Situation of Agricultural Engineering R&D in Sri Lanka

Eng. M. H. M. A. Bandara
Deputy Director
Farm Mechanization Research Centre
Sri Lanka
Introduction

- Agriculture plays a dominant role in economy.
- Agriculture contribution to the GDP declining.
- Agriculture is not considered as a profitable business.
- Mechanization is not considered as a priority area.
Agriculture Policy

- Transformation of subsistence agriculture into a profitable commercial venture.
- Diversification, market orientation, modernization and profitable agro-based industries.
- Incentives for agriculture.
- Social security for the farmer.
Mechanization Policy

1. Mechanize and manage agriculture to improve profitability of agriculture.
2. Encourage primary processing and value addition at farm level.
3. Promote the formation of agricultural machinery manufacturers and suppliers association.
4. Promote private sector to actively engaged in other economic activities in the rural sector.
Strategies for Policy Statement 1

- Establish a reliable and accurate database on status of agricultural machinery.
- Define standards for all mechanization inputs to assure quality and farmer protection.
- Allow importation of machinery meeting the specified standards.
- Protect local manufacturing industry by introducing protective tariff system.
Strategies for Policy Statement 2

- Provide incentives to private sector in introducing new technology for sorting, grading and handling at farm level.
- Organize farmers in to collective action and to pool their resources.
- Introduce group credit systems.
- Promotion of Agri business insurance.
Strategies for Policy Statement 3

- Encourage supplier of agricultural machinery to train the end users.
- Provide vocational training to agricultural machinery repair and service personnel.
- Establish Sri Lanka Agricultural Technology Secretariat (SLATS)
Strategies for Policy Statement 4

- Granting tax concessions to those generating rural economic activities.
- Improve rural infrastructure facilities.
The Overall Situation of R&D in the country

Financial Resources for Research & Development
## The Total Expenditure on R&D

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP Current Prices Rs. million</th>
<th>GERD Rs. Million (US$)</th>
<th>GERD as Percent if GDP</th>
<th>Total Population million</th>
<th>GERD per Million Population Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1966</td>
<td>7,529</td>
<td>20 (4.2)</td>
<td>0.30</td>
<td>11.5</td>
<td>1.7</td>
</tr>
<tr>
<td>1975</td>
<td>11,100</td>
<td>45 (6.4)</td>
<td>0.40</td>
<td>13.5</td>
<td>3.3</td>
</tr>
<tr>
<td>1984</td>
<td>142,700</td>
<td>257 (9.7)</td>
<td>0.18</td>
<td>15.6</td>
<td>16.5</td>
</tr>
<tr>
<td>1993</td>
<td>49,800</td>
<td>649 (13.1)</td>
<td>0.13*</td>
<td>17.6</td>
<td>36.8</td>
</tr>
<tr>
<td>1996</td>
<td>769,900</td>
<td>1,410 (23)</td>
<td>0.18</td>
<td>18.3</td>
<td>77.0</td>
</tr>
<tr>
<td>2000</td>
<td>1,258,000</td>
<td>1,810 (22.9)</td>
<td>0.14*</td>
<td>18.4</td>
<td>98.4</td>
</tr>
<tr>
<td>2004</td>
<td>1,800,750</td>
<td>3,807 (40.9)</td>
<td>0.20</td>
<td>19.4</td>
<td>196.2</td>
</tr>
</tbody>
</table>

**GERD** - Gross Expenditure on R&D
Growth of R&D Expenditure
National Expenditure on R&D by Source of Funding

- Government: 67.50%
- Foreign: 22.60%
- Private: 0.60%
- Other: 9.30%
## National R&D Expenditure by Sector of Performance

<table>
<thead>
<tr>
<th>Sector</th>
<th>1984</th>
<th></th>
<th></th>
<th>1996</th>
<th></th>
<th></th>
<th>2004</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Recurrent</td>
<td>Capital</td>
<td>Total</td>
<td>Recurrent</td>
<td>Capital</td>
<td>Total</td>
<td>Recurrent</td>
<td>Capital</td>
<td>Total</td>
</tr>
<tr>
<td>Higher Education</td>
<td>14.6</td>
<td>1.6</td>
<td>16.2  (6.3%)</td>
<td>299.3</td>
<td>58.4</td>
<td>357.7  (25.4%)</td>
<td>1,150.0</td>
<td>127.6</td>
<td>1,277.6 (33.5%)</td>
</tr>
<tr>
<td>State</td>
<td>143.8</td>
<td>72.5</td>
<td>216.3  (84.3%)</td>
<td>827.2</td>
<td>203.2</td>
<td>1,030.4 (73.1%)</td>
<td>1,319.0</td>
<td>1,001.2</td>
<td>2,321.1 (61.0%)</td>
</tr>
<tr>
<td>Private</td>
<td>15.9</td>
<td>8.3</td>
<td>24.2  (9.4%)</td>
<td>3.0</td>
<td>18.5</td>
<td>21.5   (1.5%)</td>
<td>132.4</td>
<td>76.4</td>
<td>208.8 (5.5%)</td>
</tr>
<tr>
<td>Total</td>
<td>174.3  (67.9%)</td>
<td>82.4  (32.1%)</td>
<td>256.7  (100.0%)</td>
<td>1,129.5 (80.1%)</td>
<td>280.1 (19.9%)</td>
<td>1,409.6 (100.0%)</td>
<td>2,602.3 (68.3%)</td>
<td>1,205.2 (31.7%)</td>
<td>3,807.5 (100.0%)</td>
</tr>
</tbody>
</table>
The Overall Situation of R&D in the country

