

Light Engineering Business Ecosystem in Bangladesh: A Study on Institutional Preparedness

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Abstract: *Dholaikhal and Jinjira of Bangladesh once became iconic sites of Light Engineering Sector that had beaconed hopes of industrial revolution in the country. Bangladesh has maintained an enviable annual GDP growth rate above six percent over the last two decades. Sustained growth of the economy needs development of manufacturing industry supported by strong Light Engineering sector. The institutions that contribute to the business ecosystem of the light engineering sector influence its performance. This study attempts to assess the preparedness of institutions to overcome challenges and capture opportunities of the sector. The institutions have been studied by case method. Findings show that the major institutions having diverse focus lack vision, resources and understanding of the requirement of the sector. An institution dedicated to the development of light engineering sector needs to be established to unleash potentials.*

Keywords: *Light Engineering Sector, Bangladesh, institutions, business ecosystem.*

I. Introduction

Light Engineering (LE) enterprises are small firms that produce small machinery, equipment, tool, metallic household appliance or sanitary ware, and electrical, electronic, electromechanical and mechatronic products mainly by metals through engineering and technological processes [1]. The sector started journey in early 1980s when demand for mechanical fittings grew with post liberalization industrialization process.

It is claimed that the sector is producing about 50 percent spare parts for the industrial sector, the rest are imported [2]. LE sector is now providing critical support to automobile, industrial, agricultural and construction sectors by supplying cheap spare parts, castings, moulds and dices, oil and gas pipeline fittings and light machinery, as well as repairing those. It is also claimed that the electrical goods manufactured by the LES meets about 50% of country's demands, which was earlier met through import. The light engineering sector as 'the mother of all sectors,' provides backup support to cement, paper, jute, textile, sugar, food processing, railway, shipping, garments capital machineries by repairing and maintaining those [2].

But big industrial units which earlier had used many spares from the local LES now have turned to imported spares mainly from China and India. They complain of poor quality of local spares. So far, export has remained insignificant while India is earning a lot by exporting LE products. Although it has the potential to thrive with industrialization and economic development of the economy, the sector may face serious challenges of survival if it fails to satisfy the consumers. Survival and growth require an enabling policy environment, institutional support and infrastructural backbone [1].

The purpose of the present study is to assess the preparedness of the institutions that contribute to the business ecosystem of the LE Sector in facing the current challenges including quality of products, state of technology, skill of human resources and access to finance.

1.1 Objectives of the Research

The broad objective of the research is to assess the institutional preparedness of light engineering sector for achieving competitiveness.

The specific objectives are as follows:

- To identify the challenges and opportunities of the LE sector;
- To identify the institutions those contribute (or supposed to contribute) to business ecosystem of the LE sector;
- To assess preparedness of the institutions to help enterprises to overcome the challenges of competitiveness and to capture the opportunities.

1.2 Methodology

This is an exploratory research carried out by qualitative method. Value chain analysis and Triple Triangle Framework (TTF) [4] were used to identify the challenges and opportunities of LE sector from literature. Similarly the institutions that contributed to the business ecosystem of the LE sector were then identified by Value Chain analysis and TTF from literature.

Value Chain Analysis was proposed by Michael Porter [3] as a tool to desegregate the strategic activities of a firm in order to understand the behavior of costs and potential sources of differentiation. It helps to diagnose the challenges and opportunities of a production/ service process or a whole sector. Since then, it has been used in numerous research works.

The TTF uses three triangles to summarize the factors that affect business competitiveness at different levels: enterprise domain, industry domain and macro domain. TTF was used to make the analysis comprehensive and make a more rigorous identification of the challenges, opportunities and complete list of institutions of the LE business ecosystem. Then the challenges and opportunities were refined by views of experts of the sector. The list of institutions that influence the sector was also refined by views of experts. The institutions were judged on the basis of relevance of their functionality in impacting performance and competitiveness of LE enterprises and on their potential ability to help overcome challenges and capture opportunities of the sector.

The high impact institutions were studied by case method to assess how much they are prepared to impact performance and competitiveness of LE enterprises and help the enterprises to deal with the challenges and grab the opportunities to become competitive, grow and survive. The findings were refined by depth interviews with three experts.

