‘Establishing a Cooperation Mechanism for Human Resource Development on Sustainable Agricultural Mechanization’

Presentation by

1. Prof. Nimal Dharmasena, Department of Agricultural Engineering, University of Peradeniya, Sri Lanka

2. Eng. Chinthaka Balasooriya, Deputy Director, Farm Mechanization Research Center, Department of Agriculture, Sri Lanka.
The Democratic Socialist Republic of Sri Lanka

- **Location** - 7°N 81°E
- **Population** – 20.5 million
- **Agricultural based economy,**
- **Agriculture plays a dominant role in economy,** GDP contribution (20.1%)
Land use

- Total land area: 65,610 km$^2$
- Agricultural land: approx. 2.6 million hectares (42%)
- No. of smallholder farmers: 1.65 million
- Average landholdings: less than 2 hectares
- Smallholder farmers are in charge of almost 80% of Sri Lanka’s total annual crop production
Land use

**Land Use** [5]

- 46% Arable land
- 17% Permanent meadows and pasture
- 37% Permanent crops

Agricultural area is **41.8%** of total land area [5]

**Main Crops** [5]

- 2.5% Maize
- 46.1% Paddy rice
- 3.5% Vegetables
- 9.7% Tea
- 17.5% Coconut
- 20.7% Others
Institutes Involved In Agricultural Mechanization Research & Human Resource Development

• Farm Mechanization research Centre (FMRC)
• Farm Mechanization Training Centre (FMTC)
• Institute of Postharvest Technology (IPHT)
• National Engineering Research & Development Centre (NERDC)
• Agricultural Mechanization Departments and Divisions in Higher Education Institutes.
As a Former Design and Testing Unit - DTU

• Established in 1968
• Introduced suitable 4w tractors to Sri Lanka
• Introduced and modified 2w tractors according to Sri Lankan conditions
Farm Mechanization Research Center

Mandate

• Research and Development of sustainable agricultural mechanization
• Testing and Evaluation of Agricultural Machinery
• Adoptive research of new technologies
• Extension of Agricultural Mechanization
Priority Research Areas

• Land Preparation Techniques
• Plant Establishment methods
• Crop Management Systems
• Harvesting Handling and Processing
Commercialized Machines

- Paddy Thresher
- Paddy Reaper
- Multi Chopper
Manual Rice Transplanter

Bucket Seeder

Cono Weeder
Successful Machines - OFC

Manual Highland Seeder

Multi Crop Thresher
Commercialized Machines – Postharvest

Paddy Cleaner  Pulse Processing Machine
Successful Designs

3 Tine Tiller for 2W Tractor

Drum Seeder - Commercialized
Commercialized Designs

**Injector Planter**

**Tractor Coupled Seeder**
4W Tractor Coupled Injector Planter
Axial Flow Pump 6”

Axial Flow Pump 12”
2W Tractor Rotary Coupled Seeder
Finger Millet Thresher + De Husker
Ground Nut Decorticator
Tine tiller coupled seeder
High Capacity Maize Thresher
High Capacity Finger Millet Thresher
Cassava Digger
Cassava Slicer
Recent Contributions towards Agricultural Mechanization
Introducing Motorized Rice Transplanter
Demonstrations
National Rice Planting Day 2015
Distribution of Machinery
Machines Distributed to Farmer Societies on 08.04.2017
Introducing Riding Type Transplanter
Potential operational modalities and cooperation activities

Department of Agriculture can provide:

- In-house training facilities
- Study Tours for officers
- Facilitate visiting scholars
- Organize and conduct workshops
- Exchange technologies and share experience
Human Resource Development for Sustainable Agricultural Mechanization in Sri Lanka

Prof. D. A. Nimal Dharmasena
Department of Agric. Engineering
University of Peradeniya
Sri Lanka
Content

• Overview of the higher education (HE) and research institutions offer AgEng./Mechanization in Sri Lanka

• Dept. of Agric. Engineering - Research & Training focus on Agric. mechanization

• The needs assessment and challenges faced by the HE and research institutions on HRD in Agric. mechanization

• Suggestions for regional cooperation on HE and joint research on HRD in Agric. mechanization

• Possible contributions from the Dept. of Agric. Engineering, (UoP) for such regional cooperation
Overview of the Higher Education and Research Institutions That Offer Agric. Mechanization Programmes in Sri Lanka
History of higher education system in Sri Lanka

• The modern university education system was established in Sri Lanka in 1921

• University of Ceylon was established in 1942

• The first Faculty of Agriculture and Veterinary Science was established at Peradeniya in 1947
Ministry of Higher Education and Highways

Institutions Governed by the UGC

15 universities

Three campuses

18 degree awarding institutes

- PGIA, (UoP)
- Institute of Agro-Technology and Rural Sciences, University of Colombo

Agriculture/Agric. Sciences Faculties

Agricultural Engineering/Mechanization related Training and Research

State Univ. not governed by the UGC – (UNIVOTEC)
At Present

Eight Faculties of Agriculture ➔ Potential - 1250/yr

Produce - 800/yr ➔ About 11% - Specialize in Agric. Engineering (# 90)

