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The 2nd Regional Forum on Sustainable Agricultural Mechanization

Enabling Environment for Custom Hiring of Agricultural Machinery in the Philippines

Rossana Marie C. Amongo, PhD
Director and Program Coordinator
Maria Victoria L. Larona, PhD
University Researcher II
Agricultural Mechanization Development Program Institute of Agricultural Engineering
College of Engineering and Agro-industrial Technology, UP Los Baños

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Outline of Presentation

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Introduction of Agency

Agricultural Mechanization Development Program (AMDP)
Institute of Agricultural Engineering, CEAT, UP Los Baños

- Established by INSAET in 1979 as its research and development and extension program in agricultural mechanization.
- This was also in response with the establishment of the then Regional Network for Agricultural Machinery (RNAM) in 1977 now Center for Sustainable Agricultural Mechanization (CSAM) to address the different agricultural mechanization requirements in the Asia and Pacific Region.

Introduction of Agency

GOALS

AMDP's goal is to help provide and promote sustainable and profitable Philippine farming condition through:

1. Improvement of the production and post- production system of the agro-fisheries sector;
2. Improvement of the local manufacturing system and linkages with foreign counterparts;
3. Development of agro-fisheries business enterprises;
4. Strengthening RD&E capabilities of SCUs;
5. Development of specialized technology packages for agri-aqua mechanization;
6. Increasing adoption of agro-fisheries mechanization technologies;
7. Increasing generation and adoption of renewable and other alternative sources of energy;
8. Improving the support system through appropriate policy recommendations.

Introduction of Agency

Core Competencies

- Conduct of basic research
- Design and development of agricultural machinery
- Testing and evaluation of agricultural machinery
- Conduct mechanization needs assessment and analysis
- Development of mechanization technology package
- Conduct of machinery demonstrations and exhibits
- Development of training manuals, brochures, and other information dissemination materials
- Conduct of training
- Provision of technical assistance and expert services
- Formulation of policies
- Preparation of project proposal and farm mechanization plans