1.3 Data Collection and Data Sources

Data were collected both from secondary and primary sources. Secondary data on challenges and opportunities were collected from literature review. Primary data on challenges and opportunities of LE Sector in Bangladesh were collected by Key Informant Interview (KII) from experts using open ended questionnaire. Primary data about what institutions are involved in contributing to the business ecosystem of LE sector were also collected by KII from the same experts. The high impact institutions were studied by case method to analyze the preparedness of those in dealing with the challenges and opportunities of the sector using semi-structured questionnaire.

The institutions were analyzed through field visits, depth interviews of key persons and documents study. Small and Medium Enterprises Foundation (SMEF), Bangladesh Industrial Technical Assistance Centre (BITAC), Bangladesh Small and Cottage Industries Corporation (BSCIC), Export Promotion Bureau (EPB) and Bangladesh Engineering Industries Owners' Association (BEIOA) were studied as cases.

1.4 Limitations.

The scope of the study was limited to local institutions. There are many institutions those contribute to LE Sector Ecosystem; some have strong impacts on the enterprises others are remotely related with the performance of the sector. Among them 5 institutions were selected for study on the basis of impact on the performance of the sector.

II. Overview of Light Engineering Sector

Definition

Although there is no universal definition of LE sector, most of the literature refer to some common attributes of LE like small firm, engineering or technological production process, related to metal working or electromechanical components making, indigenous technical skill etc. [5]; [6]; [7]. The sector is broadly divided into three components- foundries, machine shops and repair workshops [1].

Rabbani [5] defined LE as "Light Engineering should have a local engineering aspect in the design of a product or its making, i.e., where indigenous engineering intellect or skill has a contribution. The main processes are cutting, blending, machining, shaping, milling, hobbing, rolling, extruding, drawing, sawing etc. [8]. The sector produces three types of products/ services: complete machinery, spare parts and repair service. Integrating all the above attributes Light Engineering (LE) sector can be defined as "small firms employing engineering or technological process that produce small machinery, equipment, tool, metallic household appliance or sanitary ware, and electrical, electronic, electromechanical or mechatronic products mainly by metals; produce spare parts for different types of industrial, agricultural, automobile and small machinery and provide repair service".

History of LE Sector in Bangladesh

After liberation of Bangladesh non-Bengali industry owners left the country. The government took over their factories under large public sector corporations. Government set up more units of the industry under the corporations. It created a large demand of spare parts which were earlier imported by the private owners. After 1980 indigenous light engineering workshops emerged around Dholaikhal, Jinjira, Mirpur, Syedpur etc.

In 1984 Dholaikhal caught attention of the Government. It was felt that although the LE workshops had praiseworthy skills they could not make quality parts due to lack of modern machinery, continuity of demand

and staff with formal technical qualification. Bangladesh Small and Cottage Industries Corporation (BSCIC) provided targeted low interest loans to LE enterprises to purchase machinery and as working capital. To address continuity of demand government passed a circular making it mandatory for sector corporations to purchase local spare parts if available. BSCIC enlisted the enterprises with product category so that the industrial buyers including government sector corporations could get access to the LE producers. The sector got a huge boost. The enterprises went viral into all parts of the country- in districts, Upazillas and growth centres.

The loan repayment was good. But the sector suffered first disaster in 1988 flood that made many machines defaulted in enterprises of Dholaikhal and Jinjira. More than half of the enterprises lost business. In 1998 another flood devastated many enterprises. The next blow was afflicted by influx of cheap Chinese products after 2000. A large number of enterprises got out of work due to loss of demand. Those survived the blow of cheap Chinese supply after 2000 are still in business with limited demand.

Sector Size, Performance and Growth

Accurate figure of LE enterprises in Bangladesh is not available from Bangladesh Bureau of Statistics (BBS) as it does not have a composite category for LE sector in its industrial statistics. Bangladesh Economic Census 2013 also does not have number of LE enterprises specifically. BEIOA [9] claims that there are 40,000 LE enterprises in Bangladesh which is supported by European Union (EU) sponsored study [10]. But, International Finance Corporation (IFC) sponsored study conducted by SEDF concluded that there were approximately 7,200 Firms in the LE Sector [8]. SME Foundation identified 31 LE clusters in the country [11] having about 6000 enterprises. There are LE enterprises in all cities, towns and growth centres. In most of the places such enterprises are concentrated in specific locations although they are not as big as clusters. So, there is no scientific estimation or census on the figure of LE enterprises in Bangladesh. The numbers above are mere guesses.

