

Agricultural Mechanization in Cambodia

The 2nd Regional Forum on Sustainable Agricultural Mechanization

- Enabling Environment for Custom Hiring of Agricultural Machinery

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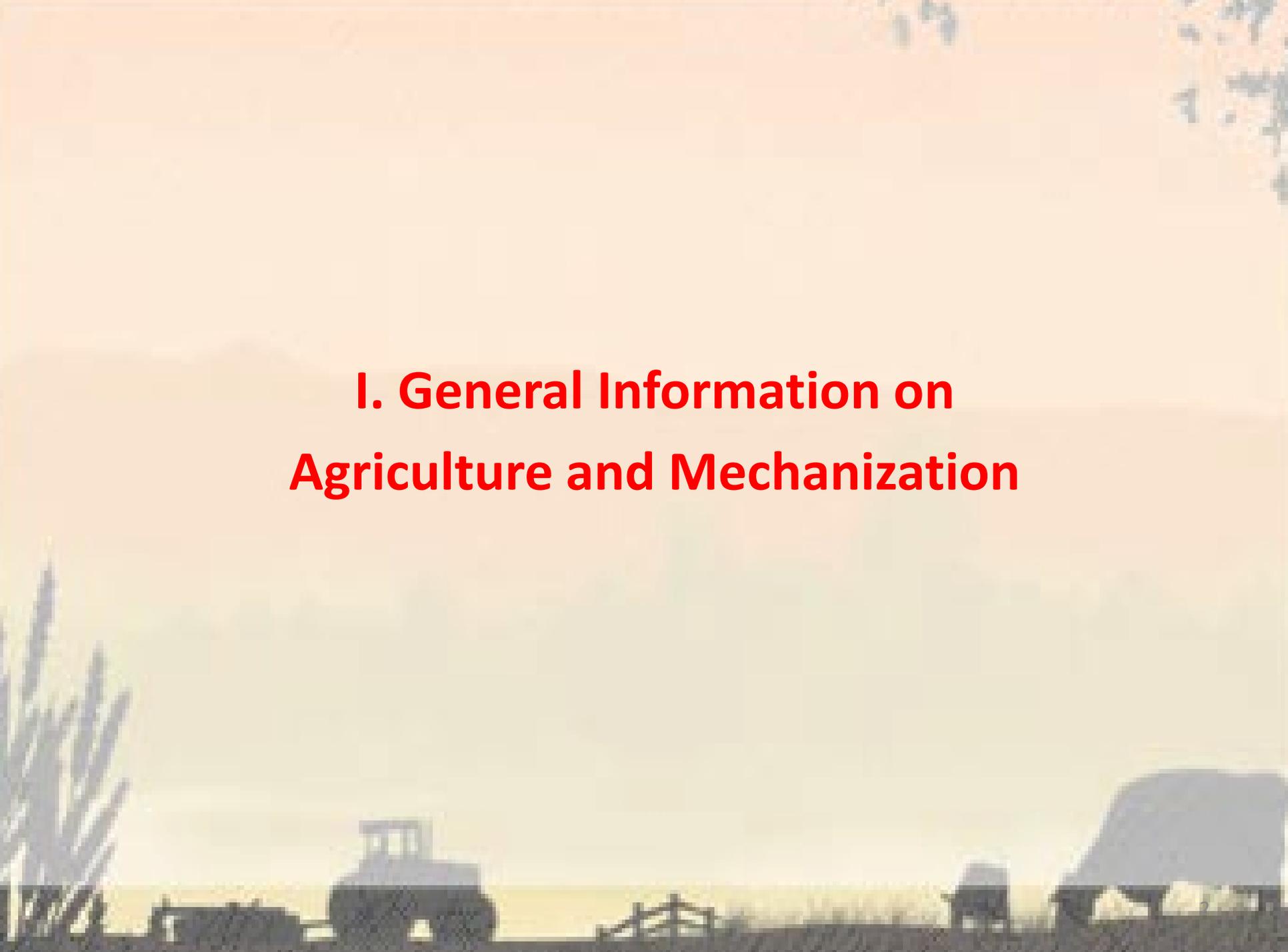