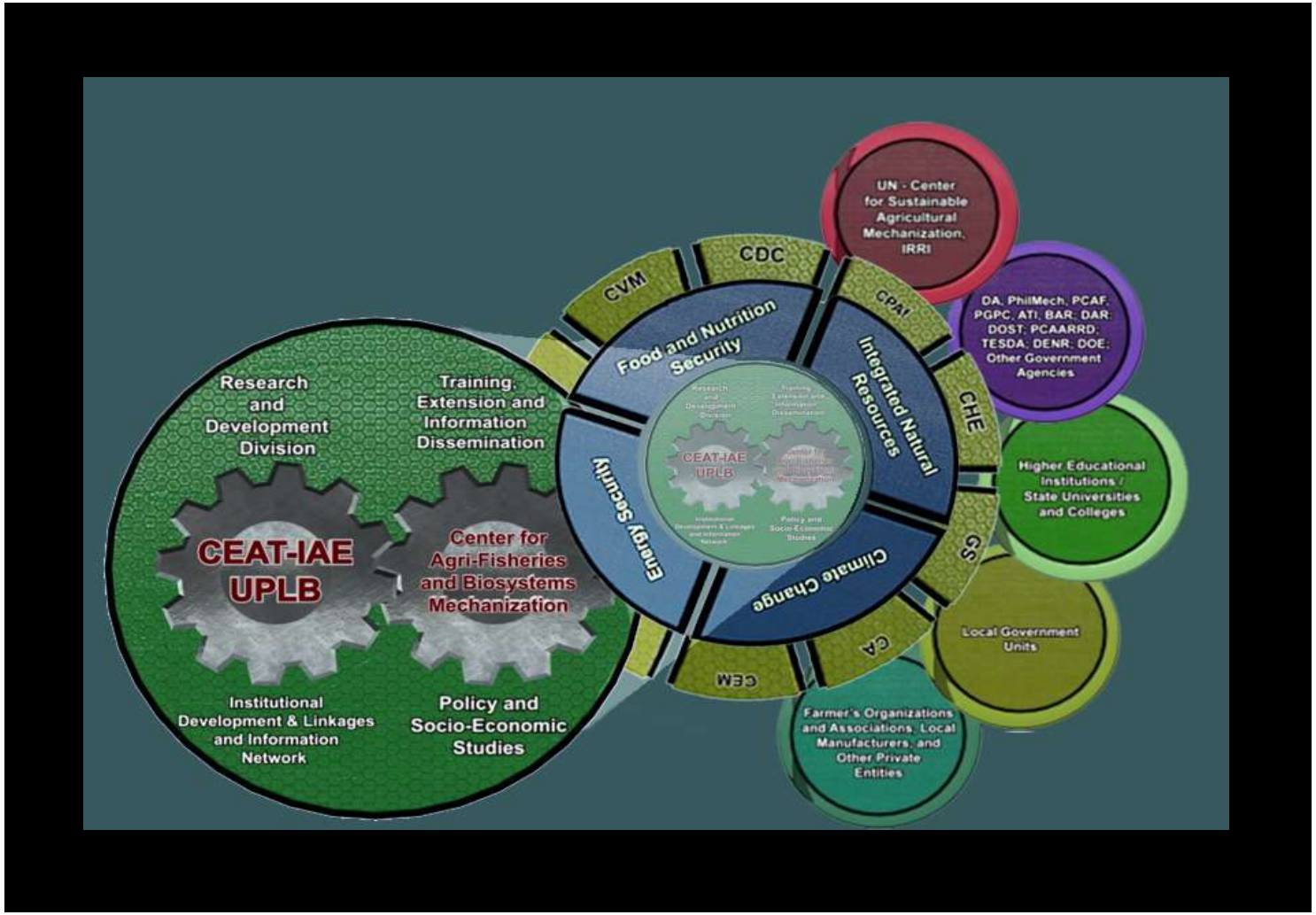
Introduction of Agency

Republic Act No. 10601: "Agricultural and Fisheries Mechanization (AFMech) Law of 2013"

SEC. 8 Agri-fisheries Mechanization RDE Network. – An Agricultural and Fisheries Mechanization RDE Network is hereby organized and composed of research and educational institutions, LGUs, nongovernment organizations' and the recognized and well-established associations of agricultural and fisheries machinery assemblers, manufacturers and distributors, agricultural engineers, farmers and fisherfolk.

Moreover, the Agricultural Mechanization Development Program of the University of the Philippines, Los Baños (UPLB), which is part of the Network, shall be strengthened and institutionalized to lead and coordinate the agricultural and fishery mechanization RDE program of all academic institutions in the country.

Introduction of Agency



Introduction of Agency

VISION

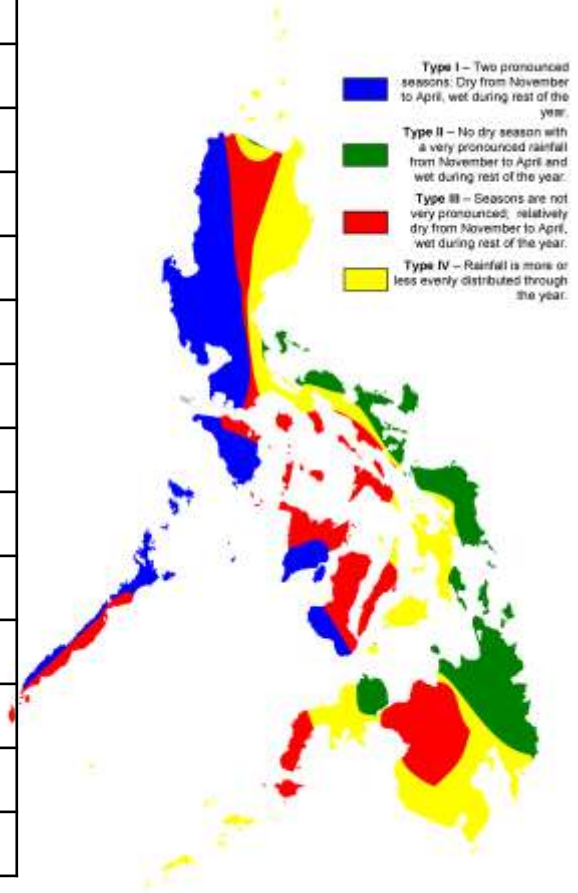
To perform excellence in RDE committed to agri-fisheries and biosystems mechanization in the Philippines responsive to the challenges of food security, energy sustainability, environmental protection, climate change and globalization.

