

Agricultural Mechanization in Cambodia

The 1st Annual Meeting of the Asian and Pacific Network for
Testing of Agricultural Machinery (ANTAM)

16-19 September 2014
Beijing, China



Presented by:

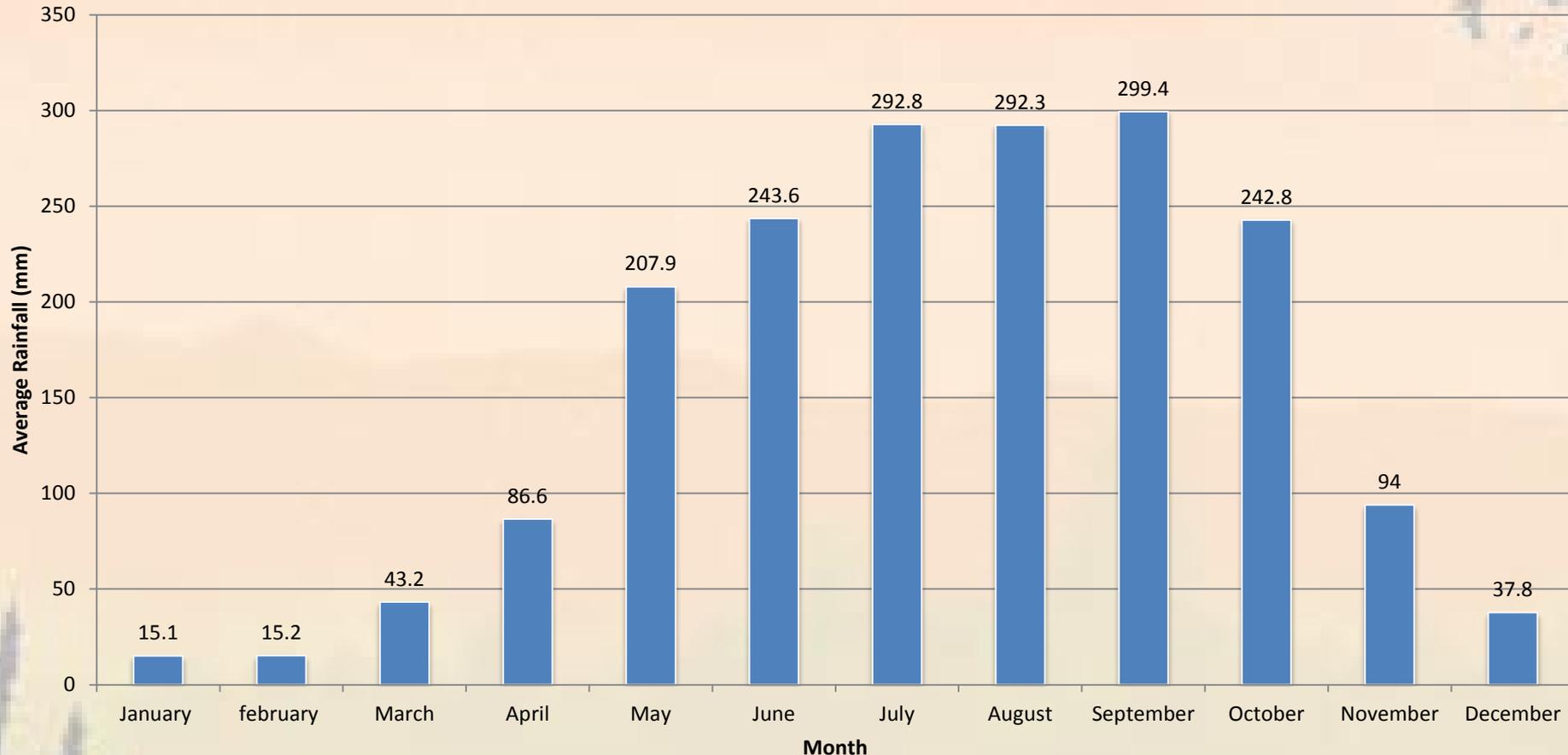
Dr. Chan Saruth
Director of Agricultural Engineering Dept/GDA
saruthchan@hotmail.com