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I. General Information on Agriculture and Mechanization

1.1 Ag machinery in Cambodia

- Cambodian farming systems are largely subsistence oriented and are dependent on rainfed conditions thereby excessively exposing producers to production uncertainties.
- Because of migration of young people move out of rural areas to work in urban areas; climate change; and demand for food is increasing as population growing; farmers have started to use more agricultural machineries since 2009 for farming.
- Around 9,500 tractors and 151,700 power tillers have been used in 2013 and mainly imported from Belorussia, China, Japan, India, US and Thailand.
- Local manufacturers of farm machineries and equipment, usually, produce thresher, water pump, local-made truck for transportation, trailer, implements and spare parts such as cage wheel. However, 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 to local market.

1.2 Population of farm machinery and equipment

- The number of farm machineries and equipment has been increased in the last few years because of the economy grows, young people move out of rural areas to work in urban areas for garment factory, shoe factory, construction or migrate to work abroad. At the same time, the price of food is also increasing. This is an opportunity for farmers to expand their food production by intensification (2 to 3 times a year)
- **The statistical data of agricultural machineries in Cambodia from 2004 to 2013**

Year	Harvester	Thresher	Rice milling	Tractor	Power Tiller	Water pump	Others
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	

1.3 Ag mechanization ratio in terms of mechanized area by major farm operations

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

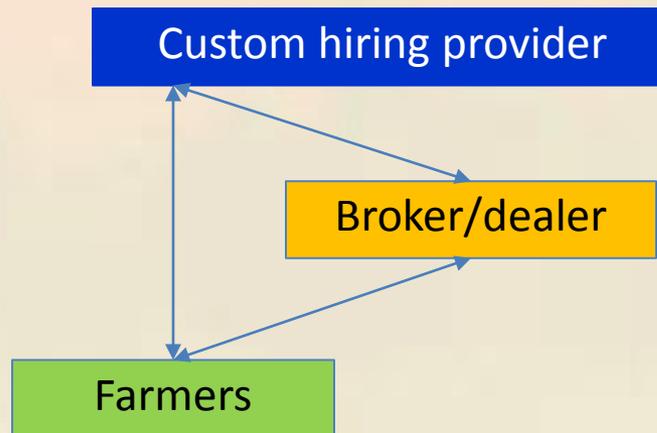
Items	Manual	Animal Power	Agri. Machinery
Land preparation	0	27	<u>73</u>
Broadcasting and transplanting	99.9	0	0.01
Weeding	90	0	10
Fertilizing	100	0	0
Spraying	70	0	<u>30</u>
Harvesting	30	0	<u>70</u>
Threshing	1	1	<u>98</u>
Transportation	0	40	<u>60</u>
Drying	95	0	5
Milling	0	0	<u>100</u>
Average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

II. Status of Custom Hiring



2.1 Custom hiring in Cambodia

- Custom hiring on farm machinery in Cambodia is different from one region to another region;
- Most of farmers prefer to hire tractor for land preparation such as land leveling, plowing, harrowing and rotavating whereas combine harvester for harvesting.
- Normally, the custom hiring service can be offered directly from a farmer to the individual service provider or through a broker who deals with requests made by farmers.