MISSION

To provide innovative agri-fisheries and biosystems mechanization technologies through cutting edge research, strategic extension delivery methods, synergistic networking, and responsive policy advocacies towards environment-friendly, gender sensitive, and sustainable agri-fisheries and biosystems modernization.

General Information on Agriculture and Mechanization

Item	Description	Data
Geographical Location	Latitude : NL	4.7 º N
	: SL	21.5 º N
	Longitude: EL	117 º E
	: WL	127 º E
Meteorological conditions	Temperature	Min. 26.1 º C Max. 28.4 º C
	Annual Precipitation	2000 mm/year
Agricultural Conditions	Total Area	300,000,000 km^2
	Total Land Area	291,170,000 km^2
	Total Water Area	1,830,000 km^2
	Agricultural Land	9,671,000 km^2
	Arable Lands	4,936,000 km^2
	Permanent Cropland	4,225,000 km^2
	Agricultural Farms	4,820,000 farms (2002)



General Information on Agriculture and Mechanization

Item	Description	Data
Agricultural Conditions	Staple foods	RICE: Production: 18.439 MT Farm gate Price: P17.33/kg
		CORN: Production: 7.377 MT Farm gate Price: P11.62/kg
	Other staples	Root Crops and Plantain
	Other major crops	Sugarcane, Coconut
	Top Export crops	Coconut Oil, Banana, Mango
Population and Employment	Total Population	100.00 million
	Agricultural Sector	86% of total population
	Total Employment	38.12 million
	Agricultural Labor	11.84 million
	Wage Rates	P 200-255 for corn & rice
Social Conditions	Official Language	English & Filipino
	National Language	Filipino
	Religion	Christians / Muslims
Economy (2013)	GNI at current prices	P 13,851 Billion
	GDP at current prices	P 11,584 Billion (10% in agriculture with 7.18% growth)
	GVA at current prices (agriculture and fishing)	P1,293 Billion

General Information on Agriculture and Mechanization

Agricultural Mechanization as defined by RA 10601 Sec 3b…

Agricultural and fisheries mechanization refers to the development, adoption, assembly, manufacture and application of appropriate, location specific and cost-effective agricultural and fisheries machinery using human, animal, mechanical, electrical, renewable and other nonconventional sources of energy for agricultural production and postharvest/postproduction operations consistent with agronomic conditions and for efficient and economic farm and fishery management towards modernization of agriculture and fisheries;

General Information on Agriculture and Mechanization

Level of mechanization by percent utilization using man, man-animal and man-machine systems in rice production/post production operations in selected regions in the Philippines.

FARM OPERATION	LEVEL OF MECHANIZATION (% UTILIZATION OF FARMER)			
	MANUAL OPERATED			
	Camarines Sur (Region V)	Iloilo (Region VI)	Leyte (Region VIII)	Oriental Mindoro (Region IV)
Dike Repair	93.75	78.95	88.04	86.32
Planting	100.00	100.00	98.91	98.95
Fertilizer application	100.00	100.00	97.83	100.00
Insecticide application	91.67	74.74	91.30	78.95
Herbicide application	85.42	95.79	35.87*	96.84
Harvesting	100.00	98.95	100.00	89.47
Drying	63.64	53.68	78.26	44.21*

General Information on Agriculture and Mechanization

Level of mechanization by percent utilization using man, man-animal and man-machine systems in rice production/post production operations in selected regions in the Philippines.

