

Welcome



Farm Mechanization for Sustainable Agriculture in Bangladesh: Problems and Prospects

by
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Some basic information

- Bangladesh is predominately an agricultural country with 150 million people and 8.2 million hectares of cultivable land
- Every year almost 0.20 million people are being added to the total population whereas the estimated annual shrinkage of agricultural land is about 0.08 million hectares

Introduction (continued)

- Contribution to GDP by agriculture is about 21.11% of which crops, fisheries, livestock and forestry account for 11.72, 4.73, 2.90 and 1.76%, respectively

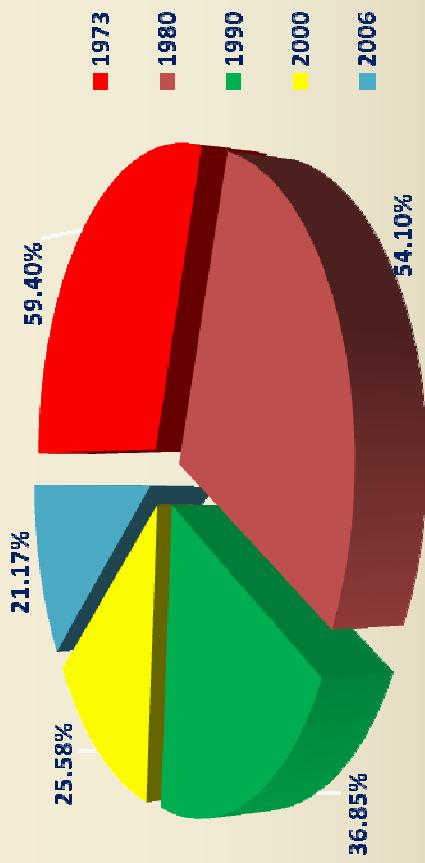


Figure: Contribution to GDP by agriculture over years

- To meet up the additional 5 million tons of food grain in 2015 from continuously decreasing agricultural lands, production per unit of land as well as cropping intensity have to be increased
- To increase production and cropping intensity, the most important gain will be the faster development of agril. mechanization as well as variety development.



Present status of mechanization

- Presently, land is prepared almost 80% by machine
- Maize is threshed almost 100% by power and hand maize shellers
- Paddy and wheat are threshed over 80%, by both power and manual threshers



Present status of mechanization

- Bed makers, seeders, weeders, harvesters and winnowers- all have limited uses



Irrigation development since 1960s

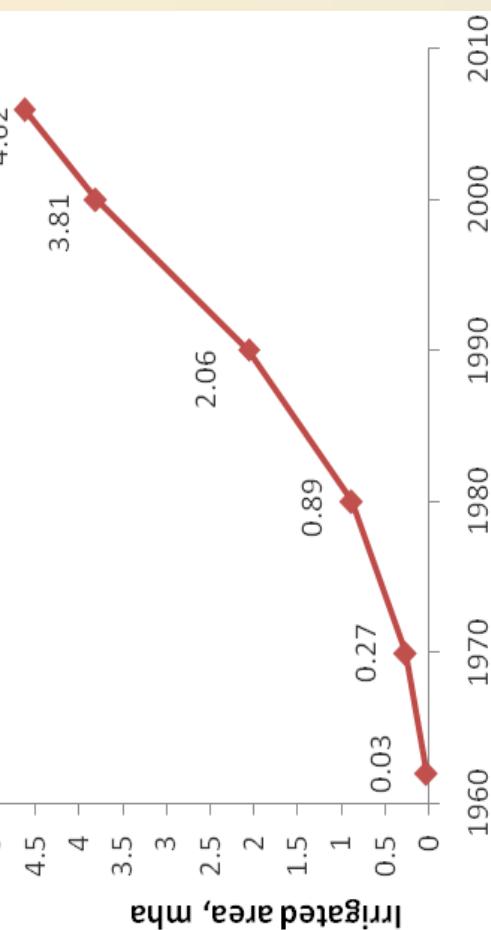


Fig. 2 Irrigated area in different years



- Though irrigation is done in a substantial area, the efficiency of irrigation schemes is very low (about 25-40% for rice and 50-55% for non- rice crops)



