Promoting Sustainable Agricultural Mechanization Strategies in the Philippines

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UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

CSAM

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Presentation Outline:

I. Introduction

II. Level of Agricultural Mechanization

III. National Agricultural Mechanization Policies and Initiatives

IV. Results from implementation of the various laws related to agricultural mechanization

V. Lessons Learned and Good Practices

VI. Suggestions for Regional Cooperation amongst Countries

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Country Background

ITEM	DESCRIPTION	DATA
Geographical Location	Latitude :	NL: 4.7 ° N SL: 21.5 ° N
	Longitude:	EL : 117 ° E WL:127 ° E
Meteorological conditions	Temperature	Min. 26.1 ° C Max. 28.4 ° C
	Annual Precipitation	2000 mm/year
Agricultural Conditions	Total Area	300,000,000 km^2
	Total Land Area	298,170,000 km^2
	Total Water Area	1,830,000 km^2
	Agricultural Land (2015)	10,187,678km^2
	Temporary Crops	3,444,000 km^2
	Permanent Cropland	3,329,000 km^2
	Agricultural Farms (2002) All farm holdings (2015)	4,820,000 farms 7,190,000 km^2

UNITED NATIONS ESCAP Economic and Social Commission for Asia and the Pacific CSAM

Country Background

ITEM	DESCRIPTION	DATA
Agricultural Conditions	Staple foods	RICE: (2015) Area Harvested: 4.660 million ha Production: 18.150 MMT Farm gate Price: P18.04kg
		CORN: (2015) Area Harvested:2.560 million ha Production: 7.520 MMT Farm gate Price: P12.01/kg
	Other staples	Root Crops and Plantain
	Other major crops	Sugarcane, Coconut
	Top Export crops	Coconut Oil (23%), Banana (13%), Tuna (7%) Pineapple & Products (11%)

UNITED NATIONS ESCAP Economic and Social Commission for Asia and the Pacific CSAM

Country Background

ITEM	DESCRIPTION	DATA
Population and Employment	Total Population	103.500 million
	Total Employment	38.74 million
	Employment in Agriculture (2017)	11.29million (29 % share) Male: 8.39 million Female: 2.90 million
	Ave Wage Rates (2017) Agricultural sector	P267.47
Economy (2015)	GNI at current prices	P 16,115 Billion
	GDP at current prices	P 13,322 Billion (9% share from agriculture)
	GVA at current prices (agriculture and fishing)	P1,364 Billion

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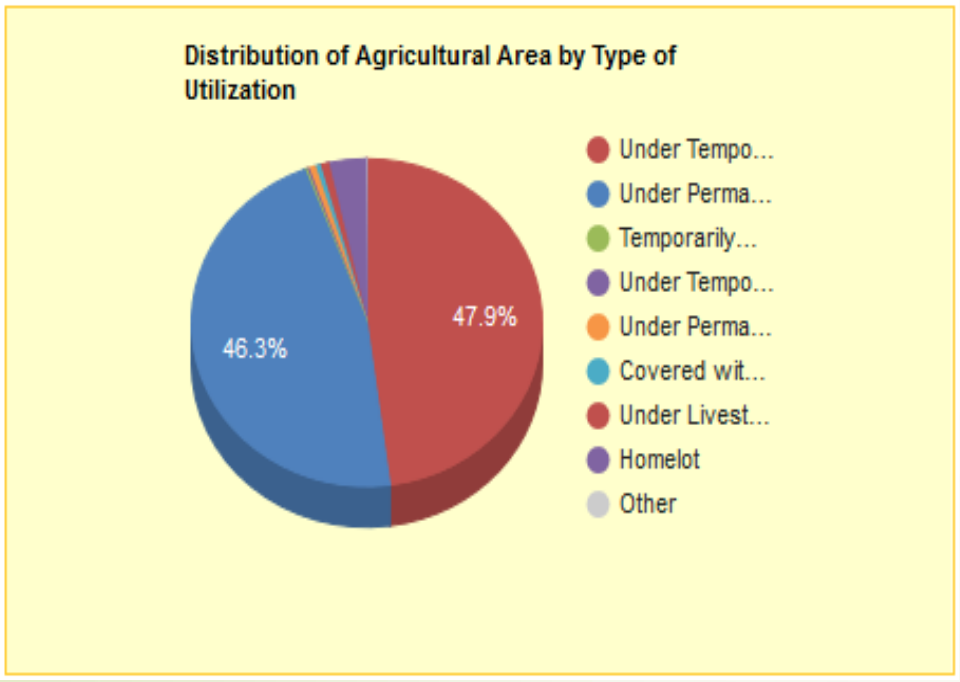
Country Background



Location:	Southeastern Asia, archipelago between the Philippine Sea and the West Philippine Sea, east of Vietnam
Area:	total: 300,000 square kilometers
	land: 298,170 square kilometers
	water: 1,830 square kilometers
All Farms/Holdings:	7.190 million hectares
Under Temporary Crops:	3.444 million hectares
Under Permanent Crops:	3.329 million hectares
Temporarily Fallow:	0.014 million hectares
Under Temporary Meadows and Pastures:	0.014 million hectares
Under Permanent Meadows and Pastures:	0.044 million hectares
Covered with Wood and Forest:	0.033 million hectares
Under Livestock and Poultry Raising:	0.057 million hectares
Under Aquaculture:	0.002 million hectares
Other Main Use of Farm/Holding Parcels:	0.005 million hectares
Homelot:	0.248 million hectares

Figure 1. Land distribution of agricultural area and type of utilization, Philippines
Source: (Country Stats, Philippines accessed November, 2017)

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Agricultural and Fisheries Mechanization

RA 10601 otherwise known as the Agricultural and Fisheries Mechanization Act of 2013 defines:

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.

