

# Present Status of Manufacturing and Importing Agricultural Machinery in Bogura

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**Abstract**—In the national development of Bangladesh it is necessary to mechanize of on and off- farm agricultural activities. Bangladesh agriculture was completely dependent on tradition and nature until the introduction of Mechanized Cultivation and Power Pump Irrigation. The changes in cropping pattern and cropping intensity due to introduction of HYV rice crop increased a demand of mechanized irrigation, tillage and post-harvest processing of crops to bring timeliness of operation. To assess the present status of agricultural machinery manufacturing and marketing in Bogura and to make a comparison between manufactured and imported agricultural machinery. The study was based on the industry survey where primary data were collected systematically by means interview schedule from individual actors. Then the final result was the manufactured and imported machines and spare parts were of 3925 and 3300 and 1822 and 2100 in 2017 respectively found. Especially for power tillers, irrigation pumps, maize shellers, threshers, liner, piston and many spare parts of small diesel engines and machines. The machinery is imported from foreign countries that bear a high purchase price. For mechanizing the agricultural sector local manufacturer are need to produce required machinery and tools. Basically, they represent the status of machinery manufacturer and marketing in the study area as well as national development of Bangladesh.

**Index Terms**—agriculture, agricultural machinery, manufactured, imported, industries

## I. INTRODUCTION

Agriculture is one of the major branches contributed 20.24% to the GDP of Bangladesh with a growth rate of 4.12% in 2010-11 [1]. Within this branch agricultural machinery is emerged as a dynamic agribusiness sub-sector. Agricultural sector created 43.6% of total national employment. In contrast, non-agriculture sector contributed 56.4% of total employment in 2008-09 [2].

Bangladesh agriculture was completely dependent on tradition and nature until the introduction of Mechanized Cultivation and Power Pump Irrigation (MCPII) scheme in 1950-51 by the Agricultural Directorate, which was the first known trial of using machines in the field of agriculture in the country. During 1960-65, the government distributed 2,238 power pumps, 200 tractors and established two workshops at government level. Later in 1970, international charitable organizations

provided 138 numbers of tractors (Model-MF-135) and 569 power tillers to the influenced farmers to cope with the draught power shortage caused by the calamitous cyclone at the coastal areas of the country. Local engineering workshops that were attached in repair and maintenance of the imported machinery serially attached in the market and soon started producing small spare parts with the limited resources and skills. That was the great landmark for manufacturing of agricultural spare parts and equipment in the country. The number of tractors operating in the county was about 5,525 in year 2002 [3].

The supply of centrifugal pumps for Shallow Tube Well (STW) and Low Lift Pump (LLP) depends on local production. At present, there are about 1,425,136 STWs and 150,613 LLPs operating in Bangladesh with an annual demand of 850,000 centrifugal pumps [4]. In the year 2002, the number of tractors operating in the county was about 5,530 [5].

The introduction of High-Yielding Variety (HYV) rice in early 1960s had generated changes in the application of fertilizer, insecticides, timely irrigation, land preparation and improved crop management practices. In 1970s, the changes in cropping intensity and cropping pattern due to introduction of HYV rice crop increased a demand for mechanized irrigation, tillage, pest management and post-harvest processing of crops to bring timeliness of operations.

Later, in the year 1988, there was a devastating flood in the country, involving a heavy loss of livestock and created a serious shortage of draught power. At that condition, the government quickly liberalized machinery import policy, such as tax exemption on agricultural machinery import, waiver of standardization certification and ends the monopoly of public sector import and distribution of agricultural machinery which resulted in large influx of imported agricultural machinery in the country such as power tillers, diesel engines and motors. There are about 2000 small to medium size agricultural machinery manufacturing entrepreneurs in the country, providing huge contribution to this sector. The agricultural machinery and implements were supplied by manufacturing workshops, repair & maintenance by 10,000 small engineering workshops and nearly 500,000 mechanics [6]. In contrast, spare parts market size in the country during 2011 was about US\$ 309.3 million of which the share of local production was about US\$ 237.9 million [7].