FARM OPERATION	LEVEL OF MECHANIZATION (% UTILIZATION OF FARMER)			
	ANIMAL-POWERED			
	Camarines Sur (Region V)	Iloilo (Region VI)	Leyte (Region VIII)	Oriental Mindoro (Region IV)
Plowing	15.63*	12.63*	59.78	6.32*
Leveling	61.46	49.47*	88.04	55.79
	MAN-MACHINE-POWERED			
Plowing	73.96	72.63	29.35*	61.05
Harrowing	67.71	80.00	84.78	55.79
Threshing/Bagging	86.46	92.63	92.39	89.47
Milling	56.25	32.63*	79.35	No data

Note: Level of mechanization (% utilization per operation = (Number of respondents per type of power source) / Total No. of Respondents per province *100%

*- means % utilization of the available power is not predominant

Source of basic data: Amongo *et al*. (2013) – UPLB-PHilMech Project

General Information on Agriculture and Mechanization

Machines utilized in rice production/post production operations in selected regions in the Philippines.

EQUIPMENT/MACHINE	Camarines Sur (Region V)	Iloilo (Region VI)	Leyte (Region VIII)	Oriental Mindoro (Region IV)
	%	%	%	%
Hand tractor	91.67	88.54	97.89	86.32
Floating tractor	16.67	11.46	1.05	33.68
Four wheel tractor	-	1.04	-	4.21
Pump set	21.88	18.75	10.53	38.95
Combine harvester	-	-	-	11.58
Thresher	88.54	87.50	87.37	82.11
Dryer	2.08	8.33	3.16	5.26
Rice Mill	55.21	34.38	77.89	18.95

Status of Custom Hiring

Percentage of farmers availing custom hiring services in rice production/post production operations in selected regions in the Philippines.

(Source of basic data: Amongo *et al*. (2013) – UPLB-PHilMech Project)

	Camarines Sur Region V		Iloilo Region VI		Leyte Region VIII		Oriental Mindoro Region IV	
	Machine	Animal	Machine	Animal	Machine	Animal	Machine	Animal
Operation	%	%	%	%	%	%	%	%
Seedling Preparation	15.63	7.29	1.04	2.08	37.89	38.95	16.84	5.26
Irrigation	5.21		2.08		4.21		4.21	0.00
Plowing	35.42	13.54	30.21	18.75	20.00	52.63	26.32	7.37
Harrowing	30.21	19.79	32.29	3.13	60.00	17.89	23.16	12.63
Leveling	6.25	46.88	9.38	36.46	2.11	66.32	6.32	26.32
Weeding							22.11	
Harvesting					1.05		41.05	
Threshing/Bagging	53.13		55.21		72.63		41.05	
Hauling Farm to Road	1.04	2.08	1.04	2.08	3.16		2.11	17.89
Hauling Road to Storage	4.17	1.04	6.25	1.04	22.11	1.05	7.37	
Drying	2.08		8.33		4.21		1.05	
Transportation	5.21		1.04		24.21		0.00	
Milling	52.08		31.25		73.68		18.95	

Status of Custom Hiring

Percentage of farmers availing custom hiring services in corn production/post production operations in selected regions in the Philippines.