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Agri-fisheries Mechanization Technologies (AFMTs) as propellers to sustainable agriculture

The use of agricultural and fisheries mechanization technologies (AFMTs) is necessary to sustain agricultural and fishery production systems in view of the changing environment, advancement of technologies and way of life to produce food, feed, fiber and energy sustainably and to meet the requirements of the ever-growing population.

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CSAM

In support to UN Sustainable Development Goals in 2015

Philippines recognizes the important role of agricultural mechanization to address the interconnected goals on sustainable agriculture and empowering the small farmers to increase productivity.

Hence, the acceleration of the diffusion and utilization of AFMTs are being purposively implemented in the Philippines.

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In support to UN Sustainable Development Goals in 2015

AFMTs

- should not only be technically-sound but should be well accepted and utilized by the different stakeholders in the food chain to achieved sustainable production.

AFMTs

- diffusion and utilization should be given focus if we want to outrace the demand of the ever growing population
- sound and SAMS should be in place.

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Philippine Agricultural Mechanization Sector Goal

Inclusive Growth

Food , Feed, Fiber Self Sufficiency

Integrating Sustainable Agricultural Mechanization Strategy (SAMS)

Sustainable Agricultural Productivity

AFMTs

HRD

EEnvi

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Level of Agricultural Mechanization

One of the bases for the acceleration of the diffusion and utilization of AFMTs is the level of agricultural mechanization which is being represented by the Agricultural Mechanization Index (AMI).

an indicative measure of the level of mechanization and has been the basis for agricultural mechanization interventions for the development of the agricultural sector.

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Methods in determining AMI

METHODOLOGY	DESCRIPTION	EQUATION
Horsepower per hectare	Sum of the contribution of each of the major sources of power multiplied by its assumed hp contribution divided by the total available area	$\frac{\text{Horsepower}}{\text{Hectare}}$
Percent Technology Utilization (Amongo et al. 2013)	Level of mechanization by type of technology (manual, man-animal power, man-machine power, combination of types of technology), by type of farm operation	$= \frac{Number\ of\ farmers\ using\ (type\ of) technology}{Total\ no. of\ farms\ responding}\ x\ 100$
Percent Area Covered by Technology (Amongo et al. 2013)	Level of mechanization by type of technology (manual, man-animal power, man-machine power, combination of types of technology), by type of farm operation	$= \frac{Area\ serviced\ by\ (type\ of) technology}{Total\ area\ of\ farms\ surveyed}\ x\ 100$

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Level of Agricultural Mechanization

METHODOLOGY	DESCRIPTION	EQUATION
Qualitative AMI Three major levels (UPLB-BAR, 2001)	Low mechanization means that an operation is done with the use of non-mechanical power source such as man and animal. Intermediate mechanization refers to operations done with the use of non-mechanical power source in combination with the use of a mechanical power source operated by man. High mechanization involves operations done solely with the use of mechanical power source operated by man.	
Number of tractors per hectare	Number of tractors utilized in a given unit area	$\frac{\text{No. of Tractors}}{\text{100 Hectares}}$
Energetics (Chamsing, 2007)	Energy inputs: human labor, machinery, animal, seeds, irrigation, fuel, fertilizers and pesticides Direct input (energy from human labor, animal power, fuel and electricity for priming agricultural machinery) Indirect input (seeds, fertilizers and pesticides) Energy outputs: rice yield and husk	$\frac{\text{Energy Output}}{\text{Energy Input}}$

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Level of Agricultural Mechanization

YEAR	AMI (hp/ha)	CONSIDERATIONS	SOURCE
1968	0.198	Rice-based farming system	RNAM (1994) as cited by PCAARRD, 2007. Mechanization Status. Agricultural Machinery Information Network.
1980s	0.360	Rice-based farming system	as cited by S.C. Capareda.1994. Issues and Trends in Farm Power and Machinery. Philippine Agricultural Mechanization Bulletin. Vol. II No.3. AMDP, CEAT, UP Los Baños.
1990	0.520	Rice-based farming system	RNAM, 1990. Technical Report. Economic and Social Commission for the Asia and the Pacific. Regional Network for Agricultural Machinery (ESCAP-RNAM).
1998	1.680	Rice and Corn based farming system utilizing human, animal and mechanical	Rodulfo, V.A. Jr., R.M.C. Amongo and M.V.L. Larona. 1998. Status of Philippine Agricultural Mechanization and Its Implications to Global Competitiveness. Philippine Agricultural Mechanization Bulletin. Vol. V No.1. AMDP, CEAT, UP Los Baños.
2010	1.500	Rice-based farming system utilizing single cylinder engines	Panagsagan, J.R. 2011. 2006-2010 Engine Sales Statistics Relevant to Determining the Level of Mechanization. Paper presented during the Harmonization Workshop on the Level of the Philippine Agricultural Mechanization. (presented by AMMDA)
2013	2.310 1.230	Rice- based farming system For all crops	R.SM. Dela Cruz, S.B. Bobier. 2013. Farm Power Available for Utilization in Philippine Agriculture. Unpublished Report. PHilMech (paper submitted for publication)
2017 ($MAMI_{rice}$)	**3.029**	Mindoro Oriental Rice- based farming system Man-Machine system	Amongo RMC, M.V.L. Larona, M.K.S. Onal, CIL Ilao, GNL Lalap, LE Oguis & PB Melendez. 2017. Operational Procedure & Policy for the Standardized Agricultural Mechanization Index in the Philippines. Terminal Report. UPLB-BIOMECH-PCAF-DA project.
	1.602	Laguna Rice- based farming system Man-Machine system	Deniega, CGV, RCAmongo, MKSOnal, ALFajardo. 2017. Validation of the Modified Agricultural Mechanization Index (MAMIrice) Equation on Lowland Rice Producing Areas in Laguna, Philippines. Unpublished undergraduate Thesis. AMD, IAE, CEAT UP Los Banos