Policy guidelines and assistance from the government and the public sector services however, remained lacking to this sub-sector. The sub-sector mainly grew on private sector attempts only. Gradually, the private sector became restricted to manufacture various agricultural machineries and implements and rendered repair & maintenance services to continue these machines at farmers' level.

The present study assessed the present status of agricultural machinery manufacturing and marketing in Bogura and to make a comparison between manufactured and imported agricultural machinery.

## II. MATERIALS AND METHODS

### A. Study Area

The study areas were selected based on the concentration of agricultural machinery manufacturing industries in Bogura. There were many manufacturing and importing agricultural machinery industries, among them 8 were selected for data collection. In case of estimating Agricultural machinery manufactured and imported size of the area, solely 8 industries and importers were considered. All the selected industries and importers were situated in Bogura sadar.

### B. Overview of Agricultural Machinery Manufacturing Industry

Light engineering was the key for many developing nations for learning skill and technical knowledge for manufacturing effort. High gathering of businesses related to agricultural machinery production become expensive and gradually shifted to different potential districts of the country such as Bogura, Jessore, Sylhet etc. Among these potential areas, Bogura was selected because it emerged as the most potential center of agricultural machinery production and key business

center in the North Bengal because of its central location and well-established road communication network.

### C. Questionnaire Preparation

Semi-structured questionnaires were prepared according to the objectives of the research with active consultation with key informants, manufacturers, importers and dealers. Furthermore, check lists were exhibited for Key Informant Interview (KII) and Focus Group Discussion (FGD). The draft questionnaires and check list were pre-tested and necessary corrections, modification and alterations were made accordingly. The data on present status of agricultural machinery was collected through semi-structured questionnaire. Data were collected from actors of the agricultural machinery manufacturers, importers and dealers. Marketing information of agricultural machinery from importers to retailers was also collected.

### D. Data Collection

Data were collected through personal interview. During interview of manufacturer and importer each question was explained clearly and tried to find out fact as much as possible. Before taking interview, the purposes of the study were clearly explained to the respondents. Initially many of the respondents used to be doubtful to answer the questions. When interviewees were assured that the study was purely on academic one and was not likely to have an adverse effect then tried to make good cooperation. As multi-level industries attached in the agricultural machinery sector in Bogura including manufacturer, foundry and retailer considering all actors the following sample distribution was followed during the study (Table I).

### E. Data Analysis

The data were compiled, tabulated and analyzed with respect to the objectives of the study by Microsoft excel 2007 software.

TABLE I. STATUS OF AGRICULTURAL MACHINERY NUMBERS IN BOGURA

Machineries Name	Maximum manufactured industries				Maximum imported industries			
	New Borsha M/c (NB)	Sonali Motors & M/c (SM)	M/s. Kamal Machine Tools	Millad Engineering Workshop (ME)	ACI Motors Ltd. (AM)	BhaiBhai M/c (BB)	Chittagong Builders & M/c Ltd. (CB)	Semco Pvt. Ltd. (SP)
Tractor	2	-	-	-	5	5	6	2
Power tiller	110	50	100	-	100	50	70	50
Centrifugal pump	500	200	300	300	300	300	400	150
Low lift pump	200	50	200	200	100	100	100	100
Diesel engine	100	20	100	-	100	50	100	50
Close drum thresher	150	100	150	50	-	100	-	-
Combine harvester	-	-	-	-	15	2	10	5
Chopper machine	15	15	20	-	-	10	-	-
Maize sheller	20	20	10	-	-	10	-	-
Reaper	-	-	20	-	20	10	20	20
Rice transplanter	-	-	-	-	5	-	5	-
Electric motor	-	-	-	-	-	100	50	-
Hand sprayer	-	-	-	-	100	-	70	50
Spare parts	1000	700	900	300	800	700	600	400

### III. RESULTS AND DISCUSSION

#### A. Annual Statistics of Agricultural Machinery

In recent past, great improvements have been made in the production and marketing of locally made agricultural machinery in the country. Eventually, almost all centrifugal pumps being used in Shallow Tube Wells (STW) and Low Lift Pumps (LLP) are manufactured locally and other machines such as threshers, maize shellers, weeders, engine and machine spare parts. Agricultural machinery sub-sector is engaged in our country there are 800 agricultural machinery manufacturing workshops, 70 foundries, 1,500 spare parts manufacturing workshops and about 20,000 repair and maintenance workshops [6]. The machinery need for production and post-harvest processing of crops has increased significantly in recent time [8].