- About 80% irrigation is done by ground water and the rest by surface water

Available power in agriculture over years

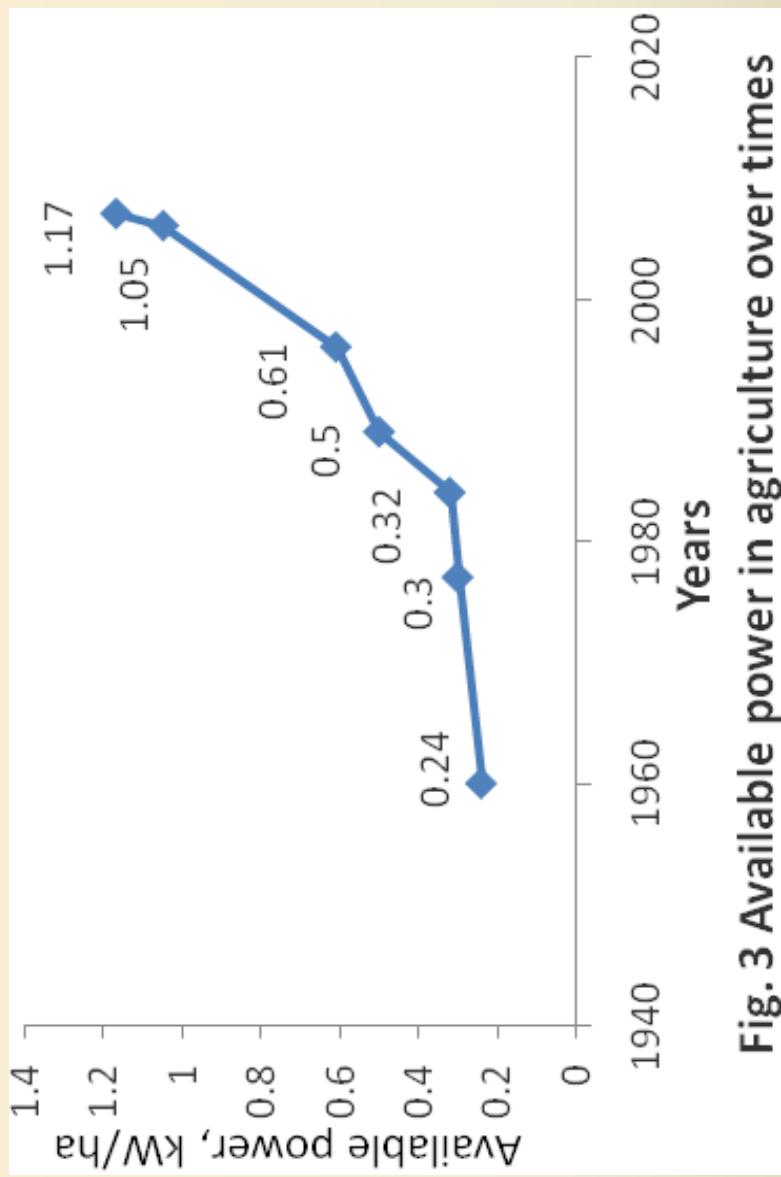


Fig. 3 Available power in agriculture over times

Table 1 Population of different farm machinery over years

Name of machine	Year				
	1977	1984	1989	1996	2006
Tractor	300	400	1,000	2000	12500
Power tiller	200	500	5,000	100,000	300,000
Maize sheller	-	-	-	100	850
Thresher(open drum)	-	500	3,000	10,000	130,000
Thresher(closed drum)	-	100	1,000	5,000	45,000
Deep tube well	4,461	15,519	22,448	24,506	28,289
Shallow tube well	3,045	67,103	223,588	325,360	1,182,525
Low lift pump	28,361	43,651	57,200	41,816	119,135

Source: Roy and Singh, 2008.

Table 2. Annual production status and postharvest losses of foods

Food item	Quantity produced, Mton	Postharvest loss, Mton	Postharvest loss, %	Market price, US\$/Kg	Monetary loss x10 ⁶ US \$
Rice	29.79	2.68	9.0	0.17	453.0
Wheat	0.96	0.07	7.5	0.21	14.8
Maize	2.36	0.25	10.5	0.14	35.2
Pulses	0.54	0.07	12.5	0.99	69.0
Oilseeds	0.93	0.12	12.5	0.28	33.8
Fruits	9.03	2.26	25.0	0.56	1273.2
Vegetables	8.91	2.23	25.0	0.21	471.1
Potato	9.23	2.31	25.0	0.21	488.0
Sweet potato	0.87	0.22	25.0	0.14	31.0
Sugarcane	3.56	0.71	20.0	0.07	50.0
Spices	2.30	0.58	25.0	0.70	408.5
Fish	2.05	0.46	22.5	1.41	647.9
Meat	1.04	0.10	10.0	2.82	28.2
Milk	2.28	0.23	10.0	0.56	129.6
Eggs	5369 Mnos.	805 Mnos.	10.0	0.08	45.4
Total					4178.7

