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The 6th Regional Forum for Sustainable Agricultural Mechanization in Asia and the Pacific - Enabling Environment for the Private Sector
25 October 2018, Wuhan, China
Agricultural Mechanization in India: Enabling Environment for the Private Sector

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INDIAN AGRICULTURAL RESEARCH SYSTEM

- 111 Institutes
- 74 Agricultural Universities
- 300 Regional Stations
- 563 Agriculture Colleges
- 700 KVKs (Agri. Science Centers)
- 90 All India Coordinated Research Projects
- 10 Mega Projects (NASF, NAHEP)
- 16 Consortia Research platforms
- > 50 Extra Mural Projects
Agricultural Mechanization status

- Farm Mechanization 40 - 45%
- Agricultural produce processing 45%
- Power input about 2 kW/ha
Challenges

- Farm machinery and equipment
- Technology
- Markets
- Operations
- Legislation
- Policy framework
Deciding Factors

- Land size
- Cropping pattern
- Market price of crops including MSP
- Availability of labour
- Cost of labour
Approach

- R&D of farm equipment and machinery
- Testing
- Quality control
- Popularization among stakeholders
Policy Support

- Farm mechanization programs
- Rashtriya Krishi Vikas Yojna (RKVY)
- Mission for Integrated Development of Horticulture (MIDH)
- National Mission on Oilseeds and Oil Palm (NMOOP)
- National Food Security Mission (NFSM)
- Sub-Mission on Agricultural Mechanization (SMAM)
- Promotion of Agricultural Mechanization through In-situ Crop Residue Management
- National Mission on Agricultural Extension and Technology (NMAET)
Research and Development

- ICAR - looks after need of R&D activities
- Cost-effective solutions to location-specific problems
- Need-based region specific technologies
- Specific-problem related issues
Public-Private linkage

- A large number of implements developed by involving manufacturers at R&D stage
- Private sector multiply technologies for millions of farmers
- Channelize sources for private sector profitability and farmers benefit
- Higher and more sustainable growth for poverty reduction

- Public research system
- For areas where private sector has not shown interest
- Rainfed areas
- Tribal areas
- Natural resource management
- Pulses & millets
Extension

- Krishi Vigyan Kendras (KVK): 700
- Centres of AICRPs: about 1000
- Promote region-specific, farmer-friendly newer technologies
Supporting Policies

✓ Promotion of custom hiring of farm equipment, high capacity machines and entrepreneurship models
✓ R&D for farm machinery through Public Private Partnership
✓ Quality manufacturing and after sales support for reliability
✓ Farm Machinery Promotion Centres for availability of equipment
✓ Extending more subsidies on precision farm machinery
✓ Identifying Farm machinery CHCs as small scale industry
✓ Treating community development of small farm holdings with mechanized agriculture as social responsibility
Custom Hiring - The Core Issues

- Adverse ‘Economies of Scale’
- Weak financial strength of majority of farmers (SMF)
- Lack of access to credit to Rural Entrepreneurs for setting Custom Hiring Centre
- Need for promoting appropriate Farm Equipment: Region and crop specific, indigenous technology
Other Key Areas (Quality Assurance)

- **Strengthening core Competency of Farm Machinery Training and Testing**: Quality Assurance, Performance Testing of newly developed equipment

- **Expanding network of Farm Equipment Testing Centers**: Currently 35 testing centres to test/certify

- **Quality manufacturing** of farm equipment in regions of low mechanization
Case Study 1: NICRA Villages

- Early decades of nineteenth century
  - 30-inch (diameter) steam thresher
- Mid-1960 - organized custom hiring
  - Agro-Industries Corporation (AIC) established
  - 1970s to 1990s - land development and tillage
- 1971 – GOI scheme to set up Agro-Services Centres
- 1990s - in a limited way under NATP and NAIP

- 2010 - NICRA - 100 Agriculture Science Centres (KVKs)
  - in drought/ flood/ hill area and difficult situations
  - centres managed by farmers through
    - Village Climate Risk management Committees.
- 2014 – Existing centres strengthened
  - 50 more centres established
Selected Districts for Custom Hiring Centres
Advantages

✓ Available extension network and technical expertise of KVKs utilized
✓ By forming Farm Machinery Service Centres/ Farmers Committee, requirement of individual village/ agro-climatic zone assessed and use of equipment tailor made as per requirement/demand.
✓ Revenue generation ploughed back to the society.
✓ Operation repair, maintenance aspects taken care of.