2.2 List of custom hiring of farm machinery in Cambodia

A. For paddy production:

No	Operations	Type of Agricultural Machinery
1	Land leveling	- <u>For tractor:</u> 20-25 US \$/hr (front shield equipped with tractor) - <u>For power tiller:</u> 15-20 US \$/hr (front shield equipped with power tiller)
2	Plowing	- <u>For tractor:</u> 35-70 US \$ (depend on distance and field condition) - <u>For power tiller:</u> 35-45 (depend on distance and field condition)
3	Harrowing	- <u>For tractor:</u> 20-40 US \$ (depend on distance and field condition) - <u>For power tiller:</u> 15-20 US \$ (depend on distance and field condition)
4	Rotavating	- <u>For tractor:</u> 50-70 US \$ (depend on distance and field condition)
5	Harvesting	70-90 US \$/ha (by combine harvester and the cost is depended on distance and field condition)
6	Threshing	8-10 % of total paddy after threshing
7	Transportation	0.75-1.25 US \$/(1 sack=100kg). It depends on distance and road condition)
8	Drying	20 - 25 US \$/ton of paddy (it depends on paddy varieties and moisture content)

B. For maize, soy bean and cassava production:

No	Operations	Type of Agricultural Machinery
1	Plowing	- <u>For tractor:</u> 35-40 US \$/ha (depend on distance and field condition) - <u>For power tiller:</u> 25-30 US \$/ha (depend on distance and field condition)
2	Harrowing	- <u>For tractor:</u> 18-20 US \$/ha (depend on distance and field condition) - <u>For power tiller:</u> 12-15 US \$/ha (depend on distance and field condition)
3	Planting	25-30 US \$/ha (by planting equipment with tractor)
4	Transportation	0.75-1.25 US \$/(1 sack=100kg). It depends on distance and road condition)

The background of the slide is a blurred photograph of a rural farm scene. In the foreground, the dark silhouettes of a tractor and a wooden fence are visible. In the mid-ground, there is a barn with a dark roof. The background shows a vast, open field under a bright, hazy sky, suggesting a sunrise or sunset. The overall tone is warm and soft.

III. Supporting Policies on Agricultural Mechanization

3.1 Short and long-term plan for the promotion of farm mechanization

- ❖ The strategic plan was developed by the Department of Agricultural Engineering in 2011;
- ❖ This strategic plan aims at enabling access to mechanization, skill development, strengthening of commodity chains, and improving policy, legal and regulatory environment; and
- ❖ There are four key drivers in promoting agricultural mechanization as below:

1. Enabling Access to Mechanization

- Field mechanization options for the four ecosystem zones in Cambodia
- Implement required for field operations
- Improving Supply Chain
- Financing

3.1 Short and long-term plan for the promotion of farm mechanization (*cont'd*)

2. Promoting of self-help group (saving group) among farmers to mobilize local financial resource to invest in mechanization

- Support Services
- Enabling Designs
- Alternative Energy for Farm Production
- Technical skills
- Knowledge Creation

3. Commercialization of Agriculture Technologies

- Pre-harvest Technologies
- Post-harvest Technologies

4. Better Policy, Legal and Regulatory Environment

- Formulation of Farm Machinery Laws and Regulations
- Cooperation between Public, Private Sector and Farmers
- Gender Mainstreaming
- Environmental Protection and Climate Change

3.1 Short and long-term plan for the promotion of farm mechanization (*cont'd*)

- ❖ **Policy on the promotion of paddy production and rice export**
 - The government set target to export 1 million ton of milled rice by 2015
- ❖ **Subsidy and loan programs to support farmer's purchase of farm machines**
 - Royal Government of Cambodia offers zero tariffs for import of farm machines and equipment.
- ❖ **Conditions for subsidy and loan if available**
 - loan amount ranging from 40% to 80%
 - The interest rates are vary from 0% to 2% per month
 - The loan durations varies from 3 months up to 5 years
- ❖ **Loan and credit schemes provided by private sector**
 - ACELEDA bank; Canadian bank; Amret bank; AMK bank; Prasac bank; Sathapana Limited and Vision Fund; etc.

