REGIONAL WORKSHOP
Research and Academic Institutions on:
‘Establishing a Cooperation Mechanism for Human Resource Development on Sustainable Agricultural Mechanization’

The Philippine Experience

Nanjing International Convention Center
Nanjing, China
13-15 April 2017
Authored & Presented by:

DR. ROSSANA MARIE C. AMONGO
Director & Associate Professor
Center for Agri-fisheries and Biosystems Mechanization (BIOMECH) University of the Philippines Los Baños

ENGR. ARIODEAR C. RICO
Chairman, Professional Regulatory Board of Agricultural and Biosystems Engineering
Professional Regulation Commission
Department of Labor and Employment, Philippines

Nanjing International Convention Center Center
Nanjing, China
13-15 April 2017
1. The Philippines: country background
2. Institutional Background
3. The Philippine Agri-Fisheries Mechanization Workforce
4. Academic, Research and HRD Institutions on Agri-Fisheries Mechanization in the Philippines
5. Suggested Priority Areas for Regional Cooperation
## Country Background

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographical Location</td>
<td>Latitude : NL</td>
<td>4.7 ° N</td>
</tr>
<tr>
<td></td>
<td>: SL</td>
<td>21.5 ° N</td>
</tr>
<tr>
<td></td>
<td>Longitude: EL</td>
<td>117 ° E</td>
</tr>
<tr>
<td></td>
<td>: WL</td>
<td>127 ° E</td>
</tr>
<tr>
<td>Meteorological conditions</td>
<td>Temperature</td>
<td>Min. 26.1 ° C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max. 28.4 ° C</td>
</tr>
<tr>
<td></td>
<td>Annual Precipitation</td>
<td>2000 mm/year</td>
</tr>
<tr>
<td>Agricultural Conditions</td>
<td>Total Area</td>
<td>300,000,000 km²</td>
</tr>
<tr>
<td></td>
<td>Total Land Area</td>
<td>298,170,000 km²</td>
</tr>
<tr>
<td></td>
<td>Total Water Area</td>
<td>1,830,000 km²</td>
</tr>
<tr>
<td></td>
<td>Agricultural Land</td>
<td>9,671,000 km²</td>
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<tr>
<td></td>
<td>Arable Lands</td>
<td>4,936,000 km²</td>
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<tr>
<td></td>
<td>Permanent Cropland</td>
<td>4,225,000 km²</td>
</tr>
<tr>
<td></td>
<td>Forest land</td>
<td>74,000 km²</td>
</tr>
<tr>
<td></td>
<td>Other lands</td>
<td>307,000 km²</td>
</tr>
<tr>
<td></td>
<td>Agricultural Farms</td>
<td>4,820,000 farms (2002)</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Data</td>
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<td>-----------------------------</td>
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<tr>
<td><strong>Agricultural Conditions</strong></td>
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<tr>
<td>Agricultural Conditions</td>
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</tr>
<tr>
<td>Staple foods</td>
<td>RICE: (2015)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area Harvested:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.656 million ha</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Production: 18.150 MMT</td>
<td></td>
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<tr>
<td></td>
<td>Farm gate Price: P18.04/kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CORN: (2015)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Area Harvested:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.562 million ha</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Production: 7.518 MMT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Farm gate Price: P12.01/kg</td>
<td></td>
</tr>
<tr>
<td>Other staples</td>
<td>Root Crops and Plantain</td>
<td></td>
</tr>
<tr>
<td>Other major crops</td>
<td>Sugarcane, Coconut</td>
<td></td>
</tr>
<tr>
<td>Top Export crops</td>
<td>Coconut Oil (18%), Banana (17%), Tuna (7%) Pineapple &amp; Products (7%)</td>
<td></td>
</tr>
<tr>
<td><strong>Population and Employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Population</td>
<td>103.500 million</td>
<td></td>
</tr>
<tr>
<td>Total Employment</td>
<td>38.65 million</td>
<td></td>
</tr>
<tr>
<td>Employment in Agriculture</td>
<td>11.74 million</td>
<td>(share 30.9%)</td>
</tr>
<tr>
<td>ABE in agriculture</td>
<td>8,336 AB Engineers</td>
<td></td>
</tr>
<tr>
<td>Skills Machinery operators /tech</td>
<td>1.2 Million</td>
<td></td>
</tr>
<tr>
<td>Wage Rates</td>
<td>P 252-454 plantation(2016)</td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Data</td>
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<tr>
<td>-----------------------------</td>
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<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Social Conditions</td>
<td>Official Language</td>
<td>English &amp; Filipino</td>
</tr>
<tr>
<td></td>
<td>National Language</td>
<td>Filipino</td>
</tr>
<tr>
<td></td>
<td>Religion</td>
<td>Christians / Muslims</td>
</tr>
<tr>
<td>Economy (2015)</td>
<td>GNI at current prices</td>
<td>P 13,851 Billion</td>
</tr>
<tr>
<td></td>
<td>GDP at current prices</td>
<td>P 11,584 Billion&lt;br&gt;(10% in agriculture with 7.18% growth)</td>
</tr>
<tr>
<td></td>
<td>GVA at current prices (agriculture and fishing)</td>
<td>P1,293 Billion</td>
</tr>
<tr>
<td>Mechanization Level (Quick Index, 2012)</td>
<td>For Rice</td>
<td>2.32 hp/ha</td>
</tr>
<tr>
<td></td>
<td>For all crops</td>
<td>1.23 hp/ha</td>
</tr>
</tbody>
</table>
Vision
Excellence in RDE committed to agri-fisheries and biosystems mechanization in the Philippines responsive to the challenges of food security, energy sustainability, environmental protection, climate change and globalization

