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Long-term Mechanization Strategy at National Level Issues and Recommendations

5.1 PREAMBLE

Mechanization has been well received the world over as one of the important elements of modernization of agriculture. It is now recognized that availability of mechanical power and improved equipment has enabled States like Punjab and Haryana to achieve high levels of land productivity. The results of the survey conducted under the project **"Study Relating to Formulating Long-Term Mechanization Strategy for Each Agro Climatic Zone/State"** confirm that in those States where agricultural mechanization has made good progress, its benefits are being shared by all farmers irrespective of the size of their operational holdings and whether they own tractors and machinery or not. However, the progress of mechanization in most of the States has been slow and its benefits of timely and precise operations, efficient use of costly inputs like seed, fertilizer, plant protection chemicals, limited water resource, etc. are not reaching the majority of farmers in full measure. During the course of project implementation this matter received deep consideration. It resulted in the identification of some issues which need to be attended to if a more even spread of mechanization and the policy goal of modernizing Indian agriculture have to be achieved. These issues have been given due consideration in making the recommendations on the strategy for mechanization of agriculture. The recommendations given in Chapter IV are agro climatic zone specific. This Chapter includes recommendations on strategy to be adopted at the national level.

5.2 THE RETURNS FROM INVESTMENTS

The annual investment on agricultural machinery including tractors, power tillers, engines, etc., is more than Rs 50,000 crores (Appendix-B) compared to the combined annual investment of Rs 24,000 crores on fertilizers, certified seeds and plant protection chemicals. Due to poor information and inadequate guidance, the farmer often makes wrong selection of machinery leading to improper investment. This and poor management of power and machinery create financial problems for the farmers. This requires:

- institutional arrangement for giving advise and guiding the farmer in the selection of farm power units and machinery;
- extensive arrangements for training to young farmers in farm machinery management including its operation and maintenance;
- active information service to keep the farmer informed of the developments in mechanization including availability of new and better farm equipment for different applications.

5.3 INSTITUTIONAL FRAME WORK

Institutional arrangements and programmes at the National and State levels are grossly inadequate to plan and give proper direction to the development of agricultural mechanization. To overcome this weakness, the following is recommended:

- There should be an Agricultural Mechanization Board at the Center under the Chairmanship of the Minister of Agriculture. Its function should be to take policy decisions at the national level, review and revise mechanization strategies, monitor the programmes of mechanization and make such interventions as may be required to keep the programmes in line with general agricultural goals and policies. Other concerned Departments and Organizations of the Central Government including Indian Council of Agricultural Research, few State Governments (by rotation), industries, research organizations, State Agricultural Universities (SAUs), progressive farmers and experts on agricultural mechanization should be represented on the Board.
- There should be Agricultural Mechanization Councils in the States which should have the same functions as the Agricultural Mechanization Board in respect of the States and which should be chaired by the Ministers of Agriculture. The composition of the State Councils should be on the same pattern as of the National Board involving other Departments and Organizations

of the State Governments with adequate representation of the industries, progressive farmers and Agricultural Universities.

- The programmes of Agricultural Mechanization at the Center should be headed by a Commissioner of Agricultural Engineering & Technology who should be directly responsible for the planning and monitoring of agricultural mechanization programmes at the national level and who should oversee testing and training activities of the FMTTIs. The Commissioner will be responsible for collection and analysis of agricultural mechanization data and to report the findings to the Agricultural Mechanization Board. He will represent the Board in all State Councils. The Agricultural Mechanization Commissioner should be assisted by two Joint Commissioners (Agricultural Machinery) and other professional and administrative staff.
- Director of Agricultural Engineering and Technology should head the agricultural mechanization programmes at the State level. He should be a qualified professional. In small States, Additional Director of Agricultural Engineering & Technology may head this programme. The responsibilities of the Director Agricultural Engineering at the State level should be the same as that of the Commissioner (Agricultural Engineering and Technology) at the Center. He should be responsible for coordinating agricultural engineering programmes including mechanization with the help of zonal and district level staff and the agricultural engineers in Krishi Vigyan Kendras (KVKs). He should organize regular interaction between progressive farmers, SAU experts, representatives of banks and industries and facilitate group visits by farmers and manufactures of farm machinery to national and international exhibitions and other events in which updated information on agricultural machinery is available.