TABLE II. ANNUAL STATISTICS OF AGRICULTURAL MACHINERY IN BOGURA

Name of the Industry	Manufactured machineries (Nos.)		Imported machineries (Nos.)	
	Machineries	Spare parts	Machineries	Spare parts
New Borsha Machinery (NB)	735	700	362	300
Sonali Motors & Machinery (SM)	320	500	120	200
Bhai Bhai Machinery (BB)	420	200	317	500
M/s. Kamal Machine Tools (MK)	700	700	200	200
ACI Motors Ltd. (AM)	430	500	325	300
Millad Engineering Workshop (ME)	550	300	0	0
Chittagong Builders & Machinery Ltd. (CB)	500	300	341	300
Semco Pvt. Ltd. (SP)	270	100	157	300
Total Amount	3925	3300	1822	2100

From Table II represents that the existing total number of manufactured and imported machinery and spare parts in Bogura. The result shows that the manufactured and imported machines and spare parts were of 3925 and 3300 and 1822 and 2100 in 2017 respectively. This study indicates that the highest numbers of products were manufactured due to high demand based on crop production and almost half was imported due to high cost of transportation, VAT and tax.

#### B. Numbers of Manufactured and Imported Machineries

The New Borsha Machinery was imported 2 and 110 numbers of tractors and power tillers from China in absence of important spare parts manufacturing capacity whereas 350, 200 and 150 numbers of centrifugal pumps, LLP and close drum threshers were manufactured in this industry in 2017 shows in Fig. 1. It is noticeable that the

spare parts were produce 700 numbers for running the agricultural machinery to develop mechanization.

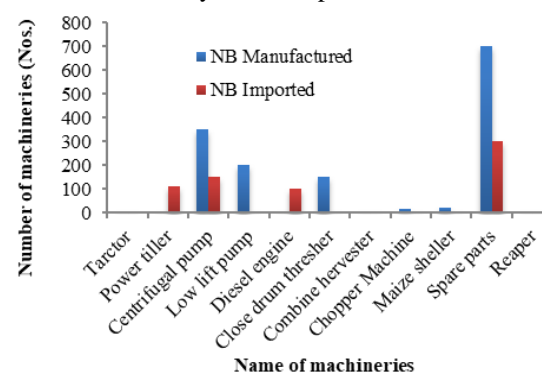


Figure 1. Production and imported number of machineries in NB

Shonali Motors & Machinery was imported 50 and 20 numbers of power tillers and diesel engines cause of important spare parts manufacturing technology is not available in locally. But this industry was manufactured 150, 50, 100 and 10 numbers of centrifugal pumps, LLP, close drum threshers and chopper machines in 2017 shows in Fig. 2. This industry also imported very negligible number of bulky machineries for lack of capital and skilled technician for repair and maintenance.

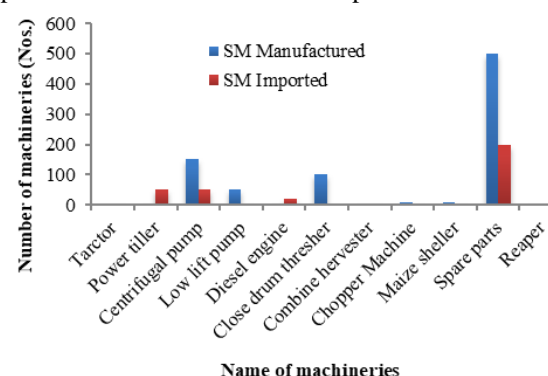


Figure 2. Production and imported number of machineries in SM

Bhai Bhai Machinery was imported 5 tractors which are greater than SM but didn't go on manufacturing until year 2017 represents in Fig. 3. They were imported 50, 2, 100 and 10 numbers of power tillers, combine harvesters, electric motors and reapers. They were manufactured 200, 100 and 100 centrifugal pumps, LLP and close drum threshers respectively by locally.

