

## SELECTED ESSAYS

### 8. CURRENT STATUS OF MACHINERY MANUFACTURING IN BANGLADESH

Ashraf Ali, D.Sc.<sup>1</sup> and Faizul Islam, Ph.D.<sup>2</sup>

#### **I. Foreword**

The purpose of this paper is twofold: 1) to present a summary of a revealing study recently undertaken by an economic team led by M. Mozammel Huq<sup>3</sup> and 2) to provide some of our recommendations on the solutions of the existing problems of economic development of Bangladesh. The study examined a number of machinery manufacturing industries vis-a-vis its impact on technological capability in Bangladesh. It was surprising to observe that many of these industries had huge installed capacities to produce sophisticated machinery and equipment. Much of these capacities remained idle however. The striking point noted here was the absence of a systematic government policy to exploit such capabilities. This, in turn, may have been due to the lack of interest on the part of the government. As a consequence, country's economic growth opportunity is being missed.

#### **II. Importance of Capital Goods Industry**

As a policy, this study unequivocally reinforces, as Bangladesh Development Initiative (BDI)<sup>4</sup> has done in the recent past, that the growth of capital goods industry is pivotal in achieving indigenous technological capability. Especially, the machine tools manufacturing is termed as the "mother industry" because it can reproduce itself. Now-a-days, there is a growing body of literature arguing in favor of adoption of capital goods industry in developing countries as a means to generation and diffusion of technological change<sup>5</sup>. These studies have unanimously concluded that in order to develop indigenous technological capability a developing country must take measures to expand its capital goods sector. Absence of capital goods sector hinders rapid capital accumulation and sustained economic growth. Capital goods industry is one of the few industries which is dynamic in nature. It lays the foundation for developing the basic engineering skill of the workforce. It also provides much needed spare parts and inputs for other industries. Its research and development (R & D) capability aids in the diffusion of technologies. Capital goods industries with the blessings of the government have received top priority in the development strategy of New Industrialized Countries (NICs).

### III. Constraints of Capital Goods Industry

Capital goods industry in Bangladesh suffers from six major constraints. Listed in order of importance they are: 1) Lack of local demand 2) inadequate finance 3) shortage of raw materials 4) illegal imports 5) shortage of skilled labor force and 6) labor unrest. These constraints along with the so-called "sub-contracting system" are briefly described below.

**1) Lack of Local Demand:** Domestic demand of locally manufactured machinery is weak because capital goods are imported at a very low import duty (2.5%). These imported capital goods are mostly aid-financed. The huge installed capacity and immense potential of capital goods industry in Bangladesh are virtually unknown to the public - deliberately or not. As a result, there has been a serious misuse of capital and labor in the country. These capital goods which can be locally produced are not made possible due to readily available imports.

There appears to be an irony in the country's development policy. As part of its industrial policy, there has been an effort to set-up heavy industry. On the other hand, it continues to import the same machineries while its installed capacity remains largely unutilized. As, for example, machineries and equipments of heavy structural engineering products, machine tools and sugar machineries are imported, although local products are of same quality and of competitive price. Bangladesh Machine Tools Factory (BMTF) which is located in Joydebpur is barely producing 4% of its capacity output, while 96% of its capacity remains unutilized.

Tariff policy of Bangladesh is certainly discouraging the development of capital goods industry. Import duty ranges from as low as 2.5% on finished products/machinery to as high as 150% on raw materials and semi-processed articles. Such discriminatory import duties raise the cost of locally produced capital goods. As a result, high-priced local goods cannot compete with low-priced imports.

**2) Inadequate Finance:** Lack of finance is faced by most of the sub-sectors of the capital goods industry. This constraint is more pronounced in the private than in the public sector. Because these enterprises are of small-scale and in the informal sector, they may be facing difficulty in having access to cheaper and organized sources of credit. Inadequate funding inhibits large-scale production. Production is contingent upon orders received and some cash advance.