(Source of basic data: Amongo *et al*. (2013) – UPLB-PHilMech Project)

	Camarines Sur Region V		Iloilo Region VI		Leyte Region VIII	
	Machine	Animal	Machine	Animal	Machine	Animal
Operation	%	%	%	%	%	%
First Plowing	9.38	50.00	3.13	13.54		
First Harrowing	7.29	50.00	2.08	7.29	1.05	
Furrowing		66.67		43.75		
Cultivation - Hilling Up		34.38		6.25		25.26
Cultivation - Off Barring		4.17		3.13		1.05
Dehusking	3.13					
Hauling - Field to		20.83	8.33	19.79		
Hauling - Road to	3.13	8.33	11.46	4.17	5.26	
Hauling - Road to	3.13	8.33	11.46	4.17	5.26	
Shelling	73.96		67.71		2.11	
Drying - Before Shelling	0.00		1.04		1.05	
Drying - After Shelling	10.42		4.17		2.11	
Transportation	2.08		50.00	4.17	63.16	
Milling			1.04		75.79	

Supporting Policies on Custom Hiring

Agricultural and Fisheries Modernization (AFMA) Law of 1997 – Republic Act 8435

AFMA law of 1997 also supports the modernization of the agricultural sector of the country. Among others, the following objectives promote the establishment o machinery pooling or agricultural mechanization custom services:

- To modernize the agricultural and fishery sectors by transforming these sectors from a resource-based to a technology-based industry;
- To enhance profits and incomes in the agricultural and fishery sectors, particularly of the small farmers and fisherfolk by ensuring equitable access to assets, resources and services, and promoting higher-value crops, value-added processing, agribusiness activities, and agro-industrialization

Supporting Policies on Custom Hiring

Agricultural and Fisheries Mechanization Law (AFMech Law) – Republic Act 1060 of 2013

Section 9 RA 10601 and IRR Rule 9.1 to 9.3,

The government supports the establishment of **Agri-fisheries Machinery and Equipment Service Centers** (AFMESC) in strategic areas and Agrarian Reform Communities (ARCs).

The centers are envisioned to be operated and managed by Securities and Exchange Commission (SEC) registered cooperatives or businesses.

Supporting Policies on Custom Hiring

AFMech Law – Republic Act 1060 of 2013

AFMESC) shall be operated as business enterprises that will provide the following services:

- After-sales service and warranty for their respective clients;
- Custom plowing, harrowing, harvesting, drying, milling and other farm mechanization services;
- Repair and troubleshooting services of agricultural and fishery machinery and equipment; and
- Training in maintenance and proper use of agricultural machineries and equipment.