BEIOA claims that the sector has annual turnover of about BDT 10,000 crore [9]. It is estimated that the sector contributed about 2.15% of GDP with US\$ 1.6 billion in revenue [8]. Some estimates [12] found that the sector employed around 7,18, 000 employees which was 5.51% of total manufacturing employment. According to Ahmed (2014) it employs about 800,000 workers.

Environmental Issues

Re-use of scrap iron and steel, which are the main outputs of the shipbreaking industry, is an environment-friendly activity since it reduces the need for mining for production of raw metal of steel industry from pig iron [13]. From energy saving and emission point of view, the production per ton of steel from scrap requires more than 5 times less energy and 7 times less CO₂ emission compared to steel production from iron ore [14]. However, there are questions on environmental hazards of ship breaking industry.

Light engineering firms produce only solid waste. Due to discharging solid waste, these engineering firms belong to green category as per country’s environmental regulation. Green category manufacturing firms are, by and large, free from environmental hazards. However, they are to be disposed as per standards. The congested clusters of LE enterprises have poor waste disposal system. The safety and working environment in this sector are poor.

III. Value Chain of Light Engineering Sector

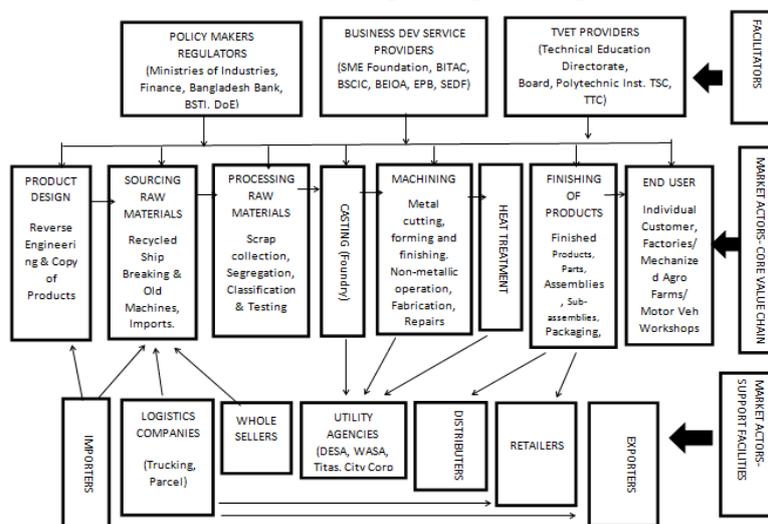


Figure 1: Value Chain of LE Sector

(Source: Author)

IV. Challenges & Opportunities Of Light Engineering Sector

Key Informant Interviews generated a number of challenges the sector faces and opportunities it can capture. Triple Triangle Framework [4] was used to identify and classify the challenges and opportunities of LE sector.

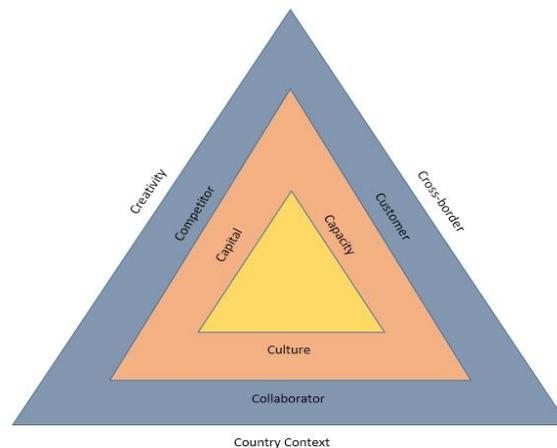


Figure 2: Triple Triangle Framework (Source: [4])

BEIOA President classified the challenges into five major heads - access to finance, backdated technology, lack of policy support, lack of skills and lack of infrastructure. The findings of key informant interviews generated some more major challenges. Altogether the following challenges are identified for LE sector of Bangladesh those need to be overcome:

1. Backdated Technology: The enterprises use indigenous and old technology to produce products. Old conventional lathe, boring, milling, shaping, drilling, grinding etc machines are used in the workshops. Computer Aided Numerically Controlled (CNC) machines and Computer Aided Design (CAD), Heat Treatment and Testing Machines are critical for design and production of quality products. By default the LE sector is capital intensive as it requires costly machines for production activities, but in Bangladesh actual average investment is very low in the sector. The enterprises cannot afford to invest in heavy machines as those are needed only for some purposes at certain stages. For such a sector Common Facility Centre (CFC) is the most appropriate solution that invests in heavy machines and serves a large number of enterprises for specialized jobs. Unfortunately neither the government nor any private firm has set up any CFC in the country as yet. The need of the CFC had been felt long ago.