5.4 TESTING AND TRAINING

- Selected SAUs and Research Institutes with strong agricultural engineering component should be supported by DOAC to develop facilities and undertake farm machinery testing for the purpose of Bureau of Indian Standards (BIS) certification, to help the manufactures to improve quality of equipment and to provide information on machinery performance to DOAC and other organizations. The tractor testing should remain exclusively with FMTTIs Centers. This will greatly increase the DOAC capability for expeditious evaluation of farm machinery and help the industry too.
- The State Directors of Agricultural Engineering, SAUs, State Agro-Industries Corporations, FMTTIs, ICAR Institutes having Tractor Training Centres (TTCs), KVKs and tractor and farm machinery dealers should be made responsible for training tractor and machinery operators. This will require that a qualified agricultural engineer is posted in each KVK. The facilities at selected SAU's and ICAR Institutes should be improved so that these institutions, together with FMTTIs, can offer high quality training to the mechanics, farm machinery fabricators and extension workers in agricultural engineering. The Extension Education Institutes of DOAC and MANAGE, Hyderabad should have staff and facilities for training middle and senior level extension staff in agricultural engineering.
- Orientation/refresher courses for the functionaries of the above listed organizations should be organized at regular interval with the cooperation of Agricultural Universities and ICAR Institutes so that the trainers remain informed of and in touch with the improvements in farm mechanization hardware and efficient farm mechanization management practices.

5.5 RESEARCH AND DEVELOPMENT

- Agricultural mechanization research and development programmes in the SAUs and ICAR Institutes should be strengthened. Agricultural Universities and ICAR Institutes having sufficient manpower and facilities for research and development in the field of mechanization should be identified and assigned the responsibility of research and development for different agro-economic zones. Other Agricultural Universities, ICAR Institutes, KVKs and NGOs engaged in agricultural mechanization programmes should be actively associated with the evaluation and demonstration of the output of research and development.
- The programmes of Front Line Demonstration (FLD) of farm machinery should be strengthened.
- Research and Development (R&D) programmes should be reoriented to deliver outputs which are needed by the farmers and are marketable. R&D

funding should be generous and adequate to produce successfully tested and well engineered equipment.

5.6 OPERATIONAL HOLDINGS

Due to continuing fragmentation, the average size of operational holdings is shrinking in all States and the percentage of marginal, small and semi-medium operational holdings is increasing. This is making individual ownership of agricultural machinery progressively more difficult. It is recommended to:

- encourage custom hiring operation of tractors, power tillers and farm machinery through training, financial incentives, subsidized loans and adequate financing to allow procurement of high capacity equipment by the custom operator to ensure sufficient turn over and income;
- contract farming should also be encouraged in which case the farmer will grow specific crops suiting to the requirement of the persons/ organizations entering into contract farming. He would also suggest the full package of practices including improved implements and technology for production of specific crops.
- organize farm machinery cooperatives at selected locations and utilize the experience for establishing such cooperatives in all States in sufficient numbers.

5.7 LIMITED RANGE OF EQUIPMENT

The R&D programmes in India have so far served mainly the rice-wheat cropping system. The range of the equipment is not wide enough to facilitate diversification of agriculture. Equipment including tractors and prime movers for mechanization of hill agriculture and production of fruits and vegetables is not commonly available. The R&D programmes in future should focus on the development of farm machinery and power units for:

- precision and protected agriculture,
- hill agriculture,
- horticulture, cash and plantation crop,
- recovery and management of crop residues,
- non-farm applications like efficient rural transport, maintenance of village roads, etc.,
- sample equipment like hill side tractors, tool carriers, precision planters, transplanters, harvesters and pickers for sugarcane, cotton, fruits, etc., high capacity mowers, swathers and balers and mechanical handling equipment should be imported and made available to R&D Institutes for proper evaluation and integration with our requirements.

5.8 RESOURCE CONSERVATION

Land and water, the two natural resources, are limited and need to be managed in such a way that their quality and productivity are maintained and possibly improved. Energy conservation has become important because the diesel prices are rising and the supply of grid power to villages remains limited. It is recommended that:

- The farmers should be encouraged to incorporate crop residues into the soil to improve its organic matter content and both animal drawn and tractor operated equipment should be developed and made available for this purpose.
- Periodic sub-soiling should be practised to avoid hard pan formation and custom operators should be encouraged to add this operation to the services offered by them.
- Equipment for forming raised beds, precision levelling and for other such operations which help to improve water use efficiency should be made available through custom operators or farm machinery cooperatives.
- Energy saving practices like zero till planting, strip till planting, use of machine combines and throttle down - high gear operation of tractors should be demonstrated and promoted.
- Micro-irrigation system viz. sprinkler and drip irrigation system should be encouraged to save energy and improve water utilization efficiency.

