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AGRICULTURAL MECHANIZATION IN VIETNAM

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OUTLINE

I. MECHANIZATION DEMAND

I. MECHANIZATION DEMAND (1)

Rapid increase of number, quantity, types of equipment and machines in agricultural, forestry, aquacultural production

➢ In agricultural production (1)

≈ 500,000 tractors with total capacity ≈5 mil. HP in 2009,
triple numbers of tractors in 2001
≤ 12 HP tractors: 65 %; 12 -35 HP: 27 %; ≥ 35 HP: 8%

(Source: Department for processing, trading of agriculture, forestry, aquaculture and salt)

- Increase of mechanization in agricultural production meets the demand of the in-season harvesting, yield, quality and reduces post harvest losses.

I. INTRODUCTION OF VIAEP (2)

➢ In agricultural production (2)

- Average rate of mechanization in agricultural production activities

Agricultural production activities	Mechanization rate (%)
Soil preparation for rice cultivation	72
Soil preparation upland crops	65
Active irrigation for rice	85
Transport in agriculture and rural	66
Rice drying in summer-autumn season in Mekong River Delta (MRD)	38.7
Rice harvesting in MRD	15
Rice threshing	84
Rice milling	95

➢ In forestry production

- 70% of stages in seedling production is mechanized: tillage, plant bags, etc.
- Some mechanized models successfully applied in soil tillage for cultivation in slope land and afforestation for wood
- Forest exploitation: machanization in some basic steps like tree cutting (80%), wood transportation (90%), use of chains for wood minimal-proccessing in the forest gate to reduce transport cost and increase usable wood rate



➢ **Fishing and Aqua-production**

- Fishing ability is increasing rapidly:
  - app. 3.8 %/year in quantity
  - 10.17 %/year in power
  - 18.3 %/year in total capacity of boat engine
- Currently, 95,600 fishing boats with total capacity of 5.8 mil. HP, including:
  - inshore fishing : 10,210 boats
  - offshore fishing: 83,250 boats
  - fishery logistics and control : 2,199 boats
- Over 90 factories:
  - produce 1.7 mil. tons of animal feed from aqua products,
  - meeting 60% of feed consumption in the whole nation

Irrigation

- > 80% arable land being mechanized irrigation
- Ensurance for 3.45/4.1 mil.ha of rice area

II. SUPLY ISSUE

Rapidly forming agr. machinery market:

- **variety of types and size (attachments, engines, tractors with capacity of 18-35 HP – either in-country manufactured or imported).**
- **agr. machinery services (outlet, after-sale service)**

However the lack of quality and safety control/national testing network caused many disadvantages and losses for farmers

III. POLICY AND INSTITUTIONAL ASPECTS OF AGRICULTURAL MECHANIZATION (1)

➢ **Since 2004, Vietnam Govenment has issued policies to support farmers to buy machines for agricultural production using budget's provinces**

- **In 2008, 30 provinces and cities implemented the supporting policy:**
  - **70-80% loan with a low interest rate, or**
  - **50-100 % of interest rate,**
  - **the time to pay the loan: during 3 years**
- **During 2001-2008:**
  - **tens of thousands of tractors and agricultural machines were used by farmers**
  - **speeding agricultural mechanization**
  - **training operation and maintenance skills of machines for farmers**

III. POLICY AND INSTITUTIONAL ASPECTS OF AGRICULTURAL MECHANIZATION (2)

➢ **Finacial policy (tax) has many changes to be relevant to the WTO integration**

- **For ASEAN countries: tax rate since 2010 for imported agricultural machines is 0%, or 5% in some cases**
- **Manufacturers of tractors and agricultural machines: priority investment under the Key Program of Mechanization**