2. Lack of World Class Skills: Most of the staffs of LE sector do not have formal technical education or training. They have learned the technology from hands-on-job training. They do not have design capacity. Some enterprises failed to operate CNC machines due to lack of trouble shooters. There are few CAT CAM experts in the LE sector. Institute of Appropriate Technology (IAP), Bangladesh University of Engineering and Technology (BUET) professor Kamal Uddin says that many of them cannot grasp training of modern technology due to lower level of their merit.

Dilemma of Investment in CNC Machine

Mr. Tapash of Elegant Engineering bought a CNC machine in 2010. It cost him BDT 70 lakh. But the problem arose when the skilled persons were not found to operate the machine. Once it got trouble. But there was no expert in Bangladesh to repair the machine. He brought foreign expert and got it repaired. But the cost he incurred in total is impossible to recover as he does not get sufficient orders due to poor marketing ability. The purchase of this machine has become a burden for him. In fact such costly machines are not appropriate for individual enterprise owners. The government can set up Common Facility Centre with such costly machines that would provide services to large number of enterprises.

3. Lack of Infrastructure: The enterprises operate in short spaces where most utilities are not available. Roads are narrow inside the area. Supply of electricity, gas and water and sewerage system is poor. There is no affluent treatment plant. Cost of doing business is high in such a situation. There is no LE Industrial Park in the country.

4. Lack of Scale of Operations: More than 70% of LE enterprises are proprietorships [8] and family owned businesses established for the purpose of livelihood. Supplying big orders locally or internationally is not possible without large scale productions. Small scale operation increases production cost also. A European

Union sponsored study finds that light engineering is a capital intensive industry, which due to lack of capital, is dominated by small manufacturing enterprises scattered throughout the country in various clusters [10].

5. Poor Quality of Products: The large buyers of sector corporations and heavy industry need world class quality of spare parts, tools and other engineering products. The LE industry often fails to ensure quality mainly due to poor quality raw materials, old technology and unskilled staff and weak designs. The raw materials are mainly recycled metals sourced from ship breaking which do not have any test report or certification. The steel re-rolling mills and foundries produce poor quality outputs and operate at very low efficiency for a variety of reasons, including, obsolete machinery and practices. Similarly, metal processors and assemblers of parts and finished goods are hampered by outdated equipment and practices, and poor testing, tooling and design facilities. The enterprises do not have access to modern testing facilities except limited scopes in BITAC and Bureau of Research Testing Centre (BRTC) of BUET. Quality is a major drawback for export potential of the LE products. Reverse engineering based copying of parts designs has inherent lack of legitimacy.

6. Competition with Imported Spare Parts: After 2000 Chinese cheap spare parts flooded the local market. Chinese enterprises operate on a very large scale as it has big export market worldwide. There is a widespread belief that Chinese enterprises are subsidized by the Government of China and they sell products at prices below their costs. The prime motive of the Chinese enterprises is to sell at whatever prices customers quote. This has created a hostile environment for LE sector of Bangladesh. There is complaint that the Chinese exporters dump products in the target market at lower prices initially and when the local producers go out of business the prices are raised to cover the past losses altogether.

7. Demand Uncertainties: Import duty for LE products is low and sector corporations are free to purchase them from open market. There is negligible export of LE products from Bangladesh. As a result there is no guaranteed market for LE enterprises.

8. Lack of Marketing Skills: The LE firms are producers. They know little about marketing. With the small scale of operation and culture of on-demand production the sector has not developed marketing mechanism. There is no branding of products or enterprises in the sector. As a result, the sector has no control on sales. The garment manufacturers do not know marketing. But the buying agents do the job of marketing for garment manufacturers. The buying agents collect orders from international brand makers for garment manufacturers. The LE sector has not developed such market intermediary.