5.9 QUALITY OF FARM MACHINERY

Fabrication of agricultural tools and machinery is often done by semi-skilled workers and without proper tooling. This is more so in the case of hand tools and animal drawn equipment. The poor quality of agricultural equipment puts the user—farmer and custom operator at a permanent disadvantage. There is vast opportunity for exporting animal drawn equipment and power equipment in small and medium range to the countries in Asia and Africa. The poor quality of agricultural equipment has prevented the Indian manufacturers from using this opportunity. It is recommended that:

- selected SAUs, Agricultural Engineering Institutes of ICAR and ITIs should be supported to develop competence and offer intensive training to young technicians and artisans in the fabrication and manufacture of farm tools and machinery;
- farm machinery manufacturing is reserved for

small scale industries. Organized industries should be allowed to manufacture farm machinery;
- while the tractor testing and training centres should continue to test tractors and power tillers, zonal farm machinery testing centres should be established in SAUs and other selected organizations and only successfully tested equipment should be recommended to the users.
- farm machinery manufacturers training programmes and manufacturers business meets may be organized to create awareness among the manufacturers about the production of quality agricultural equipment and machinery. Facilities may be extended to them for testing and evaluation of their equipment from the product development point of view. Incentives and awards should be given to the manufacturers for producing quality implements/machinery.
- FMTTIs/SAUs/ICAR Institutes and other R&D organizations should offer technical support and testing facilities to the farm machinery and processing equipment manufacturers to improve the quality of their products.

5.10 NEW DEVELOPMENTS

In the absence of adequate interaction with research organizations and industries in technologically advanced countries, R&D groups and industries in India are not able to incorporate new developments and improvements in their designs and products. It is recommended that:
- industries and R&D organizations should be allowed duty free import in limited numbers of farm machinery from other countries for the purpose of adaptive research and product improvement;
- Government should facilitate group visits by machinery manufacturers and research workers to international farm machinery and tractors shows and exhibitions.

5.11 REGION WITH LOW LEVEL OF MECHANIZATION

There are many regions in which the farmers continue to use country plough and inefficient hand tools because little effort has been made to introduce improved animal drawn implements and hand tools in these areas. It is recommended that:
- special schemes should be launched to popularize improved animal drawn implements and hand tools in areas which have backward agriculture;
- financial incentive should be provided for replacement of inefficient equipment by improved tools and implements till this transition picks up speed.
- to accelerate the growth of agricultural mechanization in these regions, special incentives and high rate of subsidy on different types of agricultural machinery should be provided.
- each State Government should themselves draw their annual plan for promoting agricultural mechanization in their regions.

5.12 BANKING NORMS

Almost all tractors are purchased through bank financing by mortgaging the land. This arrangement discriminates against the marginal and small farmers and unemployed youth who are likely to be most keen to take up custom operation. It is recommended that:
- bank loans for purchase of tractors and agricultural machinery should be given on the basis of feasibility study to ensure financial soundness of the proposal and the purchased equipment should be hypothecated to the bank;
- purchase of second hand tractors should be financed on the same basis, viz., financial soundness.

5.13 ANIMAL DRAUGHT POWER

Draught animals remain an important source of power for a large number of farmers, particularly in regions where the land is submerged during rains, the soils create problem of traction or the terrain is hilly. It is recommended that:
- few R&D institutions should be identified to concentrate on the development of better animal drawn implements and machines for different crops and operations and adequate resources should be provided for this purpose.

5.14 ASSURED SUPPLY OF POWER AND FUELS

The grid power supply to the rural sector is limited, uncertain and of poor quality. This erodes the farmer's capability to regulate the timing of farm operations and leads to mismanagement of power and resources like water. Rising fuel prices are creating economic problems for the progressive farmer. It is recommended that:
- surplus biomass should be utilized as energy resource to supply fuel and power to production agriculture and for the development of agro-industries in the rural sector;
- an efficient package of equipment and practices

should be developed to allow proper management of biomass which is now destroyed through uncontrolled burning, for use as energy material;
- priority should be given to the development of equipment for collection, densification, handling, transport and storage of surplus crop residues for use as energy resource;
- priority should be given to the development of efficient and economically viable conversion systems to produce fuel gas and liquid fuel from surplus crop residues and to decentralized power generation in production catchments where surplus crop residues are available.

5.15 REPAIR AND MAINTENANCE OF AGRICULTURAL EQUIPMENT

In the initial stages of introduction of new machines, inadequate repair and maintenance facilities dampen the enthusiasm of the user farmers. To ensure smooth spread of agricultural mechanization to all regions, training for young technicians and artisans in the repair and maintenance of agricultural equipment should be provided in KVKs, ITIs and by Non government Organizations (NGOs) with financial support from the State Government.

5.16 HEALTH AND SAFETY

Poorly designed machines and lack of operational skills pose serious threat to the health and safety of the user farmers. It is recommended that:
- standards for safety in design should be laid down for all farm equipment;
- training programmes should include safety in operation of agricultural machines.

5.17 AGRICULTURAL MECHANIZATION DATA

Generally, the agricultural mechanization data is based on the Livestock Surveys conducted in every State and these data are unreliable and unrealistic due to possible human errors in enumeration of technical details of machinery by non-technical personnel. It is suggested that for collection of reliable data, enumeration of mechanization data may be done by technical personnel. District-wise Computerized Data Banks may be set up to record all relevant data on production and sale of different types of agricultural machinery. Such information should be published annually for updating of the data for formulating future strategies as well for analyzing the impact of the mechanization programmes.

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