National Policies and Initiatives

RA 8435. Agricultural and Fisheries Modernization Act (AFMA) of 1997

An act prescribing urgent related measures to modernize the agriculture and fisheries sectors of the country in order to enhance their profitability, and prepare said sectors for the challenges of globalization through an adequate, focused and rational delivery of necessary support services, appropriating funds therefore and for other purposes.

National Policies and Initiatives

RA 8435. Agricultural and Fisheries Modernization Act (AFMA) of 1997

AFMA advocates for the development and sustainability of the agri-fisheries sectors in accordance with the principles of:

a) poverty alleviation and social equity;
b) food security;
c) rational use of resources;
d) global competitiveness;
e) sustainable development;
f) people empowerment; and
g) protection from unfair competition.

It generally aims to accelerate industrialization through agricultural development that make efficient use of human and natural resources.

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National Policies and Initiatives

RA 8435. Agricultural and Fisheries Modernization Act (AFMA) of 1997

Major support services to modernize the agri-fisheries sectors, particularly on:

(1) Production and Marketing Support Services;
(b) Credit;
(c) Irrigation;
(d) Information and Marketing Support Services;
(e) Other infrastructures including public and private such as fish ports, sea ports and airports, farm to market roads, common infrastructures, water supply system, research and technology infrastructures, research and technology facilities, public markets, abattoirs, and agricultural machinery.

for the attainment of food security, environmental protection, and balanced urban and rural development.

National Policies and Initiatives

RA 8435. Agricultural and Fisheries Modernization Act (AFMA) of 1997

The AFMA Implementation Experience. A good law but it had ambitious goals that tried to do many things involving many agencies with lack of resources for implementation. The study also noted that AFMA suffered many flaws as described below:

National Policies and Initiatives

RA 8435. Agricultural and Fisheries Modernization Act (AFMA) of 1997

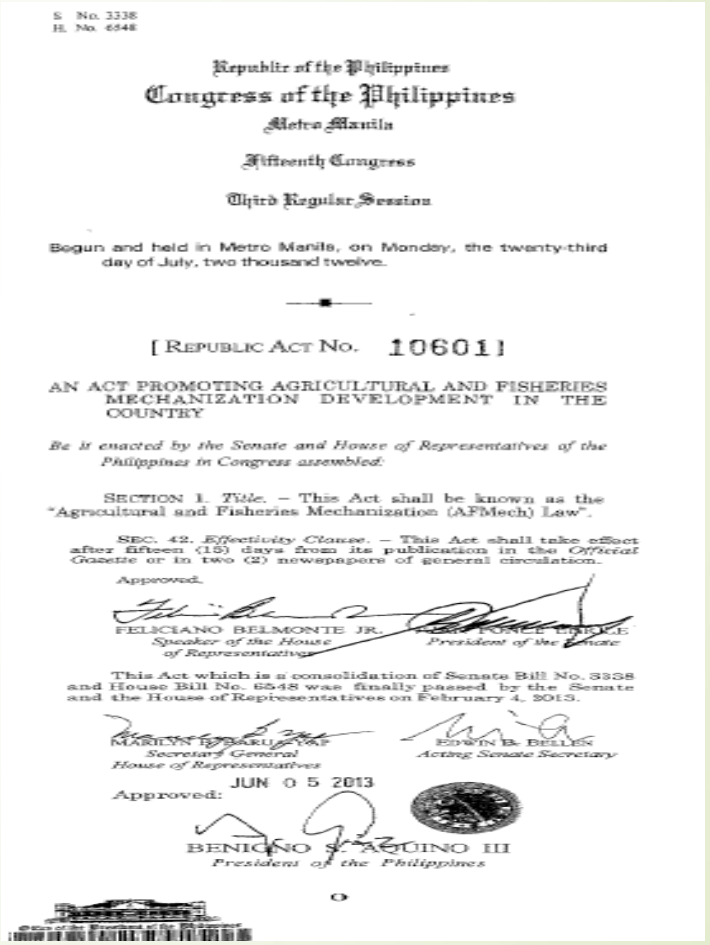
(Catipay, A. Business World, June 20, 2008 http://www.gmanetwork.com/news/news/nation/102244/ agriculture-fisheries-law-does-too-much-for-too-little-study/story/:)

- *The budget allocation by components, in percentage terms, was not followed.*
- *There was bias for production-support, to the detriment of marketing, research and development, human resources development and interagency linkages.*
- *There was little concern for regional priorities.*
- *The need for sound criteria for project selection was not explicit.*
- *The role of private investments in growth and job creation was not clear.*
- *Program benefiting monitoring and evaluation was severely inadequate which, in part, hindered the ability of the review team to conduct deeper analyses.*

National Policies and Initiatives

R.A. No. 10601

"Agricultural and Fisheries Mechanization Law of 2013"



S. No. 3338
H. No. 6548

Republic of the Philippines
Congress of the Philippines
Metro Manila

Fifteenth Congress

Third Regular Session

Begun and held in Metro Manila, on Monday, the twenty-third day of July, two thousand twelve.