Mission
Provide innovative agri-fisheries and biosystems mechanization technologies through: cutting edge research, strategic public service/extension delivery methods; synergistic networking, and responsive policy advocacies, towards environment-friendly, gender sensitive, and sustainable agri-fisheries and biosystems modernization

RA 10601 The Agriculture and Fisheries Mechanization Law 2013
BIOMECH to lead and coordinate the agricultural and fishery mechanization RDE program of all academic institutions in the country (Article 3, Section 8)

Technology accessibility and adaptation to agri-fishery communities
RDE activities influencing national policies and plans
Capability building for agri-fishery mechanization
Pubic Service for agri-fishery sector on mechanization

1312th UP BOR Meeting on 29 October 2015
Major role of **BIOMECH** in the AFMech Law of 2013 (R.A. 10601)

**Major institution** involve in the formulation of the National Agricultural and Fisheries Mechanization Program (NAFMP) (Article 2, Rule 5.1).

**BIOMECH** as part of the Agri-fisheries Mechanization and Engineering Resource Network (AFMech ERN) that shall be linked to the database of the DA, and other networks (Article 3, Section 10).

**Co-Chair** of the AFMechRDE Network to lead and coordinate the agri-fishery mechanization RDE program of all HEIs in the country (Article 3, Sec 8 and Rule 8.3).

**Major institution** involve in the formulation of the unified National Agricultural and Fisheries Mechanization Research and Development and Extension (NAFMechRDE) Agenda (Article 3, Sec. 7, Rule 7.1).

**BIOMECH** as part of the national project on contiguous farming which shall be spearheaded DA together with DAR and other agencies concerned, to increase land, labor and crop productivity utilizing agricultural mechanization technologies (Article 9, Rule 34.1).

1312th UP BOR Meeting on 29 October 2015
<table>
<thead>
<tr>
<th>RDE THRUSTS</th>
<th>SPECIFIC RDE AREAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Security</td>
<td>Crop, livestock and fisheries production mechanization technologies</td>
</tr>
<tr>
<td></td>
<td>Precision agriculture and smart farming</td>
</tr>
<tr>
<td></td>
<td>Alternative food sources mechanization</td>
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<td></td>
<td>Postharvest mechanization</td>
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<tr>
<td></td>
<td>Food and feed processing technology</td>
</tr>
<tr>
<td></td>
<td>Aquaculture engineering</td>
</tr>
<tr>
<td></td>
<td>Contiguous farming system</td>
</tr>
<tr>
<td>Energy Sustainability</td>
<td>Energy-efficient technologies</td>
</tr>
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<td></td>
<td>Renewable energy technology</td>
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<tr>
<td>Environmental Protection</td>
<td>Agro-waste management and utilization</td>
</tr>
<tr>
<td></td>
<td>GIS for Mechanization (Agricultural Mechanization Planning and Monitoring)</td>
</tr>
<tr>
<td></td>
<td>Soil and water conservation technologies</td>
</tr>
<tr>
<td>Climate Change</td>
<td>Land and water resources engineering</td>
</tr>
<tr>
<td></td>
<td>Climate change mitigation and adaptation</td>
</tr>
</tbody>
</table>
BIOMECH WORK ENVIRONMENT
REGULATED PROFESSIONS (44):