IV. CONSTRAINS

- **Low level and uncompleted development of agricultural mechanization (average: 1.2 HP/ha)**
- **Low quality of agricultural and rural infrastructure makes it difficult to apply machines and equipment (farm land use of each houshold: 0.7 ha with 7-8 plots)**
- **Post-harvest technology is still poor with high Post-harvest loss rate for:**
  - **rice: 12%**
  - **corn: 18-19%**
  - **soyabean: 6.2-14%**
  - **peanut: 8.5-15%**

IV. CONSTRAINS (2)

- Inadequate research of science and technology in agricultural mechanization, delayed transfer of technologies
- Agricultural mechanic section does not meet the demand of agricultural production activities
- Low quality labor source, untrained operators/users of agricultural machines

SOME REASONS

- In general, agr. production is still in small scale
- Income from agr. production is low, unstable
- Farmers can't afford to purchase machinery/equipment because of low accumulation

V. BEST PRACTICES

1- Mechanization to improve yield and quality for main crops

2 - Improvement of post-harvest technology to reduce losses, ensure quality and food safety

3- State support is needed

4- Development of agr. extention

V. BEST PRACTICES

5- Combination of planning and land use planning towards agglomeration with the reorganization of production, improvement and embellishment of the field, investing in infrastructure for agricultural production, adapted to adoption of mechanization,reducing post harvest losses.

6- To encourage all economic sectors to invest in machinery manufacturing sector in general for agriculture, mechanization of agriculture in particular.

V. BEST PRACTICES (2)

1 - Mechanization to improve yield and quality for main crops (1)

➢ **Comprehensive mechanization for rice production**

- Research and develop all kinds of machinery and facilities with high capacity and good quality for land preparation of rice and other crops:
  - o various kinds of iron cages,
  - o floating boats, rotavaters, harrows, etc..

- Complete design and manufacture transplanters, machines for producing mat-type paddy seedling, applicator in rice intensified regions:
  - o transplanters model MC-6, MC-8
  - o comprehensive equipment for producing mat-type paddy seedling

V. BEST PRACTICES (3)

1 - Mechanization to improve yield and quality for main crops (1)

➢ **Comprehensive mechanization for rice production (cont'.)**

- Development of rice-care mechanization as pesticide sprayer with high capacity and heath protection

- Development of threshers and combine harvesters
  - o various capacities used for household and farm,
  - o mainly for Mekong River Delta (5000 combine harvesters, 4000 windrow reapers-9/2010)
  - o reduce losses and lower threshing cost while lack of labors,
  - o approach to reduce imported machines: rice combine harvesters GLH-1.5, GLH-1.8; windrow reaper;
  - o many kinds of threshers transferred to manufactories for larger scale production by VIAEP.

1 - Mechanization to improve yield and quality for main crops (2)

➢ **Mechanization in drainage and irrigation**

- Set up model of systems of sprinkling, dropping type, absorbing irrigation have been widely applied for different areas of lowland, highland, mountains, etc

- Set up model of systems of water pumps: axial-flow, vertical-flow, centrifugal pumps.

1 - Mechanization to improve yield and quality for main crops (2)

➢ **Mechanization in drainage and irrigation (cont'.)**

- Complete design, manufacture and transfer system of water saving irrigation for dry land crops as central area and midland, contributed to friendly environment and also further climate change in the world

- Set up applied models in every appropriate scale with low cost in comparison with those of the Israel or other countries

1 - Mechanization to improve yield and quality for main crops (3)

➢ **Development of greenhouse system and devices to create micro-climate area**

- **Greenhouses**
  - o **in various scales**
  - o **automatic/semi-automatic control and mornitoring in watering, fertilizer distribution,**
  - o **micro-climate change**

1 - Mechanization to improve yield and quality for main crops (4)

➢ **Comprehensive mechanization for Sugar-cane production**

- **Research and develop machinery and facilities system**
  - o **reduce labor force**
  - o **increase quality for land preparation as small tractor, furrower, rotavator, pesticide spreader in row; leaf rotary chopper, deep chisel, etc.**

- **Set up models of cutter, combine harvester SHC-0.2; windrower CMRH-0.18; collector and others.**