➤ After great success of project, existing centres strengthened
➤ Another 50 centres started in 2014
Case Study 2: SMAM

- Since 2012
- Small & Marginal Farmers - at core of interventions
- Special emphasis on ‘reaching the unreached’
- Cater to ‘adverse economies of scale’
- by promoting ‘Custom Hiring Services’
- through ‘the rural entrepreneurship’ model.
- Aim - catalyzing an accelerated but inclusive growth of agricultural mechanization in India
Financial assistance for Promotion and strengthening of agricultural mechanization through

- Training, testing and demonstration
- Post harvest technology and management
- Procurement of selected agriculture machinery and equipment
- Establishment of farm machinery banks for custom hiring
- Establishing hi-tech productive equipment centres
- to target low productive agricultural regions and assistance for increasing farm mechanization
Farm Machinery Banks for Custom Hiring

- Promote mechanization in districts with low farm power availability
- Facilitate hiring services of agricultural machinery/implements for different operations
- Expand mechanized activities during cropping seasons in large areas (small and marginal holdings)
- Introduce improved/newly developed agricultural implements and machines in crop production
Hi-Tech, High Productive Equipment Hubs

- Promote utilization of hi-tech, high value machines for higher productivity
- Provide hiring services for high value crop specific machines for different operations.
- Expand mechanized activities during cropping seasons to cover large areas
- Involve manufacturers for setting up centres
Financial Assistance (Rs. 12 Billion in 2018)

- Purchase of farm implements (40% of the cost for individual farmers; Custom Hiring Centre by Co-operative Societies of farmers, SHGs, FPOs and Private Entrepreneurs; and 50% of the cost for small & marginal farmers, weaker sections, women and north eastern states beneficiary)

- For post harvest, value addition implements, storage and packaging, the financial assistance is 50% and 60% respectively

- For demonstration of farm implements at farmers’ fields, the assistance is 100% @Rs 4000/ha up to 100 ha per season

- For training of farmers/stakeholders, the assistance is Rs 2.5 million per state per year

- Projects up to Rs 6 million - for establishing custom hiring centre

- Projects up to 25 million - for establishing high-tech high capacity equipment hub

- Assistance to a group of farmers (minimum 8) is 80% up to Rs 1 million per bank

- Thousands of agricultural machinery manufacturers and millions of farmers benefitted
Case Study 3:

Promotion of Mechanization for In-Situ Management of Crop Residue

Since 2018
Straw burning problem

- Nearly 30 million ton paddy straw generated in Punjab and Haryana.
  - 7 million ton (from 0.8 million ha) removed for alternate uses like power generation, biofuel, feeding animals and for heat generation etc.
  - 23 million ton (from 2.8 million ha) burnt as easy and quick method of disposal.
Mechanization for In-situ Crop Residue Management

- Paddy straw/crop residues burnt to clear the field after harvest of the preceding crop for sowing next crop
- Burning of straw causes atmospheric pollution and huge nutritional loss and physical health deterioration to soil
- To curb burning and reducing winter smog pollution

- 2018 - Central Sector Scheme on “Promotion of Agricultural Mechanization for In-situ Management of Crop Residue” started
Viable and scalable solution for Rice-Wheat cropping - Straw mulching and Sowing