**3) Shortage of Raw Materials:** Unavailability of raw materials at a reasonable price and in a timely fashion adversely affects these capital goods industries. Despite the fact that now-a-days trading is carried out by the private sector, raw materials are of poor quality, high-priced, and in short-supply. The latter may perhaps reflect government's overall aversion towards import of raw materials.

**4) Illegal Imports:** Illegal imports are also adversely affecting local demand. For example, large-scale illegal imports of (banned items) electrical machinery and equipment (up to 25 HP) are suppressing local demand. Such items were banned because they can be manufactured locally. Local diesel manufacturers allege that foreign manufacturers are dumping diesel engines in Bangladesh.

**5) Shortage of Skilled Labor Force:** Because of brain-drain abroad, capital goods industry is facing shortage of skilled personnel. Also, the locally available professionals shy away from accepting employment in these public enterprises because the salary and benefits are hardly attractive. This problem is less severe in the private sector since better incentives are available. Another point is: since the firms in the private sector do not usually produce precision machineries and machine parts, the demand for highly skilled labor force is not so great anyway.

**6) Labor Unrest:** Labor unrest disrupts production periodically. In particular, Bangladesh Machine Tools Factory and Bangladesh Diesel Plant (BDP) report frequent strikes which force the plants to suspend production for long duration.

**7) Sub-Contracting System:** Bangladesh is yet to benefit from "sub-contracting" system. A firm specializing in such practices of specific items tends to enjoy economies of scale. Further, there is a potential for R & D enabling technical improvements of these items. Sub-contracting will likely ameliorate some of the shortcomings being faced by our capital goods industry.

#### **IV. Current Status of Nine Sub-sectors of Capital Goods Industry**

##### **1. Machine Tools Production:**

The Bangladesh Machine Tools Factory (BMTF) located at Joydebpur is one of the largest machine tool plants in the world. It was completed in the late 1970s. BMTF possesses an extensive production capacity in the form of precision machine tooling with well-equipped machine and assembly shops. There is one large forging shop with a capacity of 1800 tons per year and two separate foundry shops with a combined capacity of 8000 tons a year. In the year 1988-89, BMTF produced irrigation pumps of different sizes for agriculture, reeling machine and ring spinning frame for textile industry. It also produces auto tempo, seltic lathes, column drill, power hacksaw and pedestal grinding machines, hand and cutting tools, spares for jute, railway and chemical industries. It supplies products to Power Development Board and provided Teesta Barrage project with hoist gates.

There are also several privately-owned small machine tools manufacturing firms nationwide. They manufacture a whole range of simple to heavy machineries and spare parts.

As mentioned earlier, BMTF faces a serious shortage of skilled workers. Also, there is severe management problem. The strength of the small privately owned manufacturing firms lies in the fact that they do not suffer from shortage of (skilled) labor. Second, production is based on indigenous resources. The drawback is that most of the production is based on imitation or replication.

## **2. Cotton Textile Machinery:**

Over one hundred firms are known to manufacture spare parts for the textile industry. To name a few, these spares are powerlooms, reeling machines and doobby machines.

The production of these goods is labor-intensive and primal-technology based. The available technology permits assembling, erection, operation and imitation of foreign products. Because of poor access to organized capital markets, these enterprises produce goods for buyers who make payment in advance. Local demand is also very limited. There is deficiency in management. Although raw materials are imported by the private sector, there are still snags in supply. Prices are higher and inputs are of inferior quality. Development in expertise and technology will be essential if, in future, production of sophisticated items becomes a goal. What is surprising to observe is that not only are our indigenous products comparable to foreign products but also they are twenty to thirty percent cheaper.

## **3. Jute Textile Machinery:**

Over one hundred firms are reported to be involved in the production of jute textile spare parts. The central workshop of Adamjee Jute Mills Ltd. produces almost all the spare parts needed for the maintenance of its own jute mills. There is also a number of medium-scale firms engaged in the production of power loom, sizing machine, wrapping machine, tape loom, etc. Product quality is satisfactory and prices are lower compared to imports.