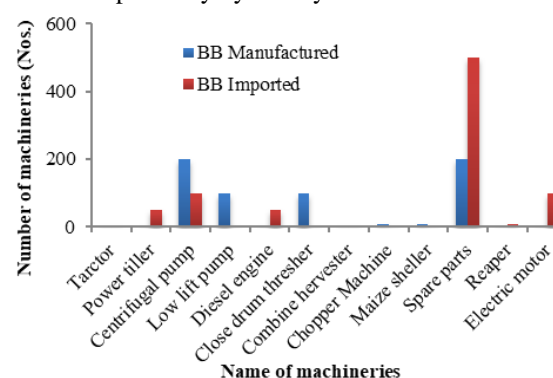


Figure 3. Production and imported number of machineries in BB

M/s. Kamal Machinery Tools was imported 100 power tillers and 100 diesel engines to contribute tilling and transporting purposes shows in Fig. 4. They were manufactured 300, 200, 150 and 10 numbers of centrifugal pumps, LLP, close drum threshers and maize shellers respectively by using existing traditional technology and also huge amount of spare parts were manufactured in year 2017.

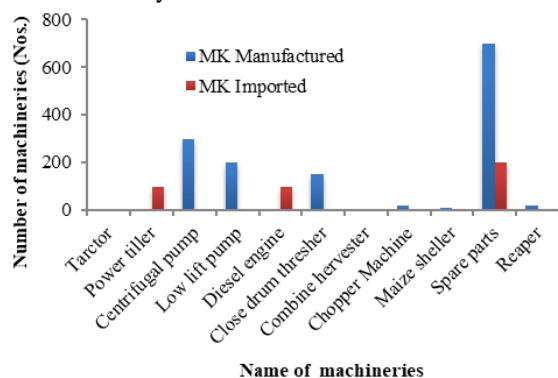


Figure 4. Production and imported number of machineries in MK

Fig. 5 shows that ACI Motors Ltd. was the mostly imported company in our country. In case of Bogura the ACI Company was imported 5, 100, 15 and 5 numbers of tractors, power tillers, combine harvesters and rice transplanters respectively from China and India.

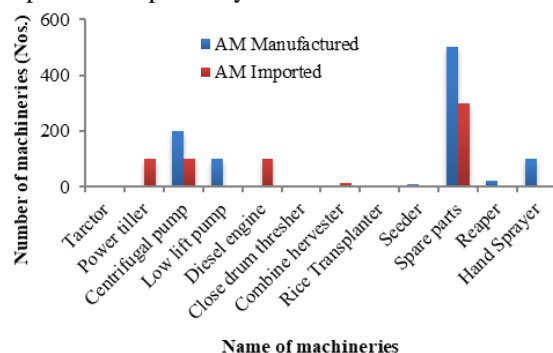


Figure 5. Production and imported number of machineries in AM

Millad Engineering Workshops was only manufactured small machineries and spare parts which is contrary with ACI Motors Ltd shows in Fig. 6. About 300 centrifugal pumps, 200 low lift pumps, 50 close drum threshers and 300 spare parts were manufactured in year 2017. Because it only a workshop and they have no ability for import machinery.

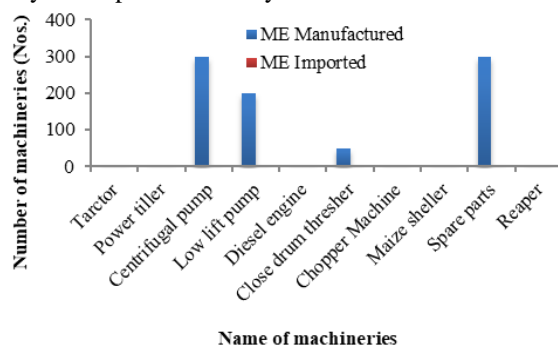


Figure 6. Production and imported number of machineries in ME

Chittagong Builders & Machinery Ltd. manufactured and imported products were shown in Fig. 7. It is a big company of agriculture products. It is also investigated that the imported machinery was 6 tractors, 70 power tillers, 100 diesel engines, 10 combine harvesters, and 50 electric motors in year 2017. They are also manufactured and imported same amount of spare parts.