I. Introduction



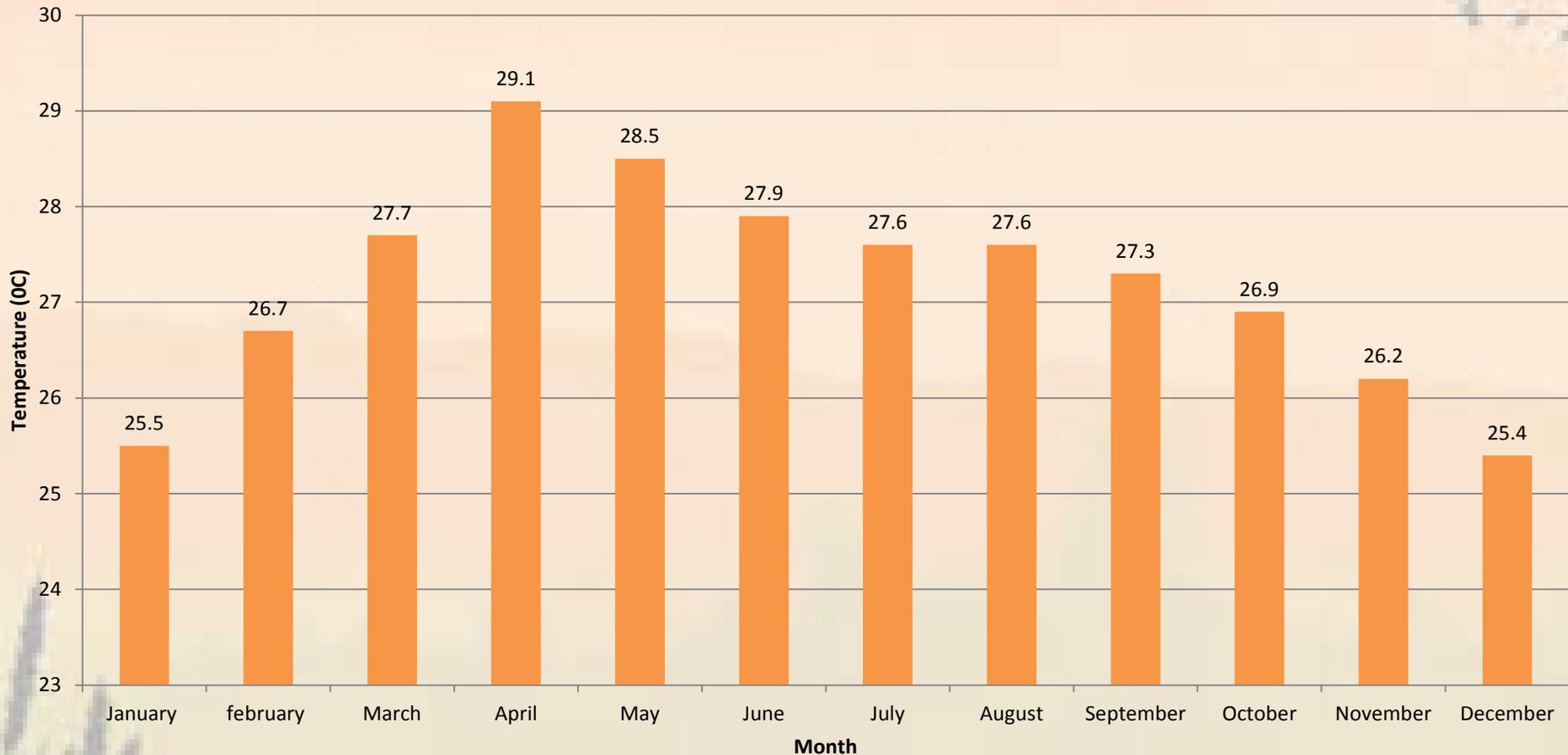
- ❖ Location: SEA and bordered with Vietnam, Laos and Thailand
- ❖ Total area: 181,035km²
- ❖ Total population: 14 millions (51.8 % are women)
- ❖ Population by Urban - Rural residence
 - ❖ Urban=3 millions
 - ❖ Rural= 11 millions

1.1 The average monthly rainfall from 1990 to 2009



- The average annual rainfall is around 1780 mm
- The maximum monthly rainfall is in September which is 299.4 mm
- The minimum rainfall is in January which is 15.1 mm

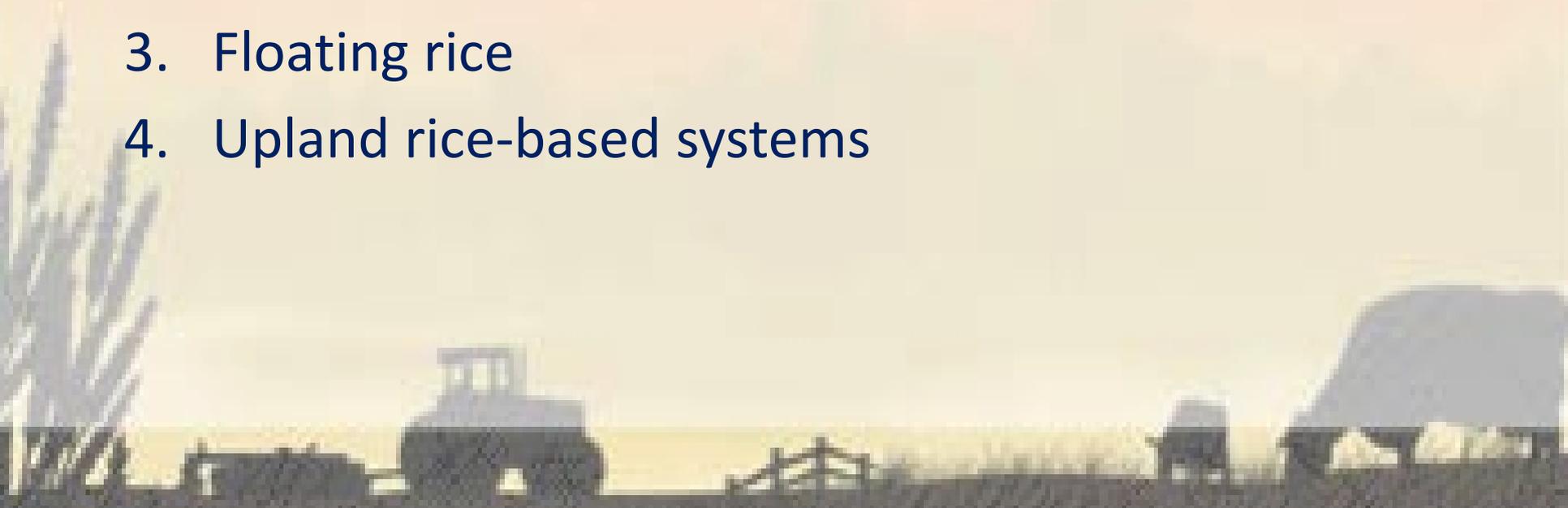
1.2 The average monthly temperature from 1990 to 2009



- The average hottest month is April in which the average monthly temperature is 29.1 °C
- The coldest month is December in which the average monthly temperature is 25.4 °C.