Human Resources in Science and Technology
### Science & Technology Personnel by Category

<table>
<thead>
<tr>
<th>STP Category</th>
<th>1996</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Number</td>
<td>Per cent of STP</td>
</tr>
<tr>
<td>Scientist</td>
<td>13,286</td>
<td>48.7</td>
</tr>
<tr>
<td>Technicians</td>
<td>14,514*</td>
<td>52.2*</td>
</tr>
<tr>
<td>Other Supporting Staff</td>
<td>6,384</td>
<td></td>
</tr>
<tr>
<td>STP</td>
<td>27,800</td>
<td>100.0</td>
</tr>
</tbody>
</table>
## Distribution of Science & Technology Personnel by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>1984</th>
<th>1996</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STP</td>
<td>Percent</td>
<td>STP</td>
</tr>
<tr>
<td>Higher Education</td>
<td>2,264</td>
<td>15.6</td>
<td>3,990</td>
</tr>
<tr>
<td>State</td>
<td>8,620</td>
<td>59.5</td>
<td>18,645</td>
</tr>
<tr>
<td>Private</td>
<td>3,603</td>
<td>24.9</td>
<td>5,165</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14,487</td>
<td>100.0</td>
<td>27,800</td>
</tr>
</tbody>
</table>
Distribution of Science & Technology Personnel by Sector

<table>
<thead>
<tr>
<th>Year</th>
<th>Higher Education</th>
<th>State</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>2,264</td>
<td>3,990</td>
<td>12,685</td>
</tr>
<tr>
<td>1996</td>
<td>4,285</td>
<td>8,620</td>
<td>5,165</td>
</tr>
<tr>
<td>2004</td>
<td>11,462</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Distribution of Science & Technology Personnel by Disciplines

<table>
<thead>
<tr>
<th>Discipline</th>
<th>1984 No</th>
<th>1984 %</th>
<th>1996 No</th>
<th>1996 %</th>
<th>2004 No</th>
<th>2004 %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Science</td>
<td>2,914</td>
<td>20.1</td>
<td>6,705</td>
<td>24.1</td>
<td>8,227</td>
<td>28.9</td>
</tr>
<tr>
<td>Agricultural Science</td>
<td>3,234</td>
<td>22.3</td>
<td>3,239</td>
<td>11.7</td>
<td>5,766</td>
<td>20.3</td>
</tr>
<tr>
<td>Engineering &amp; Technology</td>
<td>6,569</td>
<td>45.4</td>
<td>12,631</td>
<td>45.4</td>
<td>8,244</td>
<td>29.0</td>
</tr>
<tr>
<td>Medical Science</td>
<td>-</td>
<td>1.3</td>
<td>2,991</td>
<td>10.8</td>
<td>1,126</td>
<td>4.0</td>
</tr>
<tr>
<td>Social Science &amp; Humanities</td>
<td>190,1,580</td>
<td>10.9</td>
<td>2,234</td>
<td>8.0</td>
<td>1,540</td>
<td>5.4</td>
</tr>
<tr>
<td>Other / Not Specified</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3,529</td>
<td>12.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14,487</td>
<td>100.0</td>
<td>27,800</td>
<td>100.0</td>
<td>28,432</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Distribution of Science & Technology Personnel by Disciplines

- Natural Science
- Agricultural Science
- Engineering & Technology
- Medical Science
- Social Science & Humanities
- Other / Not Specified

Year:
- 1984
- 1996
- 2004

STP:
- 0
- 2,000
- 4,000
- 6,000
- 8,000
- 10,000
- 12,000
- 14,000

Discipline
## Distribution of R&D Scientist by Sector

<table>
<thead>
<tr>
<th>Sector</th>
<th>1996</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Scientist</td>
<td>Technicians</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Higher Education</td>
<td>3,993</td>
<td>66.9</td>
</tr>
<tr>
<td>State</td>
<td>1,916</td>
<td>32.2</td>
</tr>
<tr>
<td>Private &amp; NGO</td>
<td>56</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>5,965</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Institutions Engaged in Agri Engineering R&D