1 - Mechanization to improve yield and quality for main crops (5)

➢ **Mechanization for corn and legumes**

- **Design and transfer corn shellers for seed and commercial grains**
  - o **very low rates of damage;**
  - o **specific lower energy consumption.**
  - o **shell corn with husk at moisture content > 25%**
  - o **used for producing seed or commercial corn**
  - o **suitable for service in corn shelling on yards or in fields.**
  - o **E.g. Corn sheller TN-4.0M, ocrea peeler and sheller BBT-2.5, bench manual corn sheller TNQT-70, combine harvester**
- **Set up model of decorticator for groundnut pods to take out kernels with high rate recover for export and food processing at farm households as BVL-100, BVL-400**
- **Develop facilities for threshing and cleaning soybean with high performance and appropriate to house hold, farm at industrial scale**

2 - Improvement of post-harvest technology to reduce losses, ensure quality and food safety (1)

➢ **Technology and equipment for rice seed processing**

- **Develop seed processing line with semi-automatic control system:**
  - o **industrial level technology and equipment**
  - o **high germination rate and seed security in Vietnam**
  - o **transferred throughout the country**
  - o **The ratio of processed seed with the processing line improved from 0% (1995) to 30% (2008)**
- **The line is also applied for other seeds like corn, legum, etc.**

2 - Improvement of post-harvest technology to reduce losses, ensure quality and food safety (2)

- Drying technology and equipment for agro-products
- Research, design, manufacture and development of various kinds of dryers on the establishment of several new production lines and other related technological progresses
  - batch bed, vertical-type, rotary drum-type,
  - tower-type, recirculation-type,
  - bulk dryers, etc.,

2 - Improvement of post-harvest technology to reduce losses, ensure quality and food safety (2)

- Drying technology and equipment for agro-products (cont'.)
- Develop grain dryers, especially paddy dryer for MRD
  - low cost local materials,
  - loss reduction and quality assurance, particularly in autumn-summer crop or rainy season crop.
  - for flood areas.
  - increase the ratio of dried paddy from 11% (1998) to above 35% (2008)
  - also apply on corn drying of 20-30% in volume in the mountainous areas of the North and the Central Highland.

2 - Improvement of post-harvest technology to reduce losses, ensure quality and food safety (2)

- Drying technology and equipment for agro-products (cont'.)
- Research and develop new technology for drying
  - Infra-red, Heat pump,
  - Fluidized,
  - Drop Intermediate Control, etc.
- Successfully initial application to dry high value agro-products

VI. SUSTAINABLE AGRICULTURAL MECHANIZATION

Should be considered under two aspects:

- environmental protection (soil, water) and

- the development of agricultural machinery production

VI. SUSTAINABLE AGRICULTURAL MECHANIZATION (2)

- To ensure sustainability of soil, using proprriate machinery is needed (not using too heavy machinery/equipment
  - Zero tillage
  - minimum/reduce tillage
  - mulching soil/cover crops
  - Regular additions of organic matter or the use of cover crops can increase soil aggregate stability, soil tilth, and diversity of soil microbial life.
- For sustainable mechanization development
  - After-sale service: providing preparing network of maintenance, enough spare parts...
  - Comprehensive mechanization
  - Organizing training courses for operators
  - Policy support for agr. machinery manufacturers
  - Development of National Testing Center for agri. machinery

Peanut is mulched by PVC film

Plant for manufacturing microorganism fertilizer

Fig. 1. Sowing soybeans directly to the rice field without tillage, just after rice harvested

CONCLUSION

1. In the past years, Vietnamese agricultural production has obtained rapid, steady growth. Thanks to this, Vietnam basically ensured its food security, paved the path for shifting structure of agricultural economy and for developing non-agricultural industries. Several export agro-products of Vietnam have been in the world highest rank such as black pepper, coffee, rice and cashew nut.