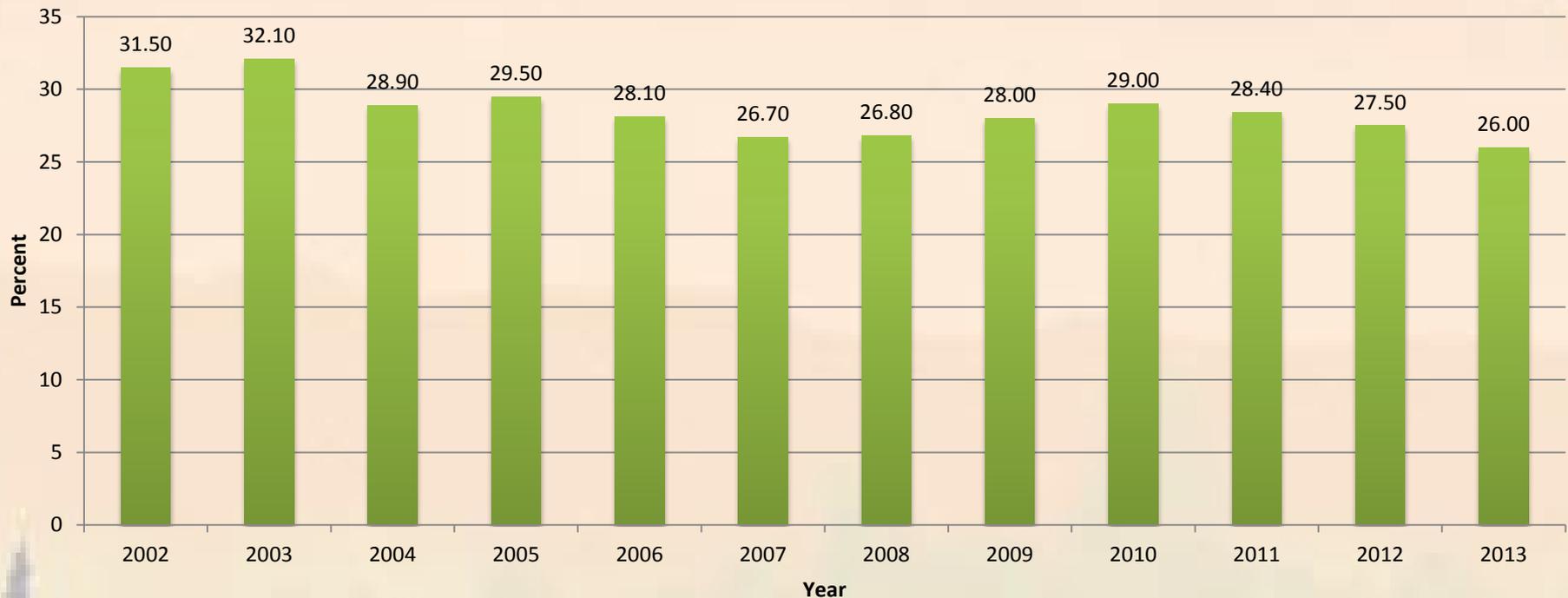
1.3 Characteristics of farming practices by regions

- Most agricultural activity is based on low input and rain fed production systems centered on paddy rice production
- The four major types of rice farming system
 1. Non-irrigated
 2. Flood recession
 3. Floating rice
 4. Upland rice-based systems



1.4 Agricultural production

Share (%) of agricultural sector in GDP from 2004 to 2013 (Constant Price 2000)