9. Lack of Policy Support: The government has neglected the sector in almost all regimes except some support during 1984-87. During that time the government provided soft loans to the LE enterprises to purchase machinery. In 1984 the government made a circular to sector corporations to give priority to purchase spare parts from the local market. BSCIC was instructed to enlist LE firms that could supply spare parts. After the Public Procurement Act was passed in 2003 the circular became void. At the moment the sector faces oppressive taxation system. There is no financial incentive for the sector. The Ministry of Industries had not prioritized the LE for financing and investment in the last five years.

10. Lack of Access to Finance: The commercial banks do not consider the LE enterprises bankable as they do not have specialized staff to keep papers. Traditional collateral policy of commercial banks discourages them to provide loans to LE enterprises. The government does not have any window till today to provide preferential loans to them. SME loans do not reach the sector for many reasons. Due to high business risk of purchasing costly machines the enterprises are not interested in borrowing large amounts from banks for machinery.

Producing Crankshaft in a LE Workshop

Professor Kamal Uddin of BUET once heard that an enterprise in Bhaluka in Mymensingh district had been making crankshaft for buses and trucks. This was unusual to make such a critical motor vehicle part in Bangladesh. He, along with a group of students of Mechanical Engineering Department of BUET went to Bhaluka to visit the shop. They found that the enterprise was making a crankshaft by machining the shafts of ships. His sales were good. But the problem was, the product was not durable. Within 6 months the crankshafts used to be broken. The bus owners used to buy a new crankshaft again as the price was much lower than the imported ones. They discovered that the materials used had lower hardness than materials required for crankshaft. If there were heat treatment facility the hardness of raw materials could be improved and durability could be increased by many fold.

In fact, the SME loans channeled through the commercial banks and financial institutions are diverted to large industries due to faulty definition of SME in the policy. The small LE enterprises those need the loan most do not meet the fixed asset amount criteria for SME. Definition of women entrepreneur has been diluted by

the Government circular that has compromised the loan eligibility for women entrepreneurs. If number of employees in an enterprise is 51% it is eligible to get the loan designated for women entrepreneurship under the current policy, which is wrong.

The first four challenges are related to supply and the next four are related to demand conditions. The last two are related to policy issues.

The Opportunities can be summed as follows:

1. Export Opportunity: This is a huge sector. A critical mass of enterprises has been established. There is possibility of exporting small machines and spare parts to developing countries. It can also supply big multinationals on sub-contracting basis.

2. Growth of Local Industry: There is a big manufacturing sector in the country that contributes about 20% (MOF, 2016) of GDP. LE sector produces spare parts, small machinery, repair services for cement, paper, jute, textile, sugar, food processing, railway, shipping, garments manufacturing sectors. Currently a large share of spares and machinery are met by imported products although local LE industry produces those products. If market linkage can be strengthened with the local industry both LE and manufacturing sector can benefit [10].

3. Vibrant Banking System: While there is lack of finance in the LE sector banks have excess liquidity. There are more than 60 commercial banks in the country. A lack of confidence between LE sector and Banking industry has contributed to persistent lack of finance in the LE sector.

4. Technical and Vocational Education and Training Institutes: There is a large network of Technical and Vocation Education and Training (TVET) Institutes in the country. But technical education has not gained due social recognition. Under Ministry of Education, Ministry of Foreign Employment & Expatriate Welfare, Ministry of Textile, Ministry of Health etc. there are many technical training institutes. It is widely believed that the curriculum in these institutes is not need based due to disconnect between industry and educational institutes. These institutes can supply skilled staff to the LE sector that might increase production capability and quality. Recently the Government has established a separate Technical Division under the Ministry of Education which is a sign of commitment for technical education.

5. Sub-contracting Supply: Big manufactures of the world in the industries of automobile, electronics, aircraft manufacturing etc. source components heavily from developing countries like China, India, Malaysia, Singapore, Thailand etc. Bangladesh, despite having a large LE sector, is not being able to position itself as an outsourcing destination. Solving quality, testing and compliance issues it can become an outsourcing destination that can boost the LE sector.

6. Household Demand: Electrical products like substations, switch, socket, light shed, channel, cables and fans which are manufactured by the LE sector are now meeting 48% to 52% of the country's demands. Many household appliances can also be supplied by LE sector. With the growth of economy demand of these goods is increasing. It can provide a big market for LE sector if import can be reduced. The light engineering sector as 'the mother of all sectors,' because it provides backup support to cement, paper, jute, textile, sugar, food processing, railway, shipping, garments capital machineries by repairing and maintaining those [2].