Its production technology falls broadly into two groups: medium-level and labor-intensive technologies. The products using the former technology are of higher quality and hence higher price.

Our country is now capable of producing at least two-thirds of such machineries. The government should recognize that such potential exists and should attempt to utilize it under its Balancing, Modernization, Rehabilitation and Expansion (BMRE) program. In sum, there is an adequate supply of skilled labor and management personnel for manufacturing jute machinery and equipment in our country.

## **4. Leather Machinery:**

The development in the leather machinery manufacturing sector of Bangladesh has been very modest. The technology used in the production of various types of leather machinery and equipment which are now locally manufactured is very simple. It involves labor-intensive

techniques commonly used in the small and informal sector engineering firms. The cost of production is low because it is labor-intensive and relies mostly on indigenous raw materials. For example, casting and steel bars are obtained from shipbreaking and castings from scraps. The leather manufacturers provide a significant portion of working capital themselves.

### **5. Plastics Machinery:**

The plastics machinery manufacturing industry is very new which began in the mid 1980s. A number of medium and small-sized firms now operate in the private sector. These firms produce, among others, hand molding machine, twisting machine, ball-pen making machine. Although, a large number of plastic items are now locally manufactured but their quality and price are generally lower than imports.

It relies on labor-intensive technology. In terms of design, much of the work involves imitation of older machines. However, there have been some improvements in assembly, erection/installation and maintenance. The production of plastics machinery does not require highly skilled labor. Its raw materials such as pig iron, C.I. sheets are imported from East Asian countries.

### **6. Sugar Machinery:**

At present, Bangladesh has sixteen sugar mills. All of them are in the public sector. They have a combined capacity of about two thousand tons per year. In the past, the entire equipment and machinery for sugar mills were imported from West Germany and the United Kingdom. Recently, they are being imported from India and Pakistan. Surprisingly enough, there are five engineering plants in Bangladesh which are capable of producing sugar machinery. They are Renwick & Company in Kushtia, Narayanganj Dockyard, Chittagong Dry Dock, Khulna Shipyard and Ispahani Marshal.

The production of the plant and machinery involves somewhat sophisticated technology, skilled labor and management. The other inputs used by sugar machinery manufacturing plants are hard coke, steam coal, pig iron, limestone, C.I. (scrap), steel plates, etc. Many of the production technology and raw materials are now available in Bangladesh. Based on field survey, interviews and plant visits, the research team was convinced that complete sugar plants can be designed, fabricated and installed by utilizing existing capacity in Bangladesh.

### **7. Electrical Machinery and Equipment:**

The electrical machinery and equipment sector is well established in Bangladesh. There are three large scale plants and a number of medium and small scale ones. The General Electric Manufacturing Company (GEMCO) is the largest electrical equipment manufacturer in Bangladesh. It has an installed capacity of 10,000 tons of electrical equipment per year. Another large scale producer is the General Electric Company (Bangladesh), a joint venture with General

Electric Company (U.K.). It has a sanctioned capacity of 2400 electric motors per year. Khan-Elin, a private manufacturer has a sanctioned capacity of 12000 motors. Other products manufactured include transformers, lightning arresters and disconnecting switches.

These three major manufacturers have capital-intensive technologies which have to be largely imported. However, the technology involved in medium and small scale industries uses labor-intensive methods, based mostly on indigenous resources.

Over the years, the know-how required for the production of electrical machinery and equipment has been transferred and designing capability has now developed in Bangladesh. There is cent per cent capability in assembly, erection, operation and maintenance of such plants. The labor force required in the production of electrical equipment has the necessary skill.

The inputs and raw materials (pig iron, aluminum ingot, electrical sheet, steel shafting bars, insulating materials, brass sheet and rods, etc.) for this sector have to be imported. Because of high import-duty, prices of raw materials are very high in the local market. Perhaps, due to management problem, GEMCO has difficulty in exporting products after meeting local demand.