IV. Social and Economic Benefits

4.1 Social Benefits

- As the Cambodian economy grows, young people move out of rural areas to work in urban areas for garment and shoe factories, construction or migrate to work abroad. Only elder people and children stay in the rural areas. But with the use of agricultural machinery in agricultural production to encouraging younger and more innovative people to remain in rural areas and work on the land.
- In addition, because there is more and more demand for food as population grows and it is an opportunity for farmers to expand their food production by intensification. For example, some regions used to produce one crop per year, now farmers grow 2 or 3 crops per year on their existing lands or expand growing areas.
- Today, the agricultural work using manpower and draft animal is less effective because of climate change such as drought, which often occur almost every year has made farmers moving machines
- Farmers have shifted to use agricultural machinery because it can help reduce drudgery, workloads and safety in their working conditions.

4.2 Economic Benefits

- Some Cambodian farmers have reduced their labor requirements in order to reduce costs, increase the area cultivated, undertaking more timely production, improve the quality of cultivation and post-harvest losses by using machines and other techniques. More advances in mechanization are occurring in the labor-intensive operation associated with land preparation and crop threshing in the rain fed areas of the Northwestern provinces, the floating rice areas along the Tonle Sap and Mekong rivers, and the dry season irrigated areas in the south.
- The numbers of tractors increase repeatedly at the rate of 145% during the last 10 years (3,857 units in 2004 and 9,467 units 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 151,701 units in 2013).
- Today, farmers used more agricultural machinery for land preparation, transportation, harvesting, threshing and milling because of labor shortage and agricultural production demands in time.











V. Challenges and Constraints faced

5.1 Major obstacles on the promotion of farm mechanization

1. Policy and Strategy on Agricultural Mechanization

- National policy on agricultural mechanization is not yet prepared;
- The agricultural engineering strategy had been prepared by Department of Agricultural Engineering. However, it is not functioning and lack of funded support to make it works.

2. Human Resources

- Inadequate skilled workforce in agricultural mechanization exists at both national and provincial level. For a long time, agricultural mechanization is not the priority field of development for the government and other development agencies;
- Structure of the Provincial Office of Agricultural Engineering is still weak. There is no staff responsible for agricultural mechanization below provincial level. Some staff of the provincial office are trained as tractor operators. Because of this, services provided to farmers almost non-exist.

5.1 Major obstacles on the promotion of farm mechanization (*cont'd*)

3 Budget

- Annual budget allocated by the government for the implementation of agricultural mechanization activities fails to cover nationwide;
- Some provincial offices have no budget allocated by provincial departments of agriculture for mechanization activities. Because of this, fewer activities on Research and Development on agricultural machinery and equipment are conducted and it exists mainly at the national level only; and
- Support for the development and the promotion for farm mechanization are still inadequate.

4 Irrigation and drainage systems

- Irrigation systems are still in development and not coverage for the whole country;
- Most farmers' paddy fields are small and lack of road access system for the paddy fields far from the road; and
- Lack of drainage systems for paddy field and sometimes rainfall during harvesting.

5.1 Major obstacles on the promotion of farm mechanization (*cont'd*)

5 Cooperation

- The relationship between public and private sectors is irregularly. Private sector does not have good communication and sharing information with public institutions;
- This is shown in their attitude towards researchers or staff of public institutions. They are reluctant to cooperate in providing information about their businesses;
- External support and cooperation with development partners on agricultural mechanization is still missing;
- There is gap in cooperation with universities and private sector dealing with farm machinery;
- Only two universities are offering bachelor programs related to agricultural mechanization. They are Royal University of Agriculture, Meanchey University. The programs are still in their infant stage; and
- Currently, there is not association of manufacturers. It is difficult for them to make their voice heard by the government or to solve conflict among themselves.

5.1 Major obstacles on the promotion of farm mechanization (*cont'd*)

6 Credit

- Credit scheme for buying farm machinery and equipment is not existent;
- To buy new machines, farmers have to use their own saving or borrow from bank, micro-finance institutions or dealers. This also applies to local manufacturers.