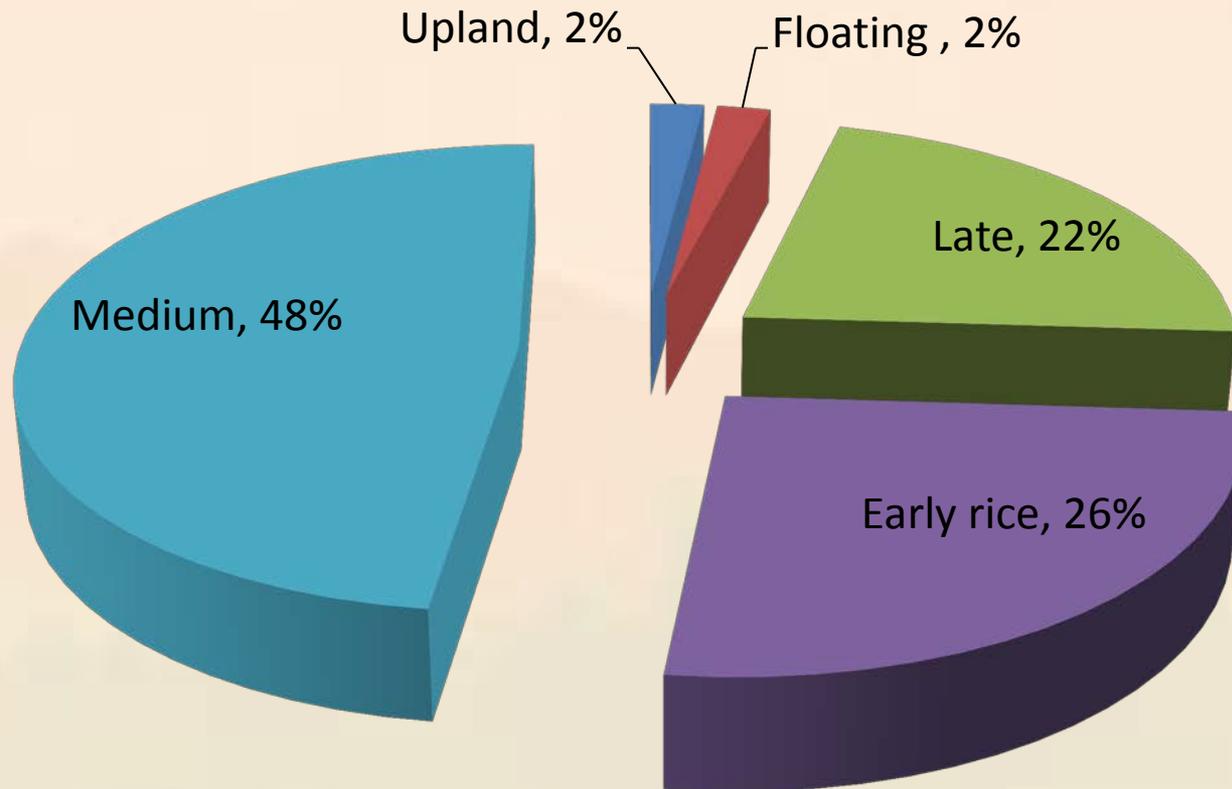
- The agriculture sector contribute to the GDP is about 27.5% in 2012, while industry sector is about 31.1% and services sector is about 41.4%.
- In general, the growth rate (%) of agriculture sector has been considered increased with an average of 4-5% per year (2006-2013) and it varied in accordance with the climate condition of each year.

1.5 Total rice production in 2013

Items	Unit	Wet Season	Dry Season	Total
Planned Area	ha	2,399,837	383,630	2,783,467
Cultivated Area	ha	2,567,723	484,697	3,052,420
Damaged Area	ha	128,360	1,581	129,941
Recovered Area	ha	46,157	330	46,487
Harvested Area	ha	2,485,521	483,446	2,968,967
Average Yield	t/ha	2.925	4.383	3.163
Production	t/ha	7,371,251	2,118,710	9,389,961

- For 2013, the rice production is much more increased than 2012 about 99,021 tons (1.07%).
- This result is based on the attempt to recovered the damaged areas and the efforts made by the farmers with better knowledge and know-how on rice production, farm management, changing the farming techniques, especially the application of new & high-yielding rice seed variety.

1.6 Rice cultivation by type in 2013



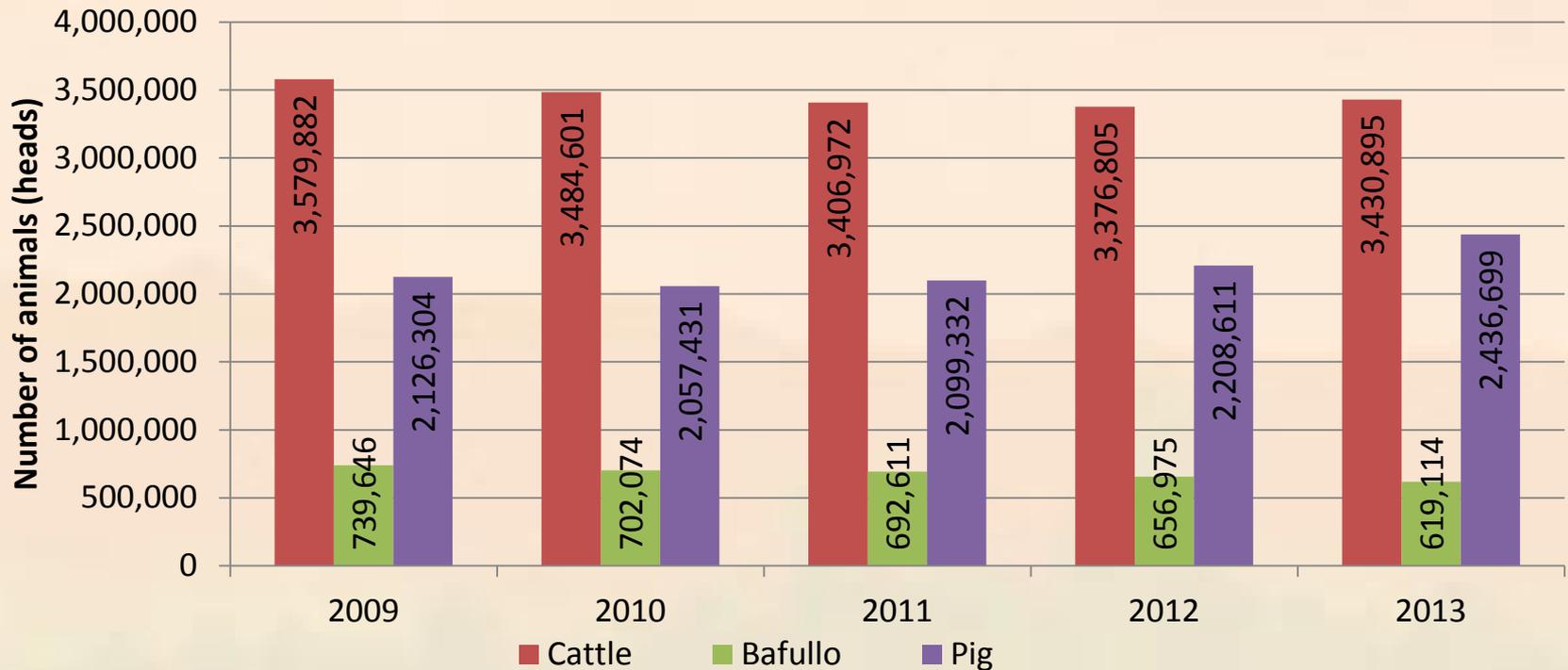
1.7 Cultivation areas under all kinds of crops (ha) in 2013