### **8. Diesel Engine Manufacturing:**

Since its completion in 1980, Bangladesh Diesel Plant (BDP) has established capability of producing diesel engines with one to six cylinders and of horse power ranging from eight to one hundred twenty. The sanctioned capacity of the plant is 8000 single cylinder engines.

There is another plant under BMTF which has the capacity to produce 10,000 diesel engines per year. A number of private units also manufacture diesel engines on an assembly basis. Capacity utilization varied immensely over time: 1984-85 (62.5%), 1985-86 (8.8%), 1986-87 (44%), 1987-88 (0.03%) and 1988-89 (21.3%).

Diesel engines are required for a number of activities in the country including irrigation (shallow and deep tubewell, low-lift pump), farm machinery (thresher, grain drier, tiller, tractor) transportation (bus, truck, jeep, fishing boats) and for other purposes (power generating sets, compressors, etc.). The average annual requirement is projected to be 59,960 diesel engines during the first half of the 1990s.

Among the two main types of diesel engines, BDP produces the air-cooled while BMTF supplies the water-cooled ones. The manufacture of diesel engines is a high technology operation and BDP is the only plant involved in such production. Its one cylinder engine has got 73% in-house manufacture of parts and components. The level of integration in two-cylinder engines is only 23% which is expected to grow progressively to 67.4%.

Both air-cooled and water-cooled engines produced locally are found to be satisfactory. Because water-cooled engines have developed immensely, the costs are low and so is the price. However, the cost of air-cooled engine is higher because of the BDP's inability to achieve higher capacity utilization. This implies that it cannot achieve economies of scale and sell the products at a cheaper price. The unreasonably high cost of import of parts and components from West Germany is discouraging BDP to raise progressively its level of integration in the two-cylinder engine.

Insofar as the assembly and operational maintenance are concerned, cent per cent capability has been achieved in Bangladesh. BDP and BMTF have some production capability. Performance of BMTF has not been as expected; BDP has equally to achieve the target of progressive manufacture for two and more cylinder engines. The private sector plants have also failed to acquire capability in the manufacture of parts and components. At present, they assemble CKD components. There is no design capability in Bangladesh. The labor skill required is available but frequent labor problem is seriously affecting continued production. On the positive note, there are trained management personnel in this sector.

The domestic component in raw materials varies from 17% (2-cylinder engine) to 73% (1-cylinder engine) in the case of BDP. It is an irony to observe that price of imported components is higher than price of complete engines of the same supplier. As such, BMTF and BDP production costs are higher. This is making it difficult for these local producers to compete with foreign imports in the open market.

## **9. Structural Engineering:**

Narayanganj Dockyard, Khulna Shipyard and Chittagong dry Dock are geared to the production of steel trusses, columns and gantry beams, pipe racks and support steel structures including a) boilers b) turbines c) tower vessels d) electric poles and e) bailey bridges. Also, a number of medium size plants capable of doing light structural engineering jobs in the private sector has emerged.

The economic research team obtained very encouraging information about the price and quality of structural engineering products in the country. 1) Recently, Chittagong Dry Dock fabricated a heavy steel structure for Saidpur Railway Workshop. The job was sub-contracted from a South Korean firm. The structure was fabricated ahead of schedule, and according to the South Korean client, the price was highly competitive and the quality was excellent. Chittagong Dry Dock designed, fabricated and erected a superstructure at a competitive price. Originally, this project was supposed to be undertaken by SASCO, an Indian firm. 2) Khulna Shipyard manufactured two major items of structural engineering: one caisson gate worth Taka 10 million, the import price of which would have been Taka 50 million. The other was a foreign joint-project of a 50-ton capacity crane. 3) The facilities at Narayanganj Dockyard were utilized to manufacture a keel block for Chittagong Dry Dock which was designed locally.

