Thematic strategies and options for *Sustainable Agricultural Mechanization (SAM)* in Asia and the Pacific Region

By

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Outline of the Presentation

- Improving Agricultural Mechanization Systems: *Farm Power; Land Preparation & Crop Husbandry; Water Use Efficiency*
- Mechanization Across the Value Chain: *Post-harvest sector and Supply Chains for Mechanization Inputs*
- Gender Role and Empowerment of *Women & Youth*
- Institutional Issues: *Smallholders & Farmer Organizations; Manufacturers; and Financing Mechanisms*
- Technology Development & Transfer: *R & D; Knowledge Transfer & Extension; ICT; Testing and Standards*
- Capacity Building at National and Regional levels
- Policy and Strategy Formulation and Coordination

Transforming the Farm Power Situation

- The region has made great progress over the past six decades in transforming farm power situation from:
  - Almost 95% from animate sources in 1960s to over 50% from mechanical sources by 2010 in many countries
  - Four main types of power sources are emerging i) 2WT; ii) 4WT; iii) Elect. & Diesel pump sets for irrigation; iv) Motorized equipment for harvesting and Post-harvest operations;
  - Use of draft animals likely to be insignificant by 2030 in the region;

  - OPTIONS:
    - i) Help all countries to smoothly achieve this transformation
    - ii) Assess the socio-economic and environmental impacts of the transformation

Transforming Tillage and Crop Husbandry Practices

- Under ***Conventional Tillage [CT]*** land preparation & crop husbandry techniques use basically same design of implements irrespective of power source
- CT practiced over many centuries, accepted as conventional knowledge by farmers, researchers etc.
- *Sustainability of CT practices being questioned & global movement to* ***conservation agriculture [CA]*** *– regarded as more sustainable*
- CA adopted more in OECD countries - North & South America but even here limited adoption cf. effort;

Transforming Tillage and Crop Husbandry Practices-2

- Options for transformation of CT practices include:
  1. Need for short, medium & long term planning for significant conversion of CT practices to more sustainable ones e.g. CA;
  2. Transformation of CT practices more challenging than change of farm power situation – need to draw lessons from the latter;
  3. Requires change of mindset of all involved in agric. sector as CT practices are centuries old & quite entrenched;
  4. Costs involved quite high both to the farmer; public and private sectors including manufacturers of implements;
  5. R & D effort to determine what is the right practice for different agro-regions required not a matter of copying what has worked elsewhere e.g. CA practices from North & South America;
  6. Should be part of *Sustainable Agricultural Intensification.*

Water Use Efficiency

- Asia & the Pacific region has largest area under irrigation – mostly for paddy cultivation
- Use of electric & diesel pump-sets has increased significantly and will continue to increase;
- Water use efficiency in irrigated agriculture could be improved considerably in reducing water use;
- Options here include technical support for development of irrigation infrastructure particularly for controlled irrigation systems and for R & D efforts;

Mechanization across the Value Chain

- Previous mechanization analysis confined to on-farm production issues & Did not include off-farm uses of machinery & implements;
- Farmers were realizing economies of utilization & profitability of their agric. mechanization [AM] investments off-farm
- Effective demand of outputs of farming critical to success in AM;
- Need to consider entire food chain - from inputs to post-harvest and processing to consumer protection-(food safety) in AM analysis
- AM can contribute significantly in reducing food losses
- Need to factor in supply chains for AM inputs – repairs & parts etc.
- Options here include considering entire food chain for SAM;
- Factoring environmental impacts of AM – including emerging global issues - Climate Change; CO_2 emissions; application of herbicides and pesticides etc.

Gender and Empowerment Issues

- Increasing labor costs & feminization of agriculture are creating significant shifts in agriculture in Asia
- More men than women migrating to urban areas creating gender problems in access & ownership of land and productive resources & services like AM ones;
- Need to mainstream gender dimension in SAMS – from legal; social and technological perspectives;
- Youth training and empowerment critical for success of SAMS to create new cadre of farmers and reduce migration to urban areas and greying of agriculture
- Targeted programs for youth and women critical for success of SAMS

Smallholders and Farmer Organizations

- The region has the largest number of smallholders but they need not be obstacles to AM – lessons from the past;
- Need for the right policies, regulations & incentives which facilitate provision of AM services to smallholders;
- Provision of AM custom-hiring services to smallholders by entrepreneurs and other farmers critical to SAMS;
- Right policies for credit; land tenure; R & D and technology transfer are essential for success of SAM with smallholders;
- Farmer organizations including cooperatives and other associations need to be capacitated to provide AM services;
- Welfare & industrial policies which facilitate AM processes

Manufacturing of agricultural machinery and implements

- Asia Pacific region emerging as a leading global player in the manufacture and use of AM inputs
- Key issue is how to incentivize manufacturers to R&D and produce SAM machinery and implements;
- Other options include - setting up and operation of efficient supply chains for AM inputs especially for low profit margin items e.g. for land preparation and
- Creation of regulatory frameworks to facilitate operation of AM supply chains & franchises through Chambers of commerce & business associations
- Financing of AM investments – credit subsidies; collaterals

Technology development & transfer -1

- Research & Development critical for success of SAMS
- Successful R & D dominated in AM by private sector although large expenditure by public sector also;
- Integration & coordination of private and public R & D investments and initiatives in SAM critical
- R&D at national and regional levels to determine what works best under prevailing conditions in the region
- South-south and regional collaboration in R &D to avoid duplication and achieve economies of scale and scope
- Regulatory framework for patenting and licensing of technologies at regional level including inventory what is available in the region – who, where & what

Technology development & transfer -2

- A large manufacturing base in the region and trade in AM technologies requires a regional mechanism for standards and testing of AM technologies
- ANTAM offers a good starting point in the process of establishing and sustainably financing testing centers
- Harmonization of testing protocols across the region will facilitate trade in AM technologies regionally and globally
- Networks of extension services, researchers and CSOs involved in SAM required – use of ICT could facilitate this;
- Formation of a Network for sharing experiences and approaches on SAMS should be a high priority area

Capacity building at national and regional levels

- New crop of experts required due to retirement, new emerging technologies such as those of SAM;
- Capacity development of human resources and strengthening institutions required both for the public and private sectors
- Regional training programs where economies of scale and scope dictate so;
- Need top revise curricula of colleges and universities to introduce new concepts – CA; Precision farming etc.
- Training of farmers, supply chain technicians etc. necessary on SAM technologies critical

Policy and strategy formulation and coordination

- SAMS will require long-term commitment by a wide variety of stakeholders – at policy & operational levels;
- Policy makers have to take a long term perspective and remain steadfast – e.g. experience of farm power
- Options include improved coordination of all key stakeholders in the public and private sectors;
- Defining short, medium and long priorities for SAMS across countries; agro-ecologies, farming systems etc.
- Drawing and documenting lessons from the past experience and successful case studies for scaling-up.
- Coordination across sectors – agriculture; trade; industry etc.

Concluding Comments

- There is no doubt that the Asia and the Pacific region has made a lot of progress in AM over the past 60 years
- The agriculture and food sector is going to face even more daunting challenges over the next 3-4 decades
- SAMS should contribute to helping the sector and region in tackling those challenges.
- Regional collaboration would greatly help in this regard.

THANK YOU !