Areas Under all crops	2013	Remarks
Areas for Rice Crop	3,052,420	Wet & dry seasons
Areas for subsidiary and industrial crops	941,028	Maize, Cassava, Sweet potatoes, vegetables, all kind of bean, sesame, sugar cane, tobacco etc.
Areas for permanent crops	183,048	Cashew, banana, oil palm, coconut, mangoes, coffee, durian, pepper, orange, and other fruit etc.
Areas for rubber plantation	328,771	
Total Areas	4,505,267	

- The cultivated areas of subsidiary and industrial crops in 2013 was also increased to 941,028 ha compared to 2012 and the total production is also shown increasing from 9.9 million tons in 2011 to 10.54 million tons in 2013.

1.8 Livestock Production

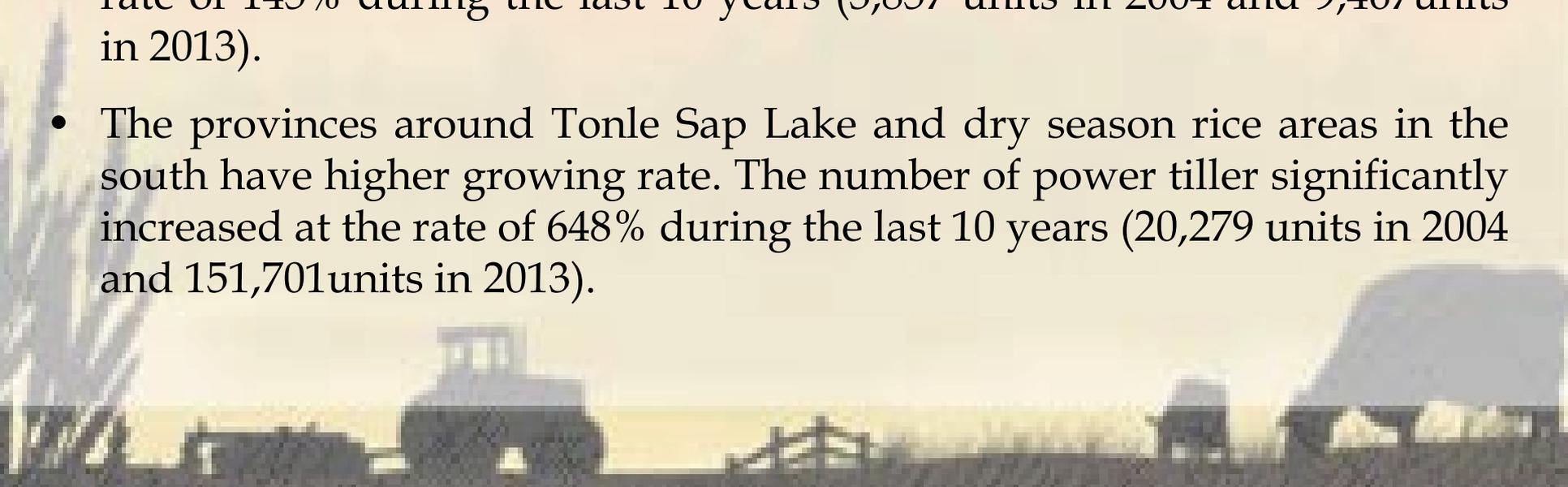
Livestock Production in Cambodia from 2009 to 2013



- From 2009 to 2013, cattle was decreased from 3.57 million heads to 3.43 million heads.
- Buffalo was also increased from 0.73 million heads to 0.61 million heads between 2009 to 2013.

II. Prime mover of agricultural mechanization in Cambodia

- At present, more farmers are using agricultural machineries in farming. However, the use of traditional tools and local made machineries and equipment are still practice by some farmers, especially those whose farms are not suitable to use machineries since their farm size is small or not leveled. These farmers cannot afford to use expensive machines and cannot use them to their full capacities.
- Agricultural mechanization in Cambodia has been increasing widely since 1990s especially in land preparation, irrigation, threshing and recently harvesting. The numbers of tractors increase repeatedly at the rate of 145% during the last 10 years (3,857 units in 2004 and 9,467units in 2013).
- The provinces around Tonle Sap Lake and dry season rice areas in the south have higher growing rate. The number of power tiller significantly increased at the rate of 648% during the last 10 years (20,279 units in 2004 and 151,701units in 2013).