[REPUBLIC ACT No. 10601]

AN ACT PROMOTING AGRICULTURAL AND FISHERIES MECHANIZATION DEVELOPMENT IN THE COUNTRY

Be it enacted by the Senate and House of Representatives of the Philippines in Congress assembled:

SECTION 1. *Title.* – This Act shall be known as the "Agricultural and Fisheries Mechanization (AFMech) Law".

SEC. 42. *Effectivity Clause.* – This Act shall take effect after fifteen (15) days from its publication in the *Official Gazette* or in two (2) newspapers of general circulation.

Approved,

FELICIANO BELMONTE JR.
Speaker of the House of Representatives

President of the Senate

This Act which is a consolidation of Senate Bill No. 3338 and House Bill No. 6548 was finally passed by the Senate and the House of Representatives on February 4, 2013.

Secretary General
House of Representatives

EDWIN B. BELLO
Acting Senate Secretary

Approved: JUN 0 5 2013

BENIGNO S. AQUINO III
President of the Philippines

o

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CSAM

National Policies and Initiatives

RA 10601: Agricultural and Fisheries Mechanization Act of 2013

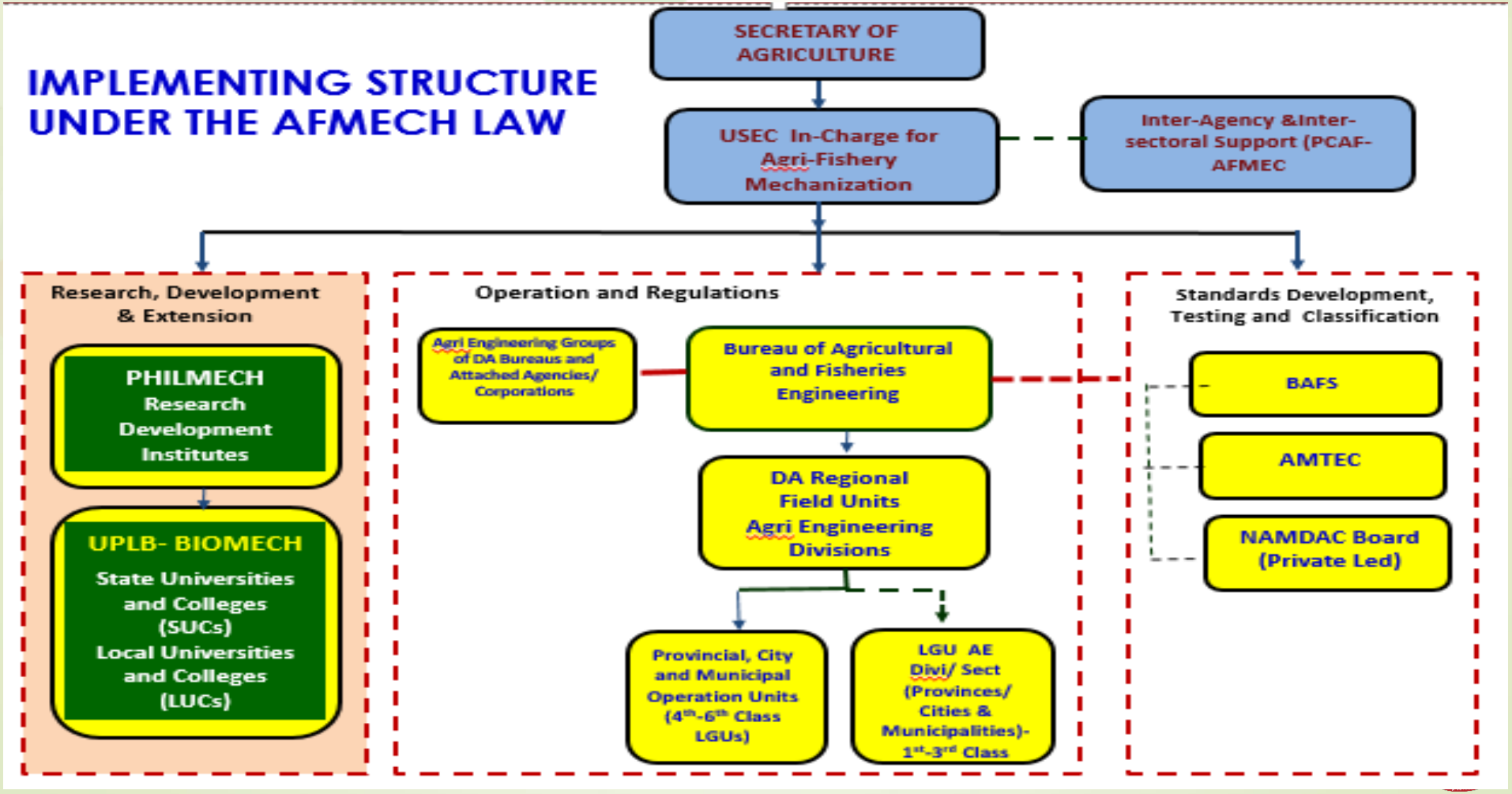
An act promoting agricultural and fisheries mechanization development in the Philippines.

AFMech Law recognizes the significant role and contribution of **agricultural mechanization in agricultural development.**

Provides **comprehensive legal framework** for the distribution, supply, assembling, manufacturing, research, development and extension, promotion, regulation, use, operation, maintenance and project implementation of agricultural and fisheries machinery and equipment in the country (NAFMP-DA, 2017).