Source: BBS (2007), DAE (2008), Shajahan (2008), Author's calculation

A BARI Hybrid Dryer



Drying of jujube



Sun dried jujube



Jujube dried in hybrid dryer



Sun dried potato chips



Potato chips dried in dryer





Field demonstration of BARI USG applicator with DAE and IFDC



BARI Double Row USG Applicator



BARI Single Row USG Applicator

Vermicompost separator



Vermicompost separator in operation



Agricultural machinery testing

- Prior to 1988, there were two committees- National Technical Committee (NTC) and Technical Sub Committee (TSC) to test country made and imported agricultural machinery
- The TSC tested the machines submitted by the manufacturers or importers both at field and laboratory levels and sent the results to the technical committee with recommendations for good ones

- The TSC in return claimed fees for testing the machines which the manufacturers or importers would have to pay at the time of submitting the machines
- The TSC finally produced the test results to the NTC for approval of the suitable machines
- But after 1988, to encourage faster mechanization, the binding of testing agricultural machines was waved to encourage quick development of irrigation in the country

- As a result, low graded engines and pumps were sold and imported at cheaper rates and expanded very rapidly. But these machines failed to perform well and went out of order in a season or two making the farmers disappointed

Problems in Mechanization

a. Fragmented lands

- In 1980, the average farm holding was 0.91 ha which decreased to 0.68 ha in 2000
- It has been found that many farmers cultivate only about 1.0 decimal (1 acre=100 decimal) land by traditional method
- Total holding of land of a farmer is located in several places in split plots restricting power operated machines to perform at optimal efficiency

b. Poor buying capacity of farmers

- The rural people are mostly poor and hardly can buy a costly machine individually
- Some moneyed farmers having a large quantity of agricultural lands possess some costly machines like, tractors, power tillers, power tiller operated seeders, combines etc.
- They use these machines in their own lands and also on hiring basis. But, their number is very small

c. Lack of quality machines

- Due importance was not given to farm mechanization until the beginning of the century
- With the growing needs for food, the decision makers got the realization that Bangladesh need mechanized cultivation to feed her ever growing population
- Presently, more than 40,000 small and medium sized local working workshops have grown up to manufacture agricultural machinery all over the country

- Many small workshops are manufacturing sub-standard machinery creating adverse impact on the farmers. They do not use jigs and fixtures and produce different standard machines
- They get the prototype from the designers or researchers and multiply them. While copying these machines, they do not use exact quality materials and specifications thus producing low quality machines.

d. Lac of knowledge and skill of users

- The machine users, artisans and traders are mostly illiterate and don't have substantial knowledge and skill about machine operation, repair and maintenance
- The manufacturers do not provide 'after sale service' to the users and machines are left without working for minor and easily repairable faults

e. Tariff difference on machines and spare parts

- Low tariff on imported machines and high tariff on spare parts and materials have discouraged the local manufacturers
- The high tariff has restricted the imports of spare parts making them unavailable in the local market
- Researchers and manufacturers lack appropriate and adequate trainings on design and fabrication of developed farm machinery

Agricultural machinery testing

- Agricultural machinery developed by research organizations and universities are given to private manufacturers for multiplication and sales
- But, unfortunately, many of the manufacturers produce inferior quality machines to earn higher profit

- Till 1988, it was mandatory for the manufacturers of agricultural machinery to get certificates about machines of concerned National Standardization Committee. But later, this system of obtaining certificate was waived after 1998
- Presently, for local and imported machines, the existing facility of waving testing and standardization of agricultural machinery has been proposed to retain in the draft national agricultural policy (MoA, 2009)