- Attachment of super Straw Management System in Existing Combines
- Direct wheat sowing with Happy Seeder
For Rice-Potato/vegetable cropping system - Straw incorporation

- Paddy straw Chopper-cum-spreader / Mulcher + Reversible Mould Board Plough or / and Rotavator + Sowing of potato / vegetable / other crops
Financial assistance on purchase of implements

- Super Straw Management System (11580)
- Happy Seeder (23160)
- Paddy Straw Chopper/ Shredder/Mulcher (8685)
- Shrub Master / Cutter cum Spreader (2000)
- Hydraulic Reversible M.B. Plough (3975)
- Rotary Slasher (1100)
- Zero Till Seed cum Fertilizer Drill (2735)
- Rotavator (367)
✓ 50% of the cost of the implement for individual farmers

✓ 80% of the cost of implements for Custom Hiring Centre (CHC) by Co-operative Societies of farmers, groups or SHGs, FPOs and Private Entrepreneurs)

✓ Real time online monitoring of fire incident cases by remote sensing

✓ Empanelment of manufacturers for supply of implements based on standardized specifications and cost
## Budget: Rs 11.52 Billion

<table>
<thead>
<tr>
<th>Components</th>
<th>2018-19</th>
<th>2019-20</th>
<th>Total</th>
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<tr>
<td></td>
<td>No.</td>
<td>Rs in billion</td>
<td>No.</td>
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<tr>
<td>i) Fin. Ass. to establish farm machinery banks for CHC</td>
<td>3,650</td>
<td>3.5</td>
<td>3,400</td>
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<tr>
<td>(80% subsidy on Implement/machine)</td>
<td></td>
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<td></td>
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<td>ii) Fin. Ass. to farmers for procurement of machinery</td>
<td>18,500</td>
<td>1.39</td>
<td>17,500</td>
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<tr>
<td>(50% subsidy on Implement/machine)</td>
<td></td>
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<tr>
<td>iii) IEC for awareness creation</td>
<td>1.03</td>
<td></td>
<td>1.03</td>
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<tr>
<td>Total</td>
<td>5.92</td>
<td></td>
<td>5.60</td>
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# Machinery and Fund Allocation

<table>
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<tr>
<th>S. No.</th>
<th>Name of equipment</th>
<th>Number</th>
<th>Amount, Rs in billion</th>
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<tr>
<td>1.</td>
<td>SMS</td>
<td>11,580</td>
<td>1.62</td>
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<tr>
<td>2.</td>
<td>Happy Seeder</td>
<td>23,160</td>
<td>3.13</td>
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<td>3.</td>
<td>Straw chopper/ shredder / Mulcher</td>
<td>8,685</td>
<td>2.17</td>
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<td>4.</td>
<td>Shrub Master/ Cutter-cum-Spreader</td>
<td>2,000</td>
<td>0.1</td>
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<tr>
<td>5.</td>
<td>Reversible M B Plough</td>
<td>3,975</td>
<td>0.9</td>
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<td>6.</td>
<td>Straw Slasher</td>
<td>1,100</td>
<td>0.04</td>
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<tr>
<td>7.</td>
<td>Zero till Drill</td>
<td>2,735</td>
<td>0.14</td>
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<tr>
<td>8.</td>
<td>Rotavator</td>
<td>367</td>
<td>0.03</td>
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<td></td>
<td><strong>53,602</strong></td>
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Way Forward
Lessons Learned and Good Practices

- Mechanization - capital intensive; for promotion to farmers there is need to:
  - Consolidate widely fragmented and scattered land holdings
  - Extend benefits of mechanization to small and marginal farmers, horticultural crops, and all regions especially rainfed areas
  - Innovate custom service or rental model by institutionalizing high cost farm machinery and promote by private / public sector in major production hubs
  - Provide subsidies to medium and large farmers or rural unemployed youth to encourage them to buy and apply advanced medium and high size machinery
  - Establish farm machinery banks for machines manufactured elsewhere and supply to users/farmers on custom hiring mode
  - Setting manufacturing units in areas with lower mechanization by supporting and extending tax and duty sops
Social and Economic Benefits