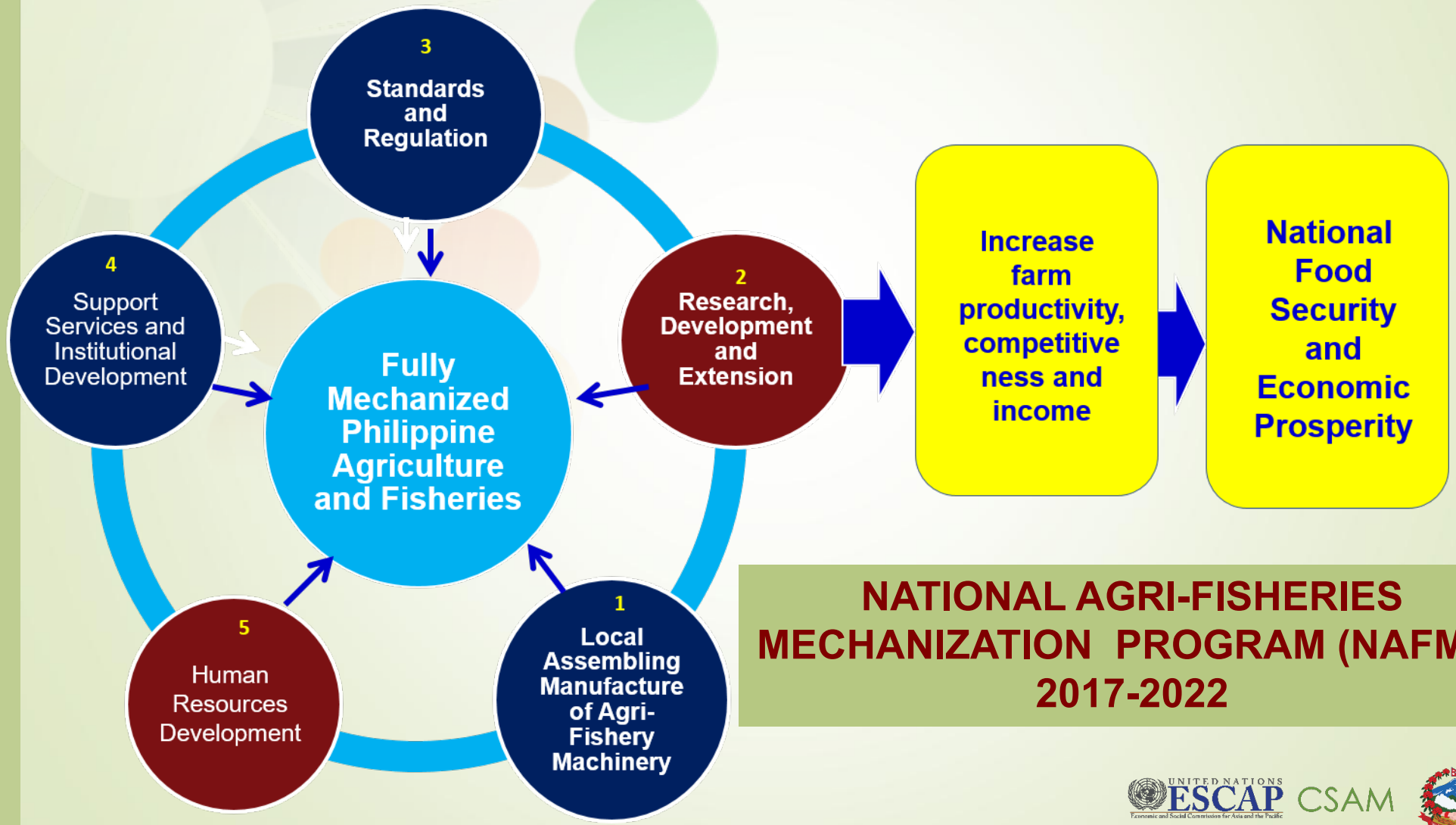
National Policies and Initiatives

RA 10601: AFMech Law of 2013



National Policies and Initiatives

RA 10601: AFMech Law of 2013



NATIONAL AGRI-FISHERIES MECHANIZATION PROGRAM (NAFMP) 2017-2022

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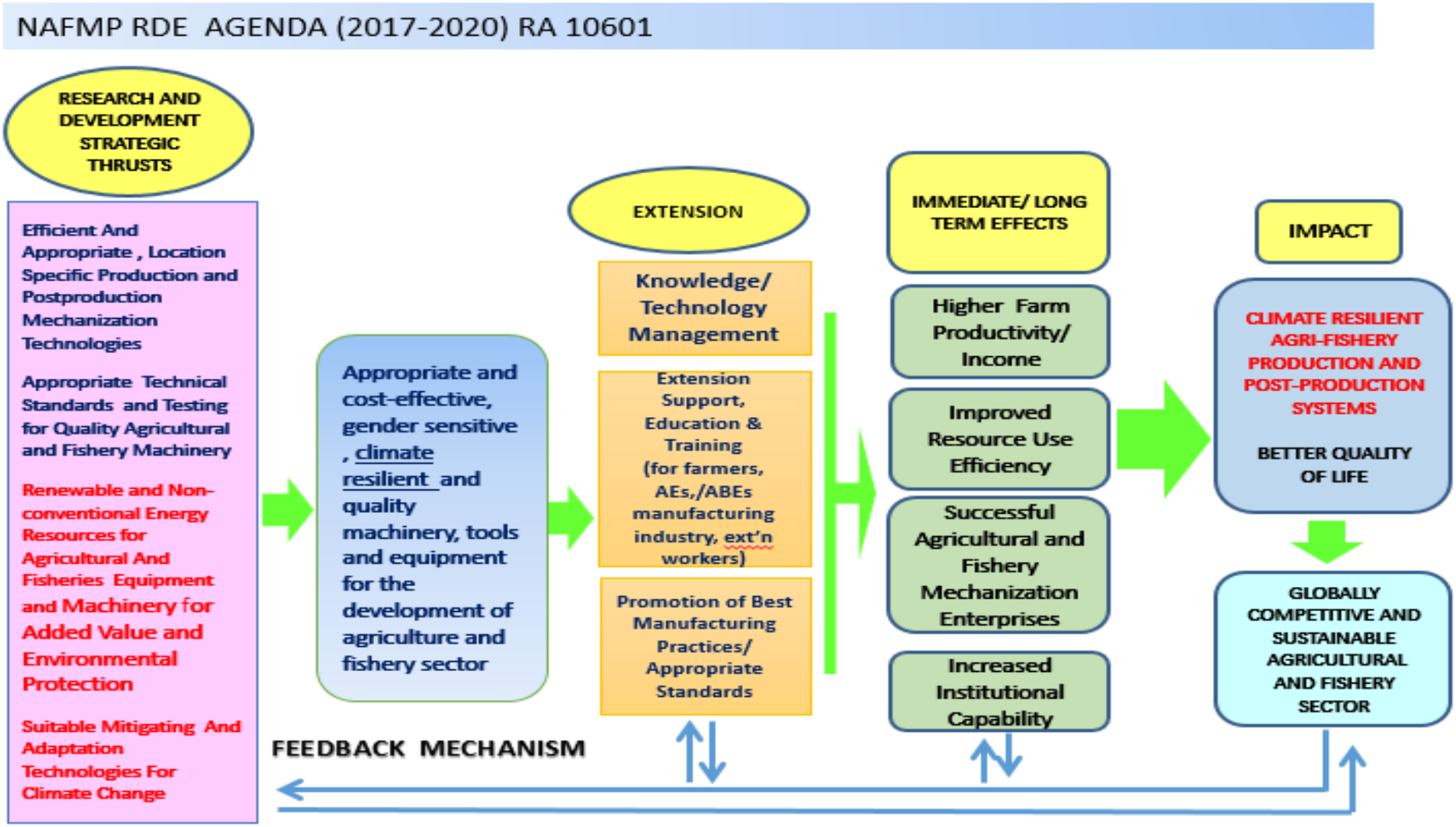
National Policies and Initiatives

RA 10601: AFMech Law of 2013



National Policies and Initiatives

- ***Some of the key developments of the AFMech Law of 2013***

- **Approval and endorsement of the Secretary of the Department of Agriculture of the National Agriculture and Fisheries Mechanization Program for 2017-2022**

- **Organization of the National Agriculture and Fisheries Mechanization Research, Development and Extension Network (AFMechRDEN) of the R&D Institutions (RDIs) and Higher Education Institutions (HEIs)**. The membership of the network include concerned stakeholders, including RDIs, HEIs, LGUs, Regional Field Units.

- The **AFMechRDEN** has established and operationalized the **AFMechRDE database information system** for the RDIs and HEIs.

- Development and operationalization of the **Agricultural and Fisheries Engineering Resource Network (AFMechERN)** - The network shall be used for the online registration of agricultural and fisheries machinery and equipment for monitoring agri-fisheries mechanization and insfrastructure projects.

- **Strengthening of the Philippine National Standards for Agriculture Mechanization Technologies through the creation of the Bureau of Agriculture and Fishery Standards (BAFS).** – Since the implementation of the AFMech Law, several national standards on agricultural machines had been approved.

- **Accreditation of ABE engineers as machinery test engineers** in the country side.

UNITED NATIONS ESCAP CSAM

National Policies and Initiatives

Some of the key developments of the AFMech Law

- Development of **Training Regulations** for the operation of agricultural machinery by the Technical Education and Skills Development Authority (TESDA) –

Out of 7 new TRs, 3 had been promulgated for implementation. These are: (1) Agricultural Machinery Operation (Non-rice) –National Certificate (NC) 3; (2) Drying amd Milling Plant Servicing – NC2; (3) Milking Operation – NC2.