Framework for custom hiring

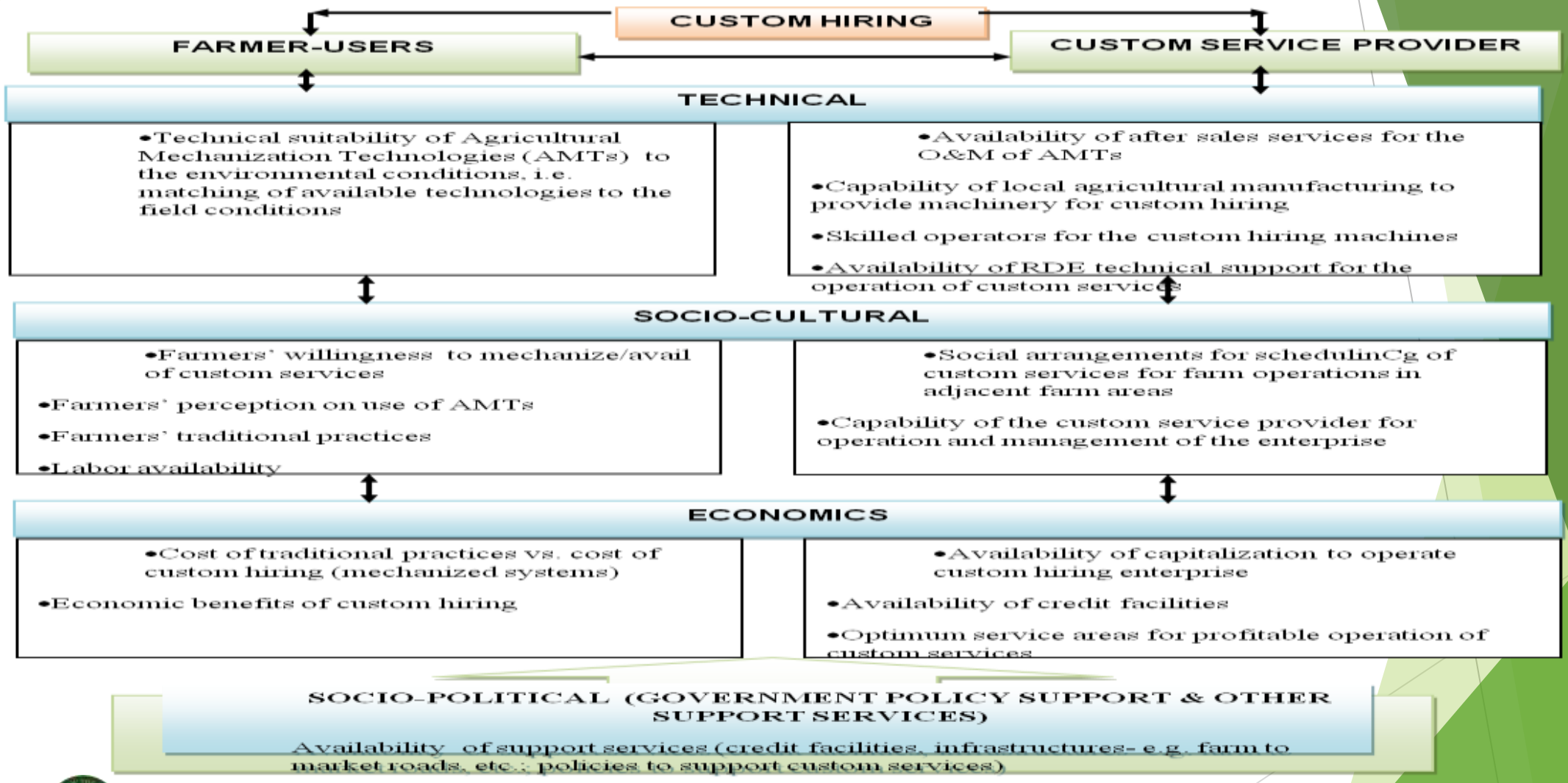


Figure 2 . Framework enabling environment for custom hiring of agriculture and mechanization

Social and Economic Benefits

Farmers as beneficiaries of custom services

Technical suitability of agricultural machines

Location specificity of AMTs

Farm size

Small farm holdings → *Farm Clustering/ Contiguous Farming* → *Large AMTs*

Large AMTs → Custom Hiring Services

Farmers' traditional practices

Social preparation

Social and Economic Benefits

Farmers' preferences on use of agricultural machines

Rice farm operations which farmers preferred to mechanize

PROVINCE	RICE FARM OPERATIONS
Camarines Sur	Harvesting, planting, drying, weeding, and fertilizer application
Iloilo	Harvesting, planting, drying, weeding, fertilizer application
Leyte	Drying, harvesting, plowing, threshing, weeding
Oriental Mindoro	Harvesting, harrowing, plowing, threshing, and leveling

Source: Amongo, *et al.* (2013)

Corn farm operations which farmers preferred to mechanize

PROVINCE	RICE FARM OPERATIONS
Camarines Sur	Plowing, harrowing, harvesting, cultivation, and furrowing
Iloilo	Drying, harvesting, dehusking, planting, and fertilizer application
Leyte	Plowing, shelling, planting, harrowing, and harvesting

Source: Amongo, et al. (2013)

Social and Economic Benefits

Cost of mechanized system vs. traditional practices

Major reasons of corn farmers for joining clustering and custom services facilities in Cauayan City, Isabela, Philippines:

- reduction in production cost
- improved production performance
- availability of support services from the government
- increase farm operation efficiency.