Engineering Cluster
- Aeronautical Engineering
- Agricultural & Biosystems Engineering
- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Electronics Engineering
- Geodetics Engineering
- Mechanical Engineering
- Metallurgical Engineering
- Mining Engineering
- Naval Architecture & Marine Engineering
- Sanitary Engineering

Technology Cluster
- Architecture
- Chemistry
- Environmental Planning
- Fisheries
- Foresters
- Geology
- Interior Design
- Landscape Architecture
- Master Plumbers

Business, Education & Socials Cluster
- Accountancy
- Criminology
- Custom Brokers
- Guidance and Counseling
- Librarians
- Marine Deck Officers
- Marine Engine Officers
- Professional Teachers
- Psychology
- Real Estate Service
- Social Workers

Medical and Health Cluster
- Dentistry
- Medical Technology
- Medicine
- Midwifery
- Nursing
- Nutrition and Dietetics
- Optometry
- Pharmacy
- Physical Therapy
- Occupational Therapy
- Radiologic Technology
- Respiratory Therapy
- Veterinary Medicine
The PROFESSIONAL REGULATORY BOARD OF AGRICULTURAL AND BIOSYSTEMS ENGINEERING
(Formerly Board of Agricultural Engineering)

- Created by law, R.A. No. 10915 (Philippine Agricultural and Biosystems Engineering Act of 2016, previously R.A. No. 8559)

- Functions:
  1. Conducts Licensure Examination
  2. Regulates the Practice of Agricultural and Biosystems Engineering

Note: All appointed by the President of the Philippines
NATIONAL AGRI-FISHERIES MECHANIZATION PROGRAM 2016-2020

1. Local Assembling Manufacture of Agri-Fishery Machinery
2. Research, Development and Extension
3. Standards and Regulation
4. Support Services and Institutional Development
5. Human Resources Development

Fully Mechanized Philippine Agriculture and Fisheries

Increase farm productivity, competitiveness and income

National Food Security and Economic Prosperity
60 Higher Education Institutions (HEIs) that offers 5-Year BS Agricultural Engineering/Agricultural and Biosystems Engineering Education Program

3 HEIs offering the MSAE program

2 HEIs offering the PhDAE program

1 National University

1 AUN- QA Accredited

3 Centers of Excellence (COE)

Supervised by the Commission on Higher Education (CHED)
THE PHILIPPINE QUALIFICATIONS FRAMEWORK (PQF)

NATIONAL POLICY

COMPETENCY-BASED

LEVELS OF EDUCATIONAL QUALIFICATIONS

LABOR MARKET-DRIVEN

STANDARDS FOR QUALIFICATION OUTCOMES

ASSESSMENT-BASED QUALIFICATION RECOGNITION
ACADEMIC, RESEARCH & HRD INSTITUTIONS ON AGRI-FISHERIES MECHANIZATION IN THE PHILIPPINES

COVERAGE OF PQF

Three levels: Basic Education, Technical & Vocational, Higher Education
The Domains:
- Knowledge, skills, and values
- Application
- Degree of Independence
Organized into Agricultural and Fisheries Mechanization Research, Development and Extension Network (AFMechRDEN) composed of:

- Research Development Institutes (RDIS) chaired by Philippine Center for Post Harvest and Mechanization (PhilMech)
- Higher Education Institutions (HEIs) chaired by the UPLB-Center for Agri- Fisheries and Biosystems Mechanization (UPLB-BIOMECH)
The RDE Framework

RESEARCH AND DEVELOPMENT
- Efficient and appropriate, location specific production and postproduction mechanization technologies
- Appropriate technical standards and testing for quality agricultural and fishery machinery
- Renewable and non-conventional energy resources for agricultural and fisheries equipment and machineries for added value and environmental protection
- Suitable mitigating and adaptation technologies for climate change

EXTENSION
- Knowledge/technology management
- Extension support, education and training (for farmers, AEs, manufacturing industry, extension workers)
- Promotion of best manufacturing practices/appropriate standards

IMMEDIATE/LONG TERM EFFECTS
- Higher farm productivity/income
- Improved resource use efficiency
- Successful agricultural and fishery mechanization enterprises
- Increased institutional capability

IMPACT
- Climate resilient agri-fishery production and post-production systems (marketing) better quality of life
- Globally competitive and sustainable agricultural and fishery sector