- **Agricultural Training Institute**, extension and training arm of DA, has allotted budget for the conduct training nationwide.

- The **TESDA has already accredited HEIs** offering BS ABE program which can serve as Rice Machinery Operation Assessment Center and RMO Training Center. It has also sponsored scholarships for the Training Methodology 1 for Rice Machinery Operation.

National Policies and Initiatives

Some of the key developments of the AFMech Law

➨**Completion of Policy Study in Support to the Local Assembly and Manufacturing of Single Cylinder Engine for the Philippine Agri-Fisheries Sector** - The general objective of the project is to create the enabling technical, operational and investment environments that will attract local investor and foreign partner to a joint venture agreement for the local assembly of small agricultural engine (June 2016-June 2017).

➨**Completion of the Policy study on Operational Procedure & Policy for the Standardized Agricultural Mechanization Index in the Philippines** - The general objective of the project was to formulate a national policy to indicate the agricultural mechanization index for rice crop production and postproduction systems in the Philippines (March 2016 – May 2017).

The government will adapt the procedure/methodology for the computation and updating of the agricultural mechanization index through the regional field units. A manual will be published as a guide for measuring the level of mechanization.

National Policies and Initiatives

Some of the key developments of the AFMech Law

- **Conduct of an evaluative study on Intensive Use of Mechanized Technology in the Agriculture Sector:** An Evaluation of the Effects and Implications in Selected Commodity Value Chains (rice, corn, coffee, and cassava) - The study seeks to generate critical policy recommendations in support to the DA's priority agenda on farm mechanization, as well as strategic and effective postharvest, storage and processing facilities that can lead to increased productivity and competitiveness, in the light of the current ASEAN integration (September 2017-October 2018).