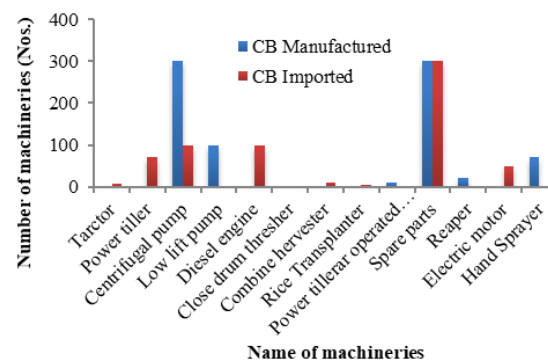


Figure 7. Production and imported number of machineries in CB

Semco Pvt. Ltd. is contributing to develop meaningful mechanization by manufacturing and importing agricultural machinery. From the investigation Semco Pvt. Ltd. were imported 2 tractors, 50 power tillers, 50 diesel engines and 5 combine harvesters represents in Fig. 8. They also manufactured some number of centrifugal pumps, LLP and hand sprayers respectively by local based on consumer demand.

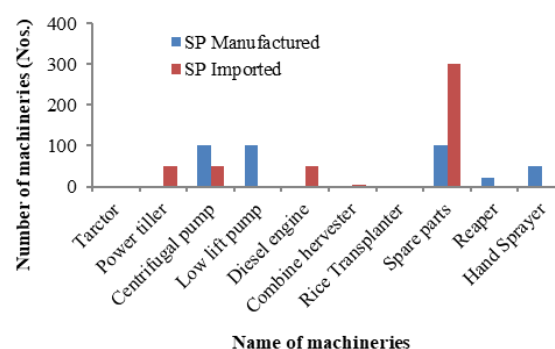


Figure 8. Production and imported number of machineries in SP

### C. Different Manufactured Machineries in Various Industries

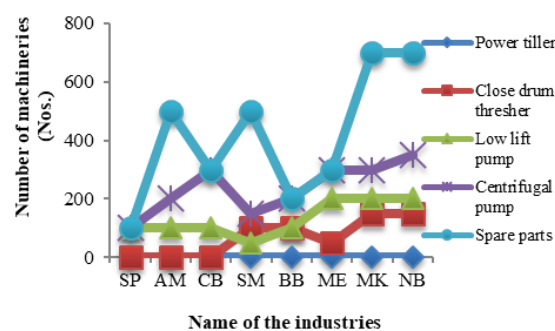


Figure 9. Different manufactured machineries

Fig. 9 shows the comparison of the product that was manufactured by the local industries. The results represent the spare parts was taken highest position

among all manufactured machineries. It is also showing that the manufactured spare parts were tremendously fluctuated over the year and other products slightly increased except power tiller. It is noticeable that local industries are not able to produce any power tiller although 90% of the agricultural lands are cultivated on it.

#### D. Different Imported Machineries in Various Industries

The comparison of the machineries that was imported from the foreign countries shows in Fig. 10. The results represent the spare parts was taken highest position among all imported machineries. It is also showing that the imported spare parts are gradually increased but other machineries fluctuated in the year of 2017 except combine harvester. Combine harvester was imported minimum number due to high initial investment cost for the industry as well as farmers. It is great concern local industries are not significantly imported combine harvester although pre and post-harvest operations can be done in a single machine.

