3.31</td>
</tr>
<tr>
<td>Caribbean</td>
<td>1.70</td>
<td>1.97</td>
</tr>
<tr>
<td>Central America</td>
<td>4.63</td>
<td>3.72</td>
</tr>
<tr>
<td>Northern Europe (Europe)</td>
<td>3.58</td>
<td>3.86</td>
</tr>
<tr>
<td>Southern Europe</td>
<td>1.80</td>
<td>2.90</td>
</tr>
<tr>
<td>Asia (except West Asia)</td>
<td>3.25</td>
<td>3.10</td>
</tr>
<tr>
<td>Northeast (China, mainly)</td>
<td>4.79</td>
<td>3.32</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>2.63</td>
<td>3.92</td>
</tr>
<tr>
<td>South Asia</td>
<td>2.02</td>
<td>2.66</td>
</tr>
<tr>
<td>West Asia</td>
<td>2.87</td>
<td>3.05</td>
</tr>
<tr>
<td>North Africa</td>
<td>2.62</td>
<td>1.88</td>
</tr>
<tr>
<td>West Asia</td>
<td>2.98</td>
<td>3.65</td>
</tr>
<tr>
<td>Oceania</td>
<td>2.53</td>
<td>2.34</td>
</tr>
<tr>
<td>All Developed Countries</td>
<td>2.05</td>
<td>1.93</td>
</tr>
<tr>
<td>USA &amp; Canada</td>
<td>2.05</td>
<td>2.39</td>
</tr>
<tr>
<td>Europe (except FSU)</td>
<td>1.99</td>
<td>1.60</td>
</tr>
<tr>
<td>Europe, Northwest</td>
<td>1.58</td>
<td>1.36</td>
</tr>
<tr>
<td>Europe, Southern</td>
<td>2.11</td>
<td>1.56</td>
</tr>
<tr>
<td>Australia &amp; New Zealand</td>
<td>2.90</td>
<td>1.68</td>
</tr>
<tr>
<td>NE Asia, developed</td>
<td>3.31</td>
<td>2.23</td>
</tr>
<tr>
<td>Transition Countries</td>
<td>3.27</td>
<td>1.32</td>
</tr>
<tr>
<td>Eastern Europe</td>
<td>2.67</td>
<td>1.73</td>
</tr>
<tr>
<td>Former Soviet Union (FSU)</td>
<td>3.59</td>
<td>1.10</td>
</tr>
<tr>
<td>Baltic*</td>
<td>3.56</td>
<td>0.93</td>
</tr>
<tr>
<td>Central Asia &amp; Caucasia*</td>
<td>3.41</td>
<td>4.71</td>
</tr>
<tr>
<td>Eastern Europe FSU*</td>
<td>3.18</td>
<td>0.78</td>
</tr>
</tbody>
</table>

*Data for former Soviet republics covers 1985–2009 only. The average annual growth rate in series Y is found by regressing the natural log of Y against time, i.e. the parameter B in ln(Y) = A + Bt. Source: Author’s estimates. See Table 16.3 for list of countries in each regional group.

World Food Gross Production Indices
(Unit: Int $, 2004-2006=100)

World Food Consumption
(Unit: kcal/capita/day)
However...

- Not enough
- May work in opposite direction

Modern inputs: fertilizers, Pesticides, etc.

- soil and water pollution
- harmful residues

Environmental sustainability

Food safety
However...

- Not enough
- May work in opposite direction

More & cheaper food

Over consumption, Obesity

Higher productivity, Lower price, farmers’ income

food security status of rural poverty group
“Go Beyond Productivity”
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- Move from productivity to “efficiency”;
- Shift from productivity to "consumer-focused supply-side reform";
- Increased focus on “beyond-productivity technology”; 
- Supplement productivity-led commercialization with “local priority”; 
- Toward “holistic, efficient food system”.
1. Move from productivity to “efficiency”;

• **Food production**

  ➢ **Productivity:**
  cost-benefit, ignore negative environmental externalities;

  ➢ **Efficiency:**
  most effective utilization of production resources, especially natural resources
• Food consumption

Dietary pattern inefficient

- **excessive** intake of calories, sugar, salt, fat, and etc.
- **insufficient intake** of nutrients

The inefficiency in food production and consumption may **interplay** with each other.