Priority areas of technical cooperation

a. Skill development of researchers

- Development of skill and knowledge of the researchers working for the improvement of agricultural machinery is of immense importance
- This can be achieved through training and visit to countries having updated technologies. Such training and visit will enable them to work with higher skill and confidence

b. Capacity building of manufacturers

- In many cases the manufacturing workshops do not have requisite precision machines and thus, the workmanship and quality are often sub-standard
- The technicians involved in agro machinery have very little knowledge and skill of design, drawing and quality control
- Most of the manufacturers are using outdated machines though there are a very few manufacturers who have machines of foreign origin

- Services to address this problem are almost nonexistent in public and private sectors. Hence, the capacity building of these workshops/manufacturers is very important to get good machines from them

Means to address challenges

A. Bangladesh perspective

Formation of strong farmers group

- A strong group of farmers having their fragmented lands in an area can form bigger lands by combining more than one plots together facilitating easy movement of machinery by reducing turn around time and improving machine performance

- Formation of such farmers group will also help them get bank loan or loans from Govt. and non-government organizations to buy agricultural machines

Strengthening custom-hire services

- Farmers capable of purchasing costly machines should be convinced to own such machines and use them for custom-hire services
- Evidence of success stories should be brought into their knowledge and if possible, they should be made to communicate to those who have already got the machines and earned financial benefits from using the machines

Formulation of agricultural mechanization policy

A healthy agricultural mechanization policy must be Formulated including machine development and manufacturing, quality protection by standardization of machines, skill development of researchers, farmers, mechanics and machine operators and marketing system improvement

Establishment of a National Centre for Agricultural Machinery

- The centre will provide services for development of agricultural mechanization through drawings, designs, testing, certification and training, specialized services like heat treatment etc.
- The centre will work in collaboration with National Agricultural Research System institutes, universities and manufacturers

- The centre may be administratively attached with Bangladesh Agricultural Research Council with separate operational budget along with provision for cost sharing by beneficiary organizations like manufacturers and traders

Special fund for machinery research

- Funds for relevant machinery research, development and extension are to be provided to the capable Agricultural Research Institutes and Universities on competitive basis
- This will stimulate quality research to produce new machines within possible shortest time and enhance farm activities and agricultural machinery industries.

Revival of National Standardization Committee/cell

- To maintain the quality product a testing and standardization cell should be created. The cell will be responsible for thorough testing of machines and certifying about the fitness of machines
- Beside field performance, the cell should conduct durability test to determine manufacturing quality and identify the practical problems that may arise after long time operation in the real field conditions

- The tested results should be fed back to the research institutes, universities, manufacturers and importers for further tuning of the machines.

Review and rationalization of current tariff rates

- The existing tariff rates are affecting the import of agricultural machines, spare parts and raw materials and need to be reviewed and rationalized so that local manufacturers feel encouraged to work on competitive basis
- This will reduce the import dependency and increase the capacity of the local manufacturers and the employment opportunity in non-farm sectors

B. Regional perspective

- Among numerous problems of mechanization in the countries of the region, absence of mechanization strategy, lack of appropriate machinery, insufficient equipment support services, ineffective machinery extension services, inadequate farm credit and shortage of qualified personnel are the main.
- Many of these can be solved to a large extent by mutual cooperation, visit, imparting training to researchers and manufacturers, and technology exchange among the countries.

- Due to various quality of testing rigs, the standard of the machines vary widely in the region. In order to maintain equal standard of machinery and safety measures, the testing and standardization stations should have uniform testing facility

Prospects of mechanization

- Bangladesh is an agro-based country. Since a considerable share of her GDP comes from agriculture, this sector is always given due importance
- With the use of limited mechanization in crop and other sub-sectors the output from agriculture is increasing
- The farmers have started realizing that to save time and cost of operation and to practice profitable agriculture, mechanization is indispensable
- This upholds the hope for better mechanization in the years to come

Conclusion

Despite all the developments and constraints, manual labour claims the highest input cost in rice production of Bangladesh for transporting, weeding, harvesting, threshing, drying and many other related activities.

The farmers and rural entrepreneurs are trying to further mechanize some of these operations in order to reduce cost of production and time of operation.

Highly coordinated research and extension among GO, NGO and private agricultural machinery manufacturers are required

In order to maintain equal standard of machinery and safety measures for the Asia-pacific region, the testing and standardization stations should have uniform testing facility

Since the highest level administrators and planners including the root level technology users have started realizing the importance of mechanization in agriculture, Bangladesh has got ample prospects to go for better agricultural mechanization for sustainable agriculture