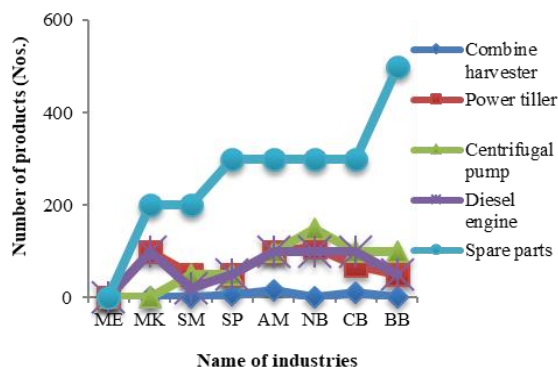


Figure 10. Different imported machineries

#### E. Obligation of Agricultural Machinery Manufacturing and Business Development Service (BDS) Provisions

As an emerging sub-sector, agricultural machinery manufacturing faces many obligations. However, few major obligations that have grave implications on the growth of the sub-sector are illustrated as follows:

- 1) Absence of modern capital machinery at producers' level resulted in low productivity and poor quality of products. Agricultural machinery sub-sector is included of small and medium size enterprises.
- 2) Absence of steady supply and rationing of electricity limits the production and business at producers and farmers level.
- 3) Insufficient working capital hinders production of agricultural machinery industries and workshops.
- 4) Absence of space and infrastructural facilities hinder growth of this sub-sector in Bogura.
- 5) Absence of ability to collectively protect the interest of the sub-sector, resulting in insufficient reflection of the needs and expectation of the sub-sector in the policies and regulations.

#### IV. CONCLUSION AND RECOMMENDATIONS

Bangladesh is an agriculture-based country. Above 65% people are depending on agriculture. The most of

the farms are cultivation traditional hiring basis mechanical power for tillage, irrigation, harvesting and threshing will be performed. As a result, the progress of mechanization is very slow. The study was conducted to find out number of manufactured and imported agricultural machinery and spare parts in the selected area represent the number of machineries is need per annual. From the study the final result was the manufactured and imported machines and spare parts were of 3925 and 3300 and 1822 and 2100 in 2017 respectively. The demand of spare parts is gradually increasing and local manufacturer are also able to manufacture it and some are import for fulfill the consumer demand. The tractor and power tiller are not manufacture by the local industries. Most of them imported from foreign countries especially China, Japan and India that bears a high purchase cost. As a result, the farmers are not able to buy these machineries. To mechanize the agriculture sector our local industries, need to concentration manufacturing required machinery and spare parts at a bearable cost for the farmers [9].

Based on above discussion the following priority recommendations are made for intervention by suitable authorities:

- 1) Bogura can be announced as 'Agri-machinery districts' to ensure infrastructural facilities such as non-interrupted supply of electricity, gas, water etc. for agricultural machinery production units;
- 2) Incorporation of 'Agri-machinery Production Zones (APZ)' on the outskirts of Bogura town to compromise existing and potential agricultural machinery industries and workshops;
- 3) Establishment of 'Common Facility Centre' at each Agri-machinery Production Zone to facilitate quality services related to heat treatment, material testing, test and standardization, advisory services etc. on public, private and development partners persuasive;
- 4) Provisions should be made for duty free access to SAARC and developing countries, and formal trading of agricultural machinery at border markets through two-sided negotiations with India;
- 5) Incorporation of a 'Central Institute of Agricultural Engineering (CIAE)' for succession of innovation through R&D on GO and development partners initiative;
- 6) Preparation and updating of National Agricultural Mechanization Policy;
- 7) Incorporation of National Standardization Committee for agricultural machinery can be thought of;
- 8) Modernization of local foundries through assistance and experience sharing activities among SAARC and industrialized countries;
- 9) Access to soft and flexible long and mid-term deposit facilities for capital machinery and working capital needs to be deliberated;
- 10) Policy options should be deliberated for removal of multiple VAT on imported raw materials and strengthen rules and regulations against illegal hoarding of raw materials for the growth and development of agricultural machinery sub-sector;



11) Policy options should be moderated for zero tariff/nominal tariffs on modern capital machinery import for agricultural machinery sub-sector.

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#### CONFLICT OF INTEREST

The authors hereby declare that the submitted research work didn't carry out any conflict of interest. Also confirmed the research work was not copied from any other research work and there is no chance of conflict of interest.

#### AUTHOR CONTRIBUTIONS

Muhammad Rashed Al Mamun has accomplished the research design, supervised; data analyzed and revised the paper. Toufik Ahmed was conducted the work and wrote the paper. Kamrul Islam was represented the collected data by graphically. Finally, all authors approved the final version of the paper.

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