Move from **productivity** to **efficiency** -- sustainability of environment and food security.
“Go Beyond Productivity”

✓ Move from productivity to “efficiency”
✓ **Shift from productivity to "consumer-focused supply-side reform"**
✓ Increased focus on “beyond-productivity technology”;
✓ Supplement productivity-led commercialization with “local priority”;
✓ Toward “holistic, efficient food system”.
2. Shift from productivity to "consumer-focused supply-side reform"

- Changing in diet:
  - High-valued, usually animal sourced food
  - Healthy and nutritious food, such as higher quality fruits and vegetables.

- Changing in pursuits:
  - Productivity and quantity increase
  - Quality, safety, nutrition and other higher value characteristics
“Go Beyond Productivity”

✓ Move from productivity to “efficiency”
✓ Shift from productivity to "consumer-focused supply-side reform"
 ✓ Increased focus on “beyond-productivity technology”;
✓ Supplement productivity-led commercialization with “local priority”;
✓ Toward “holistic, efficient food system”.
3. Increased focus on “beyond-productivity technology”

• Changing in Technologies:

  Input intensive Technologies

  Resource-saving and environment-friendly Technologies

• Demand for the Technologies:

  ➢ Be economically competitive
  ➢ Successfully and easily reveal the traits of consumers’ upgraded food safety and nutritional concerns.
“Beyond-productivity technology”

- For consumers: consume **higher quality, more nutritious and healthier food**
- For Producers: increase their income, and **benefit their food security status**
- For the Society: improve **sustainability for the environment**.
“Go Beyond Productivity”

- Move from productivity to “efficiency”
- Shift from productivity to "consumer-focused supply-side reform"
- Increased focus on “beyond-productivity technology”;
- Supplement productivity-led commercialization with “local priority”;
- Toward “holistic, efficient food system”.

4. Supplement productivity-led commercialization with “local priority”

- Market integration and globalization help improve food security and safety in many ways:
  - making up for the shortage of natural resources
  - unifying food safety standards
  - improving world’s total productivity

- However,

  “Winner wins all” in the food sector.

  Those who are highest in productivity and lowest in production cost will win.
• Increase productivity and cost-effective competitiveness, by:
  – Homogenous seed variety
  – Shortened production period
  – Addition of elements for longer shelve time, and etc.

- “Wipe out” local varieties and fresh supply
- Increase food safety uncertainties, and could easily escalate any food safety incidents into big impact issues
• “Local priority” should be built into the food system.
• “Leave a green room” for local varieties to survive, and for local fresher supply to sustain.
• Considerations in international trade arrangement
“Go Beyond Productivity”

- Move from productivity to “efficiency”
- Shift from productivity to "consumer-focused supply-side reform"
- Increased focus on “beyond-productivity technology”;
- Supplement productivity-led commercialization with “local priority”;
- Toward “holistic, efficient food system”.
5. Toward “holistic, efficient food system
Reducing food waste and loss along the supply chain.

<table>
<thead>
<tr>
<th>Commodity Group</th>
<th>Percentage</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>30%</td>
<td>In industrialized countries, consumers throw away 286 million tonnes of cereal products.</td>
</tr>
<tr>
<td>Dairy Products</td>
<td>20%</td>
<td>In Europe alone, 29 million tonnes of dairy products are lost or wasted every year.</td>
</tr>
<tr>
<td>Fish and Seafood</td>
<td>35%</td>
<td>8% of fish caught globally is thrown back into the sea. In most cases they are dead, dying or badly damaged.</td>
</tr>
<tr>
<td>Fruits and Vegetables</td>
<td>45%</td>
<td>Almost half of all the fruits and vegetables produced are wasted.</td>
</tr>
<tr>
<td>Meat</td>
<td>20%</td>
<td>Of the 263 million tonnes of meat produced globally, over 20% is lost or wasted.</td>
</tr>
<tr>
<td>Oilseeds and Pulses</td>
<td>20%</td>
<td>Every year, 22% of the global production of oilseeds and pulses is lost or wasted.</td>
</tr>
<tr>
<td>Roots and Tubers</td>
<td>45%</td>
<td>In North America &amp; Oceania alone, 5,814,000 tonnes of roots and tubers are wasted at the consumption stage alone.</td>
</tr>
</tbody>
</table>
Utilizing the underutilization of the “edible parts” of food, due to various reasons.

A holistic, efficient food system: from “farm to fork”
CHANGE from conventional mentality

**GO BEYOND PRODUCTIVITY**

FIGHT the global food security and safety challenges with dynamic and enriched toolbox and our ever-enhancing human wisdom.

*Zero-hunger, Zero-malnutrition 2030!*
Thanks!