2.1 The statistical data of agricultural machineries in Cambodia from 2004 to 2013

Year	Harvester	Thresher	Rice milling	Tractor	Power Tiller	Water engine pump
2004	-	6,220	36,531	3,857	20,279	106,569
2005	-	7,338	38,606	4,166	26,504	120,968
2006	325	7,795	38,618	4,247	29,706	127,610
2007	395	8,036	38,680	4,475	34,639	131,702
2008	430	8,237	39,429	4,611	38,912	136,061
2009	836	13,798	47,620	5,495	53,220	164,974
2010	947	14,390	48,217	6,200	66,548	166,633
2011	1,548	15,210	48,753	6,786	77,421	183,502
2012	4,820	16,146	54,328	8,961	128,806	231,942
2013	4,580	17,542	55,270	9,467	151,701	255,954

Source: DAEng, 2013

2.2 Issues on agricultural mechanization development in Cambodia

- There are some issues related to the agricultural mechanization development in Cambodia such as inadequate skilled workforce, lack of budget support, government does not have any credit scheme for agricultural machinery at the moment, local manufacturers are small scale and family owned and lack of knowledge and skills on modern and sophisticated manufacturing of agricultural machinery, and limited business management skills.
- Apart from this, the data collection and information on agricultural machinery statistics are limited and weak due to it fully depends through officials agricultural district with the chief of village and commune, which has less knowledge of agricultural machinery, and sometimes they do not have the means and resources sufficient to do this work.
- Furthermore, the first agricultural census had started to conduct in Cambodia at the beginning of 2013 and that is why there are so many shortages in obtaining complete data and information on agricultural machinery and equipment in Cambodia.

III. Status of machinery usage in Cambodia

- In Cambodia, rice is the main crop and farm mechanization is also mainly for rice. Agricultural machines are also used for other crops such as corn, cassava, bean, rubber, sugar cane and fruit tree for land preparation, transportation and planting.
- For rice, farm operations which are significantly mechanized are land preparation, spraying, weeding, threshing and milling. Other farm operations such as transplanting, fertilizing, etc. are still done manually because they are complicated to be mechanized.
- The government agencies have introduced rice transplanting and direct seedling machine in order to improve efficiency of sowing. However, its adoption is still not clear since majority of rice fields are rainfed ones which are difficult to manage water and not leveled.
- In some regions, animals are still used for land preparation and transportation, especially in those regions where farm infrastructures are not well developed and small farm size (less than 0.5ha per household) which is not suitable for use machines and difficult to access by road because they are located far from main roads.

Mechanization rate of paddy rice work

Total of land preparation in 2013 was 3,852,494 ha in which 1,037,307 ha done by draft animal and 2,815,187 done by agricultural machinery

Items	Manual	Animal Power	Agri. Machinery
Land preparation	0	27	73
Broadcasting and transplanting	99.9	0	0.01*
Weeding	90	0	10*
Fertilizing	100	0	0
Spraying	70	0	30*
Harvesting	30	0	70*
Threshing	1	1	98*
Transportation	0	40	60*
Drying	95	0	5*
Milling	0	0	100
Average	48.6	6.8	44.6

Source: MAFF, 2014

Remark: (*) Estimated by observation during field interview with different stakeholders

IV. Status of machinery manufacturing in Cambodia

- Although the use of agricultural machinery increased in Cambodia, but it doesn't have large and medium scale agricultural machinery manufacturers. Only one private company, Mekong Agricultural Tractor., Ltd, has joint venture with Minsk Motor Work, Belarusian Tractor Company, to build a tractor assembly plant in Cambodia since 2013.
- In addition, most of agricultural machineries are imported from abroad and only simple agricultural machineries and equipment are produced by local manufacturers.
- Local manufacturers, normally, produce thresher, water pump, local-made truck for transportation, trailer, implements and spare parts.
- Due to their technological capacities, they can manufacture only simple machines which do not required sophisticated production process or tools. Normally, they are small-scale or family-owned manufacturers.

IV. Status of machinery manufacturing in Cambodia – *cont'd*

- Most of the local manufacturers are still small scale and family owned with a few workers and operate seasonally and to supply local market. The production is based on order from customer.
- There is no production or distribution plan to export to neighboring countries.
- Often, these manufacturers do not only produce agricultural machineries and equipment but also produce other machineries and equipment for transportation, small enterprises, and handicraft to diversify their businesses, ensure whole year operation and reduce bankruptcy.
- There is no official number of these manufacturers available at present.
- Currently, there is no central institution which is responsible for collecting data on local manufacturers in Cambodia. It is difficult to get exact number of all local manufacturers for the whole country.

V. Status of Institutional support

There are several institutions that support agricultural mechanization activities in Cambodia as below:

1. Department of Agricultural Engineering (DAEng)

DAEng is supervised by General Directorate of Agriculture (GDA) of the Ministry of Agriculture, Forestry and Fisheries (MAFF). This Department is mainly responsible for management, R&D, capacity building and monitoring & evaluation in the field of agricultural mechanization in Cambodia.