In structural engineering Bangladesh currently possesses 100% technological capability in the design, manufacture, assembly, erection and operation of most of the products, viz., fertilizer plants and equipment, Bailey bridges, electrical sub-stations, factory buildings and workshops, etc. The country has the required skilled labor to carry out different aspects of jobs including designing, fabrication, machining, assembly and erection. The economic research team has observed that the labor force is committed and capable of executing their project. At times, they even completed orders ahead of schedule.

## **V. Policy Directions**

The policy directions of the economic research team are as follows:

1. By unpackaging the various plants and machineries in many aid-financed projects, steps should be taken to single out and produce those machineries and tools which can be manufactured based on indigenous resources. The remaining components should be imported.
2. At the time of inviting tenders, separate bids can be asked for the items that can be produced domestically with the existing installed capacity, thus enabling the local producers to bid exclusively for these items.
3. The application of marginal cost pricing can take into account the fact of various machining and other facilities remaining idle. As long as the marginal variable costs were covered, public sector plants could be authorized to charge that price, a practice carried out in the case of Chinese exports.
4. At times, the existence of tax anomalies has made the imported price of a complete machine/equipment much cheaper than that of a locally assembled alternative, as import duties on complete items are much lower than the import duties in individual components. Although, over time attempts have been made to remedy the situation, it is the observation of the team that the tax inequities are still providing negative effective rates of protection. On this account, such a tariff policy should be immediately abandoned.
5. On the supply side, the present salary structure needs to be reviewed in an attempt to encourage the entry of highly skilled labor and upper echelon management personnel into the industry. These individuals who are in high international demand obviously should be offered a more attractive salary scale.
6. Also, the difficulties faced by the local firms in procuring imported materials need to be explicitly recognized. While a foreign firm can immediately procure these materials, the local firms need more time before production can begin because of import requirements. Thus, in tender formalities allowing extra time to the local producers for order delivery is fair and compatible.



7. There is a need for institutional support for the entire capital goods sector, particularly in R&D. As the manufacture of some of the sophisticated machinery and equipment necessitates large and precision engineering operations including heat treatment and laboratory testing, the involvement of the large public sector plants like BMTF, Renwick, Galfra Habib, etc. needs to be considered, if a plan to manufacture these items is undertaken.

8. The inadequacy of financing is an important constraint especially faced by private sector medium and small sized firms. The existing funding policy of the major lending institutions of Bangladesh needs to be reevaluated in favor of the productive and potentially productive firms of the country.

9. The automation of production in other economic sectors of the country is closely tied to the creation of domestic demand for capital goods sector. A relevant example is the cotton textile industry. Over half of the supply of apparel in Bangladesh is met by the handloom sector, for which the entire equipment is locally manufactured. The increase and growth in demand for modern textile machinery will largely depend on the transformation of the handloom sector into power loom weaving. In this context, the rapid expansion of the cotton textile holds bright prospects for textile machine manufacturing provided the transformation to powerlooms takes place in the country.

10. The installed capacity in the large public sector units in machine tools, electrical machinery and equipment, diesel engine and structural engineering is, indeed, huge and only a fraction of this is presently being utilized. The sugar mills manufacturing sub-sector is capable of producing complete sugar plants, but not a single plant of this type has ever been produced. This is because there is no demand from the lone buyer - the government. It is accentuated by imports under packaged aid projects and existing tax anomalies. If appropriate policies are formulated and implemented, unit costs could fall. It could open up markets at home and abroad. Limited exports have already taken place to Singapore and Middle East in the form of design, fabrication and erection. It has been reported that our locally produced irrigation pumps are being smuggled across the borders. The export prospect for various sub-sectors of the capital goods industry looks extremely promising. In order to succeed in export markets, government export liberalization measures like better utilization of duty draw-back facilities, subsidized air and sea freight, non-cumbersome customs facilities and travel assistance to exporters will be required.