7 Repair and Maintenance

- Most of workshops for repairing and maintenance of farm machinery and equipment are not available at rural areas. It is expensive to transport the broken machine to urban area for repairing;
- Spare parts are not available for some brand of machineries, especially second hand machineries. Some machines have just introduced to the country recently and their number is still small;
- Some spare parts of agricultural machinery were imported. That result is in the high price of some agricultural machinery; and
- It is difficult to distinguish agricultural machinery spare parts with other machinery. Therefore, imported tax is charged as non-agricultural machinery or equipment.

5.1 Major obstacles on the promotion of farm mechanization (*cont'd*)

8 Local Manufacturer

- Small market and competition;
- High cost of production;
- Difficult to find some spare parts;
- Quality of machinery
- Lack of enforcement of intellectual property rights;
- Lack of knowledge to produce modern equipment;
- Small scale;
- Interest rate for loan from bank is still high;
- Small market and competition from imported substitute products have made local manufacturers hard to do their businesses;
- High cost of electricity and imported raw materials make the production cost high which leads to low profit of manufacturers and difficult to compete with imported substitute products;

5.1 Major obstacles on the promotion of farm mechanization (*cont'd*)

8 Local Manufacturer (*cont'd*)

- Local made machineries has never been tested for its performance because of the lack of testing facilities in the country;
- Although Cambodia became a member of WTO on 13 October 2004, the enforcement of intellectual property right is still weak in the country;
- Some local manufacturers copy the design of machine of other manufacturers and manufacture it with low quality in order to reduce cost. This practice discourages innovation of new machine, because the inventor cannot get benefit from their efforts;
- Local manufacturers lack human resource with know-how on manufacturing of high quality products; and
- Most of local manufacturers are small scale. Their production capacity is limited.

5.2 Other issues relevant to the farm mechanization

- The compilation of 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;
- Young generation is not interested to study for degree related agricultural mechanization. Enrollment at university is low compared to other programs. This may due to the less significant role of agricultural mechanization in the past; and
- Some farmers owned un-necessary machine which did not match with their farm size or they did offer for custom service work, therefore low utilization rate of machines and resulted in high fixed cost of machine and cost of production.



VI. Solutions and Suggestions

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There are some key driving factors should be considered as below:

- Develop national policy to enhance agricultural mechanization sub-sector in Cambodia to ensure the import of agricultural machineries and equipments with high quality, suitable for Cambodian conditions and affordable price;
- Support and encourage local manufacturers to produce local products with reasonable price, safety, quality and suitable for local geographical conditions;
- Improve farm infrastructure and land leveling;
- Establish laws, guideline, and other related regulations to improve the efficiency of the management of agricultural mechanization and protect the benefits of all stakeholders;
- Provide in-service training for extension officers and manufacturers to improve their knowledge and skills;

VI. Solutions and Suggestions (*cont'd*)

- The establishment of Agricultural Machinery and Equipment Testing Center;
- Focus more on the development of small-scale and family-owned manufactures;
- Strengthen agricultural machinery and equipment supply networks and promote the manufacturing base on agricultural operations and processing technologies.
- Promote environmentally friendly mechanization practices that will result in sustainable economic growth;
- Support agricultural mechanization strategy (AMS) to be fully functioning;
- Establishment of adequate repair, maintenance and parts supply lines, as well as local stocks;

VI. Solutions and Suggestions (*cont'd*)

- Credit scheme should be available for all sizes and types of agricultural machinery and equipment;
- Enhance research and development of new agricultural machineries and equipment which are needed at the present or in the future and appropriate for different geographical conditions;
- Improvement of collaboration both inside and outside the region as well as building good relationships between public institutions, private sector, development partners, farmers and other stakeholders to enhance efficient management of agricultural mechanization in Cambodia;
- Improve data collection and management systems for agricultural machineries and equipment to be comprehensive which is compatible which can be shared and used by other countries.



Thank you for your attention!