Agricultural machinery related research (undergraduate level) about 38/yr
Engineering graduates (Mechanical Engineering) in agric. machinery sector

- Five Eng. Faculties
- About 1400 Engineering Graduates
- Less than 10/yr engage in Agric. Machinery sector

- A few in state sector R & D institutions and the rest serves at the executives in the private sector
Involvement of Private Sector Institutions in Agric. Machinery Training

- Aquinas College of Higher Studies - Agriculture and Animal Husbandry, -(NVQL-6)
- AgEng. component on farm machinery maintenance

- South Asian Institute of Technology and Medicine (Pvt) Ltd. (SAITM) - Initiating a new degree in Biosystems Engineering- includes mechanization related to Agro-processing

• There are many other private institutions in the HE sector – But, No Agric. Machinery Related Training
Higher Education in Vocational Technology

- Only one collage of technology offers a ‘Farm Machinery Technology’ Diploma (NVQ L-5) # about 20-25/year

- One University Collage (Kuliapitiya), ready to offer the same programme (NVQL-6) (two more in future)
Vocational Training - Ministry of Agriculture

School of Agriculture Diploma in Agriculture (NVQL- 5/6)

- 05 schools
- Annual intake - 275
- Agricultural Engineering/ Mechanization as a subject
Research institutions In the country:

• Under Five Ministries –
  1. Ministry of Plantation Industries
  2. Ministry of Agriculture
  3. Ministry of Technology and Research
  4. Ministry of Fisheries and Aquatic Resources Development
  5. Ministry of Livestock and Rural Community Development
1. Ministry of Plantation Industries

Four main plantation research institutions

- Tea Research Institute (TRI)
- Coconut Research Institute
- Rubber Research Institute
- Sugarcane Research Institute (SRI)

Research and Training in mechanization aspects
2. Ministry of Agriculture

- Department of Agriculture
  - Plays a major role in agricultural machinery research and training

1. **Food Research Unit (FRU)** - Research - food processing (processing machinery)

2. **The Farm Mechanization Research and Training Centre (FMRC)** –
   - Research on farm machinery
   - Testing and Evaluation of Farm Machinery
Department of Export Agriculture:

Two Research Stations:

- Central Research Station at Matale - actively engaged in developing processing machinery for spice crops

- Cinnamon Research Station - little research on machinery
Institutes Under the Ministry of Agriculture:

1. Institute of Postharvest Technology (IPHT)
   - R & D related to postharvest and processing machinery & training

2. Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI)
   - Limited research involvements in Agric. Mechanization
3. Ministry of Technology and Research:

Five Research Institutions
- National Engineering Research and Development Centre (NERD)
- Industrial Technology Institute (ITI)

R & D in farm/processing machinery

4. Ministry of Fisheries and Aquatic Resources Development:

National Aquatic Resources Research and Development Agency (NARA)

*Involves very little in machinery*
5. Ministry of Livestock and Rural Community Development:

• The Veterinary Research Institute in Sri Lanka (VRI)

No Engineering Division ???

AgEng. UoP Develop Technology for:
• Fully automated egg incubators
• Portable milking machines
• ICU incubators etc.
Specific Programmes/Research Focuses on Agric. Machinery and Mechanization: Dept. of Agric. Engineering, University of Peradeniya
• The University of Peradeniya (UOP):
  ➢ The oldest and the largest residential university
  ➢ 9 faculties, 4 PG institutions & 9 centers
  ➢ Undergraduates - 32,370; Postgraduates 6,600

• Nine faculties in one location: The main strength for interdisciplinary research

• The Faculty of Agriculture, UOP (Since 1947)
  - The oldest Agric. faculty in the country

• The Postgraduate Institute of Agriculture, UoP (1975)
  - Oldest PG institute in the country
The Dept. Agric. Engineering (1973)
R & D and training on engineering technology for agriculture

- **General courses:** Farm machinery and mechanization, Testing and evaluation, Machine design
- **Majoring Module:** “Agricultural & Biosystems Engineering”

**Our Strengths:**

- **15 well qualified staff** (6 of them are professors)
  - 9 faculties in one place – collaborative research
  - Farm machinery fleet; implements, harvesting machines etc.
  - 25 Ac machinery testing farm.
  - Engineering workshop for fabrications
  - Research students linked to PGIA
  - Well established working links with DoA & all other institutions for joint research
  - Experience of research collaborations with many international organizations; USAID, JICA, FAO, WFP etc
Modes of practical training:

• Students are trained in the FMTC & FMRC of the DoA

• In-plant training in leading farm machinery companies

• Student-industry interactions: Seminar & Discussion forums

• **Vacation jobs in private sector**: Students involve in;
  • machine assembling,
  • testing and evaluation,
  • assessment of machinery needs and
  • post-sales consumer feedback surveys etc.
Agric. Eng: R & D on Agric. Machinery:

Work in Progress-
Energy efficient Tea Dryer
Coconut peeler

Water filter
Thank you