11. Remarkable progress has been observed in the private engineering sector in Bangladesh. A classic example would be the so-called "Dholai Khal" movement. A number of medium and small scale private firms are now producing center lathes, simple machine tools, pumps, cotton and jute textile machinery and equipment, and most of the spare parts needed in the textile sector. It also produces various components of rice milling equipment, machinery and equipment for sugar, paper and chemical plants. Moreover, fabrication of all types of heavy steel structures including trusses, steel bridges, electric poles and towers are reported to be carried out. These firms can produce international standard machinery and spare parts for domestic customers and for export provided

they have access to institutional support in R&D, credit, precision machining operations, heat treatment and testing laboratory facilities.

## **VI. Final Thoughts**

The progress and prosperity of Bangladesh depends on several socio-economic variables. The key economic variable is production. Production or output is related to labor, natural resources, physical capital and entrepreneurship. It is essentially the growth of the 'capital goods' industry which would propel production. This would, in turn, create several forward and backward linkage effects. However, capital goods industry has failed to achieve its maximum potential in Bangladesh. They are facing unfair competition from abroad. Such an environment is, in part, created by our government. To reiterate, a nominal tax of paltry 2.5% is imposed on the imported finished machinery and equipment, whereas a heavy 50% to 150% tax is imposed on the raw materials and other inputs of the capital goods sector. One of the rationale in levying lower rates of duties on imported finished products may be to encourage 'import-substitution' industrialization but evidence suggests it entails a heavy tradeoff. Clearly, a tax structure should be so devised as to ensure that our capital goods industry is not put in a disadvantageous or uncompetitive situation. Before any of these capital goods industry shows sign of financial insolvency, the government should consider decentralizing and selling it to the private sector. It would not be wise to shut down insolvent public industries (government is reportedly considering to shut down BMTF) before a serious consideration is given to privatize them.

The bureaucrats involved in the formulation and implementation of tax policy may be driven by sheer external pressures and/or individual economic/financial motives. This is a widely recognized phenomenon. According to a recent report in the Wall Street Journal<sup>6</sup>, the Central Intelligence Agency of the United States is now focusing on identifying the practice of big-time bribery and other unfair practices abroad. It has come to the attention of the American government that in some countries, such illegal and unfair practices leave American businesses in a disadvantageous position. In Bangladesh, corruption can, in part, be remedied if salary and benefits of bureaucrats are more in line with the private sector. As, for example, in addition to the regular salary, provision of bonus or stock options could be introduced. The latter would obviously be tied to the success of these business enterprises. In such a case, the (public) officials who are managing these enterprises will be driven by profit motive. On the other side of the coin, a profitable enterprise would not face the uncertainty of getting shut down.

**Notes:**

1. Treasurer, Bangladesh Development Initiative (BDI), Pittsburgh, Pennsylvania and Senior Research Engineer, ANSYS, Inc., Houston, Pennsylvania.
2. Economic Advisor, BDI, Pittsburgh, Pennsylvania and Assistant Professor of Economics, Ohio University, St. Clairsville, Ohio.
3. Huq is Associate Director of the Developing Countries Research Unit at the University of Strathclyde, Glasgow, United Kingdom. The other members were A. K. Nabiul Islam, Research Fellow at Bangladesh Institute of Development Studies (BIDS) and Nazrul Islam, Rector, PATC, Bangladesh. This study was sponsored by BIDS and funded by Transfer of Knowledge Through Expatriate Nationals (TOKTEN).
4. BDI is a non-profit, non-political organization headquartered in Pittsburgh, Pennsylvania, United States. It is dedicated to facilitating value-added commodity production in Bangladesh. BDI believes that Bangladesh should invest in capital goods industries which only can provide high-paying, high-skill jobs for its people. In words of Ross Perot, which he meant for USA: Bangladesh should focus on producing 'computer chips' as opposed to 'potato chips'. To learn more regarding BDI's policy, see: "Economic Development of Bangladesh: Alternative Thinking", Ashraf Ali, Weekly Bichitra (Bangladesh), 21st February Special Issue, 1993.
5. Dahlman and Westphal (1983), Rosenberg (1976), Pack (1981), Amsden (1985), Stewart and James (1982).
6. Wall Street Journal, January 14, 1994.