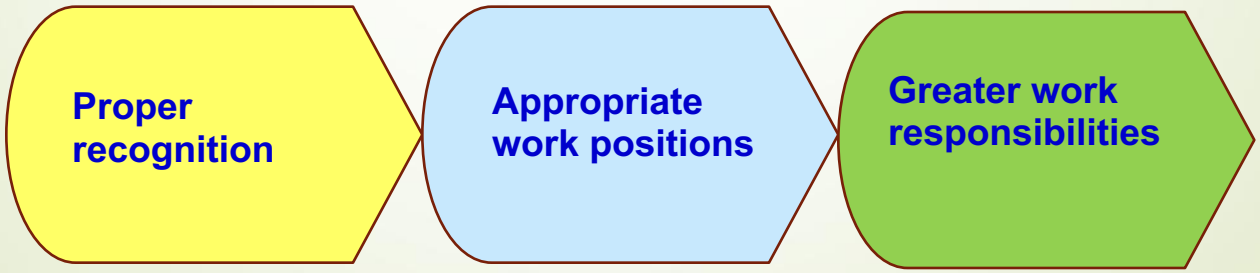
- Initial efforts on the implementation of **Contiguous Farming** as part of the component on Support Services and Institutional Development.

National Policies and Initiatives

RA 10915. The Philippine Agricultural and Biosystems Engineering (ABE) Act of 2016

An act strengthening, modernizing and aligning the practice of agricultural engineering in the country into the internationally recognized practice of agricultural and biosystems engineering, and for other purposes.

The law also aims to strengthen the different areas of practice of the agricultural engineering profession through Career Progression and Specialization.



National Policies and Initiatives

RA 10915. The Philippine Agricultural and Biosystems Engineering Act 2016

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

National Policies and Initiatives

RA 10915. The Philippine Agricultural and Biosystems Engineering Act 2016

- 48 Higher Education Institutions (HEIs) with 60 campuses that will offer the new 4-Year BS Agricultural and Biosystems Engineering Education Program in 2018.
- 3 HEIs offering the MSAE program
- 2 HEIs offering the PhD AE program
- 1 National University
- 1 AUN- QA Accredited
- 3 Centers of Excellence (COE)

Supervised by the Commission on Higher Education (CHED)

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National Policies and Initiatives

RA 10915. The Philippine Agricultural and Biosystems Engineering Act of 2016

HEIs offering BSABE Program in the Philippines

ISLAND GROUP			
Luzon	NCR	Caloocan	1
	CAR	Benguet, Kalinga	2
	1 - Ilocos	Ilocos Norte, Ilocos Sur, La Union	3
	2 - Cagayan Valley	Cagayan, Isabela, Nueva Vizcaya,	3
	3 - Central Luzon	Bataan, Bulacan, Nueva Ecija, Pampanga, Tarlac, Zambales	6
	4 -A- CALABARZON	Cavite, Laguna (2), Rizal	4
	4 -B- MIMAROPA	Oriental Mindoro, Palawan, Romblon	3
	5 - Bicol	Albay, Camarines Norte, Camarines Sur, Masbate	4
		Subtotal	26

National Policies and Initiatives

ISLAND GROUP			
Visayas	6 - Western Visayas	Capiz, Iloilo, Negros Occidental	3
	7 - Central Visayas	Bohol	1
	8 - Eastern Visayas	Eastern Samar, Leyte, Northern Samar, Western Samar	4
		Subtotal	8
Mindanao	9 - Zamboanga Peninsula	Zamboanga del Norte (2), Zamboanga del Sur	3
	10 - Northern Mindanao	Bukidnon, Misamis Occidental, Misamis Oriental	3
	11 - Davao Region	Compostela Valley, Davao del Norte, Davao del Sur	3
	12 - SOCCSKSARGEN	North Cotabato, South Cotabato,	2
	13 - Caraga	Agusan del Norte, Agusan del Sur, Surigao del Sur	3
	ARMM		0
		Subtotal	14

National Policies and Initiatives

RA 10915. The Philippine Agricultural and Biosystems Engineering (ABE) Act of 2016

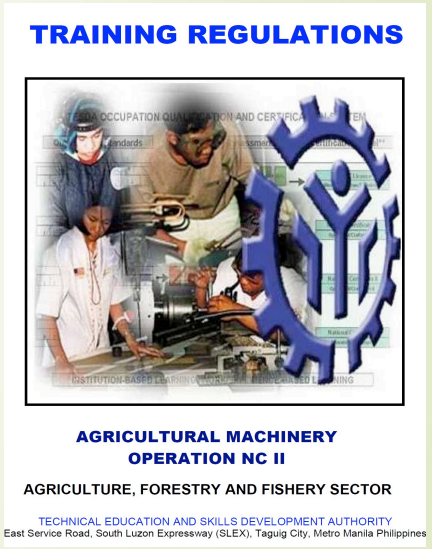
Other provisions:

(a) updating of the education curriculum of the agricultural and biosystems engineering;
(b) examination, registration of licensure of the practitioners;
(c) development of the professional competence of the practitioners through continuing professional education;
(d) accreditation of an integrated national professional organization; and
(e) prohibition of foreign agriculture and biosystems engineer to be issued a temporary license to practice the agricultural and biosystems engineering profession unless his/her country of origin allows Filipino agricultural and biosystems engineers to practice in his/her country.