2. Cambodian Agricultural Research and Development Institute (CARDI)

CARDI is under the supervision of Ministry of Agriculture, Forestry and Fisheries. Their research focuses on crops and agricultural engineering is one of its research themes, the other ones are Plant Breeding, Plant Protection, Soil and Water Sciences, Socio Economic Sciences, and Agronomy and Farming System.

3. Royal University of Agriculture (RUA)

RUA is under supervised by Ministry of Agriculture, Forestry and Fisheries. Agricultural engineering faculty is one of several faculties under RUA and its program focusses on agricultural mechanization, on farm irrigation and post-harvest technology.

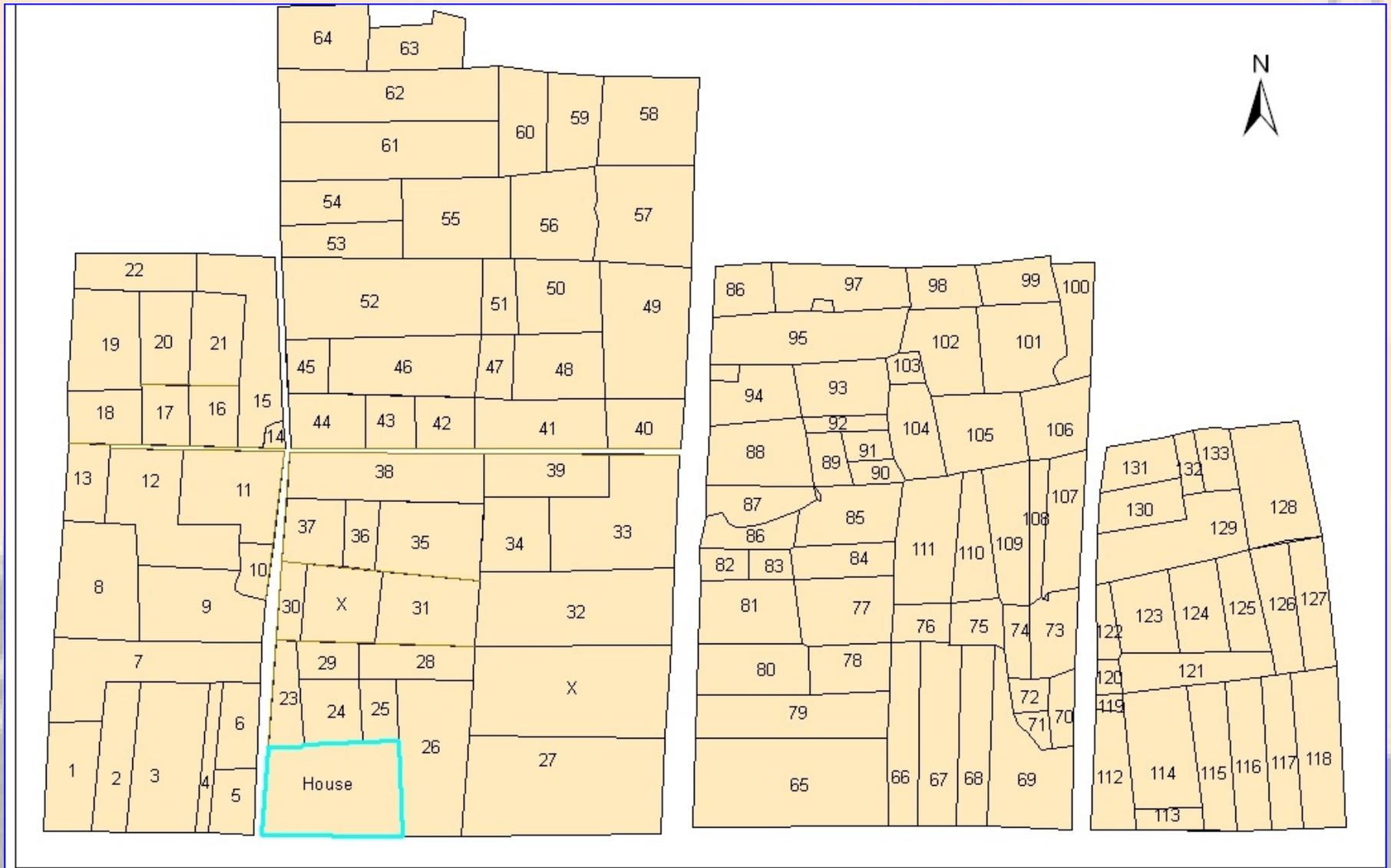
VI. Status of farm infrastructure in Cambodia

- At present, farm infrastructure is one of major constraints to develop agricultural mechanization more effectively due to small farm size, lack of irrigation systems and poor road access to the field, which is not suitable for use machines. Therefore, in some regions, animals are still used for land preparation and transportation.
- Cambodia farmers who irrigated relied on natural or constructed reservoirs that retain water from the wet season. Most of the rice growing areas in Cambodia are located on flat land which means that storing enough water for irrigation of paddy fields would require large areas to be inundated as reservoir depths are shallow.
- During and after the 1970's large numbers of reservoirs were constructed. Unfortunately, too many of these reservoirs have broken down or are only partly functioning as maintenance is seldom done and still relies heavily on limited government budgets.
- Over the past 10 to 15 years, however, the availability of affordable irrigation pumps and engines has led to greater involvement of companies and private businesses in irrigation infrastructure.