- Farm Mechanization Research Centre (FMRC)
- Institute of Post Harvest Technology (IPHT)
- National Engineering Research and Development Centre (NERD)
- Universities
- Private Sector
Farm Mechanization Research Centre (FMRC)

Main Functions:
- Identify constrains and bottlenecks of mechanization
- Select and Test implements.
- Modify and adapt promising implements.
- Industrial / Agricultural Extension
- Coordination of National Farm Mechanization Committee (NFMC) Activities.
## Allocations of DOA in 2005

<table>
<thead>
<tr>
<th>Heading</th>
<th>Recurrent Expenditure Rs. million</th>
<th>Capital Expenditure Rs. million</th>
<th>Total</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Administration</td>
<td>114.5</td>
<td>52.7</td>
<td>167.2</td>
<td>14.5</td>
</tr>
<tr>
<td>Agricultural Research &amp; Development</td>
<td>385.8</td>
<td>48.3</td>
<td>434.1</td>
<td>37.5</td>
</tr>
<tr>
<td>Extension &amp; Training</td>
<td>271.0</td>
<td>47.0</td>
<td>318.0</td>
<td>27.5</td>
</tr>
<tr>
<td>Seed Certification</td>
<td>158.0</td>
<td>77.0</td>
<td>235.0</td>
<td>20.37</td>
</tr>
<tr>
<td><strong>Farm Machinery Research</strong></td>
<td><strong>0.75</strong></td>
<td><strong>0.8</strong></td>
<td><strong>1.55</strong></td>
<td><strong>0.13</strong></td>
</tr>
</tbody>
</table>
Staff Position of DOA 2005

- Research Officers (Agronomy)      189
- Agricultural Extensional Officers 82
- Farm Machinery Research Engineers 03

(1.09% of the total research force)
<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research Engineers</td>
<td>03</td>
</tr>
<tr>
<td>Agronomist</td>
<td>00</td>
</tr>
<tr>
<td>Technical Staff</td>
<td>07</td>
</tr>
<tr>
<td>Technical Supporting Staff</td>
<td>35</td>
</tr>
<tr>
<td>Minor Staff</td>
<td>08</td>
</tr>
</tbody>
</table>
Institute of Post Harvest Technology (IPHT)

Main Functions:

- Prevent Post Harvest losses
- Prevent the deterioration in quality by improper handling.
- Prevent the nutritional losses.
- Improve farm level storage and preservation facilities
- Introduce improved labour saving post harvest techniques.
- Promote viable rural agro base industries in to commercial scale.
- Popularize the use of foods.
# Staff Position in 2006

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administration</td>
<td>05</td>
</tr>
<tr>
<td>Researchers (Agronomy)</td>
<td>11</td>
</tr>
<tr>
<td>Researchers (Agri. Eng.)</td>
<td>06</td>
</tr>
<tr>
<td>Extension Officers</td>
<td>02</td>
</tr>
<tr>
<td>Technical Staff</td>
<td>13</td>
</tr>
<tr>
<td>Others</td>
<td>50</td>
</tr>
</tbody>
</table>
Funds Allocated in 2006

- **Capital** - Rs. 8.0 millions
- **Recurrent** - Rs. 41.0 millions
- **Total** - RS. 49.0 millions
- 0.5 millions (US$)

The funds allocated and the staff positions of the IPHT is comparatively large but only a fraction of the resources are being used in Research and Development in Agricultural Engineering.
National Engineering Research & Development Centre (NERD)

Main Functions:

- R&D on Biogas
- R&D on Civil Engineering Activities
- R&D on Electrical Engineering Activities
- R&D on Environment and Energy Management
- R&D on Agricultural & Post Harvest Technology
Funds Allocated in 2006

- Capital: Rs. 68 millions
- Recurrent: Rs. 39 millions
- Total: Rs. 107 millions

Total Allocation for Agricultural Engineering Research: Rs. 01 million
(less than 01% of the total allocation)
Staff Position in 2006

- Total research engineers - 45
- Engineers for Agricultural Engineering Research - 03

(6.66% of the total research force)
The contribution from the universities for applied research is not significant. Universities carry out only academic research which helps to develop science, as a part of student’s projects. There is hardly anything in practical use.
Private sector is very much concerned on profit. Their allocation and contribution in Research and Development is not significant.
Conclusion

The funds and manpower allocated to R&D of Agricultural Engineering is not sufficient when compared to other fields. Hence it is very important to convince the policy makers to pay more attention to this field to get the maximum benefit of Farm Mechanization.
Thank You!