CONCLUSION (2)

2. According to the MARD of Vietnam; however, Vietnamese agricultural economy has achieved great initial results, but process of its development is seen not completely sustainable. The rapid shift of structure of crops and domestic animals makes changes of exploitation mode of resources of land, water and biology in large scale. Moreover, activities of survey, design, control and supervision are still insufficient; therefore, many dangers occur such as ecological imbalance, threat to the competitive ability of agricultural sector.

CONCLUSION (3)

3. For this reason, simultaneous with application of mechanisation and safer technology to reduce environmental pollution, Vietnam has done its utmost to prevent deforestation, conserve biological diversity, improve environmental hygiene, create jobs and increase standard of living for the people. To protect the environment, many countries have waged environmentally friendly movements in various names as sustainable agriculture, ecological agriculture, appropriate agriculture, integrated agriculture, etc. with the activities of research and application of production modes oriented to sustainable development in all sectors.

SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (1)

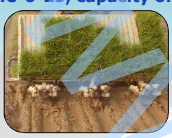
Cultivation, crops-care

Technology and system of implements and machines for complete tray paddy sowing in industrial scale

SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (2)

Cultivation, crops-care

Six-row rice mat-seedling transplanter MC-6-20 and MC-6-25, capacity of 0,12-0,15 ha/h



SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (3)

Cultivation, crops-care

System for between-row sugarcane care, including: small four-wheel tractor with two-driving shafts of 18-20 HP, stem cutter, rotavator, fertilizer distributor and furrow making machine with capacity of 0,3-0,4 ha/h.


SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (4)

Cultivation, crops-care

Models net-houses/greenhouses for development of vegetable, flower, seedling appropriate to production conditions in Vietnam



SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (5)

Harvest

+ Types of rice combine harvesters with capacity of 0,2-0,3 ha/h appropriate to production conditions in Vietnam

+ Machine for rice colletion and threshing GĐ-1,7 with capacity of 0,3ha/h


SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (6)

Harvest

+ Combine for corn-on-the-cob harvesting and corn-stem chopping and spreading in the field with capacity of 0,3 - 0,5 ha/h.

+ Groundnut combine harvester with capacity of 0,2-0,3 ha/h

SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (7)

Harvest

+ Windrow sugarcane cutter CMRH-0.1 with capacity of 0,1ha

+ Whole stem sugarcane combine harvester: one-row harvester with capacity of 10-12 tons/h


SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (8)

Processing and storage

+ System for seed processing (paddy, maize, legumes) with a scale of 1-2 tons/h

+ Types of dryers for agricultural grains with capacity of 0,2-30 tons per batch and vegetable dryers with capacity of 50-1.000 kg per batch

Dryer SH- 4

Tower-type dryer wi automatic control

SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (9)

Processing and storage

+ Various types of cold stores, frozen stores and isolation stores (capacity: 10 - 200m^3) to preserve agricultural and aquatic products with automatically adjusted temperature and moisture content

II. SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (10)

Processing and storage

+ Model of packing house for preliminary processing, prservation of fresh vegetables, flowers and fruit in centralized scale with capacity of 10-15 tons per day

SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (11)

MECHANIZATION IN ANIMAL HUSBANDRY

+ Mechanization in slaughtering: Equipment system with a scale of 150-250 heads/h for chicken and 20-30 heads/h for porker, ensuring hygience and food safety

II. SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (12)

MECHANIZATION IN ANIMAL HUSBANDRY

+ Complete lines for animal feed processing in types of meals and pellet with a capacity of 1-10 tons an hour.

Animal feed processing line

Machine for making animal pellete EV-400 (Capacity 3,5-7 tons per hour)

SOME RESEARCH ACHIEVEMENTS IN SCIENCE AND TECHNOLOGY (13)

MECHANIZATION IN ANIMAL HUSBANDRY

+ System of machines for gathering and treating straw: Machine for collecting straw square-type bale, round-type bale; for chopping bale straw; for mixing feed for cow. Machine for stubble and straw treatment in the field

Square-type straw baling machine