VI. Status of farm infrastructure in Cambodia – *cont'd*

- Pumping allows farmers in some areas to use water from rivers and other natural water courses all year round. Availability of water is not a major problem in the Mekong delta; however the distance to the river can be.
- Besides this, the road access for agricultural machinery into the paddy field is also a challenge because the current on farm road system for a paddy field has not been properly developed.
- For farmers, who have their paddy fields at the main road is not a problem for driving agricultural machines to that fields at any time. But for paddy fields farmers far from main roads, no way for driving machines to reach that place at any time and they have to finish their operations on their farmland prior to the farmers who have land adjacent roads.
- Similarly, farmers who have farmland far from the road also face a problem during the harvest time, with no system of sewage water from fields before harvesting and there is no way enough for laborers to reach short farmers are forced to harvest before the harvest, making them at risk of losing yield after harvest.

The existing of paddy land in Cambodia



VII. Status of machinery testing center in Cambodia

- Currently, the agricultural testing center has not yet existed in Cambodia.
- All agricultural machines and equipment that has been used in Cambodia not yet passed tests confirm and certify the quality and efficiency of it yet.
- It is noted that some users and relevant stakeholders are interesting on significance of having agricultural testing center to certify agricultural machines and equipment in Cambodia. Sometimes, farmers are suffered the impact of the failed test in advance.
- Furthermore, there is still no clarity yet on role and responsibility of agricultural testing center between the Ministry of Agriculture, Forestry and Fisheries and the Ministry of Industry and Handicrafts.

VIII. Policy matters

- Cambodia does not have a policy regarding current work on testing of agricultural machinery. But the strategic plan on agricultural mechanization in Cambodia had already done since 2011.
- The strategic plan on agricultural mechanization was developed by the Department of Agricultural Engineering and its aims at enabling access to mechanization, skill development, strengthening of commodity chains, and improving policy, legal and regulatory environment.
- It serves as the four key drivers in promoting agricultural mechanization as below:
 1. Enabling Access to Mechanization;
 2. Promoting of self-help group (saving group) among farmers to mobilize local financial resource to invest in mechanization;
 3. Commercialization of Agriculture Technologies; and
 4. Better Policy, Legal and Regulatory Environment.

VIII. Policy matters – *cont'd*

- The Policy on the promotion of paddy production and rice export had been adopted by the Government since July, 2010 in order to increase value added and improve rice quality for export.
- This policy has indirectly impacted agricultural mechanization in Cambodia, especially rice mill sector. The government set target to export 1 million ton of milled rice by 2015.
- In addition, the government has invested millions of dollars to expand irrigation system, installation of sub-transmission lines to supply electricity to rural areas, provide credit through the Rural Development Bank to Rice Millers Associations, and establish Credit Guarantee Scheme to encourage commercial banks to provide loans for paddy collection and processing.

IX. Conclusion

- Cambodian agriculture will remain the key factor to contribute to the economic acceleration and this sector is able to provide food for daily living condition, supply raw materials for industry, and also a main source of national revenue generated from production and exportation.
- However, Cambodian farming systems are largely subsistence oriented and are dependent on rainfed conditions thereby excessively exposing producers to production uncertainties. Most agricultural activity is based on low input and rainfed production systems centered on paddy rice production.
- Farmers have started to use more and more agricultural machineries since 2009 for their farm lands because of migration of young people move out of rural areas to work in urban areas for garment factory, shoe factory, construction or migrate to work abroad, as well as climate change and demand for food is increasing as population grows.
- However, the use of traditional tools and local made machineries are still practice by some farmers, especially those whose farms are not suitable to use machineries since their farm size is small or not leveled. These farms cannot afford to use large machines and cannot use them to their full capacities.

IX. Conclusion – *cont'd*

- Local manufacturers of farm machinery and equipment, usually, produce thresher, water pump, local-made truck for transportation, trailer, implements and spare parts.
- Due to their technological capacities, they can manufacture only simple machines which do not required sophisticated production process or tools.
- Normally, they are still small scale and family owned with a few workers and operate seasonally and to supply local market. The production is based on order from customer.
- There is no production or distribution plan to export to neighboring countries and most of manufacturers not only produce agricultural machineries and equipment but also produce other machineries and equipment for transportation, small enterprises, and handicraft to diversify their businesses, ensure whole year operation and reduce bankruptcy.
- There are some issues related to the agricultural mechanization development in Cambodia as below:

IX. Conclusion – *cont'd*

1. Inadequate skilled workforce in agricultural mechanization exists at both national and provincial level;
 2. Lack of budget support
 3. Lack of cooperation. The relationship among public, private sectors and development partners are not well cooperated. There is also gap in cooperation with universities and private sector dealing with farm machinery;
 4. The statistics of agricultural machineries and equipment is still limited and not in-depth. Most data are based on data collected by district agricultural offices and there is a lack of data on agricultural machineries' distributors, local manufacturers of agricultural machineries and equipment; and
 5. The agricultural testing center does not exist at present.
- There are still some constraints to the increase of agricultural mechanization which required attention, support, and incentive from the government as well as other stakeholders which involve in the development of agricultural mechanization sub-sector to be sustainable in the future.



Thank you for your attention!