National Policies and Initiatives

Skills Development for Agriculture and Fisheries Mechanization Technologies Operation and Maintenance

- **Technical Education and Skills Development Authority (TESDA)**
  - ✓ **Skills Certification of Agricultural and Fishery Machinery Operators and Technicians**
  - ✓ **Development and Promulgation of Training Regulations (TRs)**



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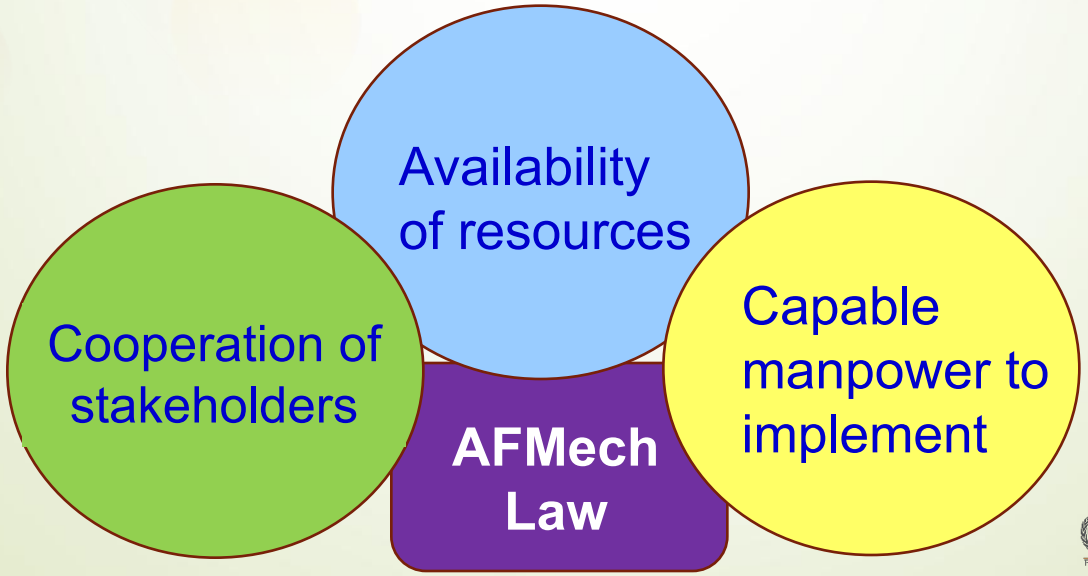
Lessons Learned and Good Practices

- **Implementing/Operational structure** is an important factor the implementation of the law. The structure will guide as to the agencies or stakeholders involved and their respective roles and functions.

As lessons learned from AFMA there is a need to streamline and identify key agencies that are responsible for respective outputs

- **Enabling environment** for successful implementation of the formulated laws



Lessons Learned and Good Practices

- **Strong monitoring and evaluation system** for the agricultural and fisheries mechanization plan to mitigate problems and strengthen positive outcomes of implementation.

The monitoring system should be able to follow through the timeline and present current updates and developments on agricultural mechanization.

- **Ensuring the successful implementation** through
  - Needs and Design Assessments (NADA) before mass distribution of AFMTs
  - Firmer Rules in the Implementation
  - Close Monitoring of Funds, and conduct of
  - Impact assessment studies.

Distribution of AFMTs' should be matched to the farm requirements and farmers' collective needs...

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Lessons Learned and Good Practices

- **Participatory approaches** should be adopted in planning and implementing the whole cycle of agricultural mechanization projects. Feedback mechanisms should be in placed to address project faults and weaknesses.

Suggestions for Regional Cooperation amongst Countries

- Although the implementation SAMS may vary from country to country, sharing of experiences and lessons learned on promoting SAMS is a good way to avoid past errors and learn from the good examples.

The Regional Forum on Sustainable Agricultural Mechanization In Asia and the Pacific is an appropriate venue for knowledge sharing and learning among member countries.

- An internet-base site should be established where CSAM member countries may share scientific-based resources and information materials on the implementation of SAMs for increased connectivity and interactions.

Although the Regional data base is already initiated by CSAM, the results and effect is still to be felt in the Regional Cooperation.

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Suggestions for Regional Cooperation amongst Countries

- The regional cooperation could be strengthened through setting up of regional cooperation **PLANS** for SAMS.

- **On HRD**, there should be a **mechanism for the exchange** of Information/Harmonization of Agricultural Mechanization/ABE Education in Asia and the Pacific. Although there is an **ASEAN Qualifications Framework** for the harmonization of the baccalaureate program, its harmonization with the other Asia and the Pacific countries are still to be in place.

For greater mobility of Agricultural & Biosystems Engineers by establishing a Credit Transfer Scheme among National Qualification Frameworks.

There should be a **Manpower Supply and Demand Study** for agricultural mechanization services in the region for efficient utilization of the human and other resources of each countries in the regional cooperation network.

Suggestions for Regional Cooperation amongst Countries

- Development and implementation of **collaborative RDE Flatform** amongst nations in the implementation of SAMS and other related RDE mechanization endeavours.

- Harmonization of **Standards for Machinery** among the CSAM member countries as evidenced by the creation of ANTAM should be continued and more standards for **primary production and post harvest processing machinery** should be harmonized.

For faster sharing of technologies and wise-use of resources in testing and evaluation.

- **CSAM may lead in the advocacy to amend the UN Central Product Classification (CPC) Version 2.1. to** include agricultural and biosystems engineering and agricultural mechanization services as one of the major focus of CPC.

END OF PRESENTATION
Thank you for listening ! ☺

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