✓ Motivation to mechanize is driven by a wish to
  ✓ Increase a family’s food security
  ✓ Increase household income
  ✓ Improve the quality of life

Economic benefits
✓ Increasing the efficiency of labour
✓ Reducing costs
✓ Increasing the area cultivated
✓ Undertaking more timely production
✓ Improving the quality of cultivation
✓ Increasing yields
✓ Adopting crop diversification
✓ Reducing harvest and post-harvest losses
✓ Earning a rental income through hiring farm-power services
Social and Economic Benefits

Social benefits

- Reducing drudgery and workloads (particularly for women)
- Improving safety
- Gaining prestige
- Encouraging youth and more innovative people to remain in rural areas and work on the land.
Solutions and Suggestions

Strategies

✓ Incentives and policy support for adoption, development and promotion of farm mechanization technologies particularly suitable for dry land farming, horticulture and orchards, hill agriculture, sugarcane harvesting, cotton picking, rice production etc.

✓ Establish farm machinery banks for machines manufactured elsewhere and supply to users/ farmers.

✓ Banks provide hassle free loans for tractors and farm machinery on individual ownership basis or custom hiring basis.

✓ Extend tax and duty sops to manufacturing units set-up in areas with lower mechanization

✓ Innovate custom service or rental model by institutionalizing high cost farm machinery such as combine harvester, sugarcane harvester, potato combine, paddy transplanter, laser leveller, etc.

✓ Develop large-scale rural entrepreneurship for custom hiring of agricultural machinery at a faster pace.
Role of Public Sector

To underpin initiatives at household level and support infrastructure, ensure enabling policy environment:

✓ A vibrant economy with well-developed private sector to deliver and sustain mechanization inputs
✓ A profitable agriculture sector with access to markets (domestic and international), effective demand for food products, opportunities for value-adding through processing, fair trade, and production of niche products
✓ A diverse economic base in rural areas to enable farming households to generate income off-farm to invest in agriculture
✓ Affordable mechanization inputs conforming to national standards
Role of Private Sector

- Indigenize imported specialized machinery for cost reduction where the volumes are of economic scale
- Promote formation of farm cooperatives to increase the use of bigger farm machinery for optimizing resources
- Promote the concept of contract farming to increase farm output and farmers’ earning
- Provide funding for improving farm irrigation levels to enable multiple cropping needing more machines
- Promote crop specific and location specific, indigenous technologies which are cheap, affordable, and more useful than mass produced machines
- Encourage custom hiring among farming community to enhance earnings.
The message to farmers

- The motivation to mechanize is primarily driven by a wish to increase a family’s food security, increase household income, or improve the quality of life.

- I suggest farmers may fully use custom hiring services and reap significant economic and social benefits.
Role the Private Sector can play

- The Private sector in India is definitely capable and offering quality products at competitive prices. The basic machinery and implements are available. However, we are importing many specialized machinery. The private sector needs to indigenize these for bringing down the cost, provided the volumes are of economic scale.

- They need to help promote the formation of farm cooperatives which eventually increases the scope of uses of bigger farm machinery and result in minimum wastage of resources.

- Even the concept of contract farming with the help of private sector will go a long way in increasing farm output and hence the earning of the farmer.

- They need to aggressively provide the funding for improving the farm irrigation levels especially in states like MP, Rajasthan, Maharashtra and Gujarat, etc. The improvement in irrigation facilities will enable the farmer to go for multiple cropping and hence there will be need of more machines.

- They need to promote crop specific and location specific, indigenous technologies which are not only cheap and affordable, but also more useful than the mass produced machines.

- The private sector needs to come forward and encourage the concept of custom hiring among farming community to enhance their earnings.

Solutions and Suggestions

THANK YOU ALL