FEEDBACK MECHANISM
AFMechRDE Network of the HEIs

NAFMechRDE Network

HEI Sub Network 1
North Luzon

HEI Sub Network 2
South Luzon

HEI Sub Network 3
Visayas

HEI Sub Network 4
West Mindanao

HEI Sub Network 5
East Mindanao

BIOMECH to lead and coordinate the agri-fishery mechanization RDE program of all HEIs in the country (Article 3 Sec 8 and Rule 8.3).
HUMAN RESOURCE DEVELOPMENT (HRD) INSTITUTIONS

- Professional Regulatory Board of Agricultural and Biosystems Engineering (PRB-ABE)

  Licensure examination and regulation the practice of Agricultural and Biosystems Engineers

  With established: Philippine Society of Agricultural Engineers
PROFESSIONALS SERVICES

1) Plans, designs, prepares and prescribes technical specifications
2) Supervise/ manage the construction, operation and maintenance;
3) Test, evaluate and inspect
4) Conduct Research, training and extension; and
5) Conduct feasibility study, Marketing and Consultancy Services

AGRICULTURAL & BIOSYSTEMS AREAS/FACILITIES

- Agricultural and Fishery Mechanization
- Irrigation, Soil & Water Conservation Projects/Facilities
- Post Harvest Facilities/ Agro Processing
- Bio-Energy and Agricultural Waste Utilization & Farm Electrification
- Agricultural Buildings & Structures
- Fisheries and Aquaculture Engineering
HUMAN RESOURCE DEVELOPMENT (HRD) INSTITUTIONS

- Professional Regulatory Board of Agricultural and Biosystems Engineering (PRB-ABE)

  Licensure examination and regulation of the practice of Agricultural and Biosystems Engineers

  With established:
  Philippine Society of Agricultural Engineers
HUMAN RESOURCE DEVELOPMENT (HRD) INSTITUTIONS

- Technical Education and Skills Development Authority (TESDA)
  - Skills Certification of Agricultural and Fishery Machinery Operators and Technicians
  - Development and Promulgation of Training Regulations (TRs)
HUMAN RESOURCE DEVELOPMENT (HRD) INSTITUTIONS

➢ Technical Education and Skills Development Authority (TESDA)
  ✓ Skills Certification of Agricultural and Fishery Machinery Operators and Technicians
  ✓ Development and Promulgation of Training Regulations (TRs)
TESDA TRAINING REGULATIONS (TRs):

Existing/Newly Approved:
- Rice Machinery Operation NC2
- Rubber Processing NC2
- Agricultural Machinery Operation NC2 (Non-Rice)
- Drying and Milling Processing Plant Servicing (NC3)
- Milking Operation NC2

With TR, for TESDA Board Approval:
- Farm Machinery Servicing (Tractor)- NC3
- Irrigation System Installation and Maintenance (NC2)
- Biogas Systems Installation and Maintenance (NC2)
- Hatchery Operation (NC2)

On-going TR Development:
Diploma on ABE- Farm Mechanization (NC5)
1) Exchange of Information/Harmonization of Agricultural Mechanization/ABE Education in Asia and the Pacific

- Conduct of workshops and meetings
- Trainings and scholarships
- Establishing Credit Transfer Scheme among National Qualification Frameworks e.g. ASEAN Qualifications Framework (AQF)
2) **Research Collaboration**

Development and implementation of collaborative RDE projects for funding by international funding institutions with the assistance from CSAM.
3) Facilitating Regional Experts/Services Mobility

- Harmonized ABE Curriculum, competency assessment and accreditation of professionals and agricultural machinery operators and technicians within the region

- Manpower Supply and Demand Study for agricultural mechanization services in the region
AREAS FOR REGIONAL COOPERATION

INPUTS & FEEDBACK
- Industry & Professional Orgs

OUTCOMES
- Mission/Vision
- Program Educational Objectives
- Program Outcomes
- Courses
- Learning Outcomes
- Learning Outcomes

ASSESSMENT EVALUATION
- Institutional Assessment
- Program Assessment
- Course Assessment

IMPROVEMENTS

COURSE PLANNING & DELIVERY
- Syllabus
- Teaching Methods
- Learning Activities
- Assessment Tools

QUALITY ASSURANCE - ACCREDITATION
4) Policy Development

Amendment of the UN Central Product Classification (CPC) Version 2.1. to include agricultural and biosystems engineering and agricultural mechanization services
Thank you very much!