Net income for a fully mechanized system = PhP 22,210/ha
Net income for traditional system = PhP13,045/ha

Source: Larona (2006)

Social and Economic Benefits

Economic benefits of custom services

ITEMS	TRADITIONAL PRACTICES	FULLY MECHANIZED SYSTEM
A. Labor costs	13,530.00	9,700.00
B. Material (inputs) Cost	13,925	14,090
C. Total Cost of Production/ha	27,455	23,790
D. Yield (metric tons)	5.0	5.0
E. Price/kg (PhP/kg)	8.10	8.10
F. Gross income (PhP/cropping season)	40,500	48,600
G. Net income (PhP/cropping season)	13,045	22,210
H. R.O.I. (%)	47.51	93.36
I. Income advantage (%)		70.26

(VLMPC, Cauayan City data as cited by Larona (2006)

Social and Economic Benefits

Custom Service Provider

Technical suitability of agricultural machines

Location specificity of AMTs

Locally fabricated AMTs vs. Imported AMTs

Availability of after sales services

Training on ORM

Availability of spare parts

Local manufacturing

354 small to medium scale manufacturers

Social arrangements for scheduling of custom services

Synchronize farming

Operation and management of custom services

Machinery pooling vs. Custom Services

Social and Economic Benefits

Government Support & Other Support Services

Policy Support system

RA 10601- AFMECH LAW 2013

- Development of business plans/ feasibility study
- Conduct of rapid rural appraisals/assessment
- Training of skilled operators for agricultural machines
- Implementation of large scale farming where land consolidation concepts can be modeled along side with custom services
- Provision for credit facilities and loan windows
- Regulations on the implementation of custom hiring services
- Machinery Testing and quality assurance for custom hiring providers

Institutional Infrastructure Support System

- Establishment of AFMESC
- Farm to Market Roads
- RDE support system

Challenges and Constraints

Machinery requirement applicable to the service area

-Master Plan for Custom Services
-Matching of technologies in Service Areas to avoid surplus of technology

Payment scheme

-Guidelines should be established and penalties of non-payment of services should be strictly implemented

- -- Cash Basis
- -- Loan Credit
- -- Crop yield after harvest (percent of yield)

Challenges and Constraints

Other problems encountered

Common problems in rural farming communities which affect the utilization of agricultural mechanization technologies: (Lantin , 2001)

- small land holding and fragmented parcels of land (different sizes, shapes, and orientation of fields)
- lack of water control and efficient irrigation and drainage system at the field level;
- lack of field access for transport;
- drying and milling facilities not located in the production areas; and
- application of agricultural engineering and mechanization technologies has not been given parallel attention as the biological technologies.

Challenges and Constraints

Other problems encountered

Common Problems in implementing Custom Hiring Services
(Andales, et al, 2013)

- schedule of irrigation water releases,
- machine inefficiencies and delays in custom services,
- ineffective and inefficient collection of service payments, resulting in about 30% collectibles due to machinery failure/trouble on field operations; and
- reduced service area of operation due to changes in priorities resulting from changes in policies

Conclusion and Recommendations

Success implementation of AMTs Custom Services depends on the interrelated and interconnected factors

- Technical
- Socio-cultural
- Socio-economics
- Socio-political

Stakeholders of the custom hiring services

- Farmers-clients,
- Custom Service Provider
- RDE institutions,
- Manufacturing industry (agricultural machinery dealers/manufacturers)
- Private sector
- Non-government organizations/Peoples organizations
- Government support services

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For Inquiries:

DR. ROSSANA MARIE C. AMONGO
DIRECTOR
Institute of Agricultural Engineering
College of Engineering and Agro-Industrial Technology
UP Los Baños
rcamongo@up.edu.ph
rmc_amongo@yahoo.com