7. Cluster Development: The LE industry has grown in clusters in Dhaka, Chittagong, Bogra, Jessore, Khulna etc. It provides the opportunity to arrange support system including infrastructure, targeted loan, product sourcing, staff training, CFC etc.

V. Institutions That Contribute to LE Business Ecosystem

Like biological ecosystem [15] businesses live and grow within a business ecosystem. Businesses can't evolve in a vacuum. They must attract resources of all sorts, drawing in capital, partners, suppliers, and customers to create cooperative networks. Kelly [16] suggests that "A company be viewed not as a member of a single industry but as part of a business ecosystem that crosses a variety of industries. In a business ecosystem, companies co-evolve capabilities around a new innovation: They work cooperatively and competitively to support new products, satisfy customer needs, and eventually incorporate the next round of innovations."

Moore [17] says that, traditionally known competitive business strategies like networks, strategic alliances, and virtual organizations are not enough to explain outcome of competition. James Moore [17] sets up a new metaphor for competition drawn from the study of biology and social systems. He suggests that a company be viewed not as a member of a single industry but as a part of a business ecosystem that crosses a variety of industries. In a business ecosystem, companies "co-evolve" around a new innovation, working cooperatively and competitively to support new products and satisfy customer needs.

R.M Kanter [18] stresses that all the pieces of an economy come together in particular places, and that their strength and interactions determine prosperity and economic growth. In Silicon Valley there is a sense that an enterprise prospers only because it is surrounded by lots of resources that help it to succeed, beyond the resources it controls. The same is true for all industrial sectors including LE in any economy including in Bangladesh. There are various institutions that contribute to the ecosystem of an industry. A total of 36

institutions were identified that directly influence LE sector in Bangladesh. Among them the following influence the LE sector most, which give a good picture of the state of LE business ecosystem in Bangladesh.

Table 1: List of Institutions Related to LE Sector

<i>Institutions</i>	<i>Functions</i>	<i>Nature of Institution</i>
BSCIC- Bangladesh Small and Cottage Industries Corporation	Provides business development services	Government department, under the Ministry of Industries.
BITAC- Bangladesh Industrial Training and Assistance Centre	Provides training and consultancy services	Government department, under the Ministry of Industries
BEIOA- Bangladesh Engineering Industry Owners' Association	Networking of LE enterprises, giving platform for voice to the members and providing common services	Business Association of LE industry
SME Foundation	Provides consultancy, policy support, and financial support.	An autonomous organization founded under the Companies Act, 1994 with Government and donor initiative, under the Ministry of Industries.
Export Promotion Bureau	Facilitates export of Bangladeshi products	Government department, under the Ministry of Commerce

VI. Findings

6.1 Small and Medium Enterprises Foundation (SMEF)

SME Foundation was established in 2006 under Companies Act 1994. SME foundation's stated mission is to assist the SME enterprises in facing the challenges of free market economy and globalization. Its vision is to alleviate poverty, generate employment and accelerate economic growth. With this mission and vision SMEF's objectives are to facilitate financing, identify policy anomalies, manage databases, facilitate linkages, provide incentives, develop capacity of service providers, plan interventions, finance interventions, facilitate marketing, provide awards and render policy advocacy.

As many LE enterprises fall under SME category as per industrial classification of Industrial Policy of the government, they are entitled to SMEF services. Although SMEF is mandated to offer comprehensive support to SMEs its services are limited to organizing regional trade fairs, credit wholesaling in small scale, training and consultation services to enterprises and individuals.

SMEF has identified and documented 177 SME clusters in the country out of which 31 are LE clusters. Since 2009 SMEF is operating a targeted credit to LE clusters in Dholaikhal and Bogra from its own fund. So far it has disbursed BDT 11 crore to about 150 enterprises in different clusters at an interest rate of 9%. An enterprise can borrow a maximum of BDT 10 lakh for purchasing machines under this program. SMEF is getting more applications for loan than it can serve. The utilization, results and repayment of these loans have been appreciated by the concerned department of SMEF. They estimated that there is an annual demand of around BDT 50 crore loans in these two areas. SMEF has a training institute in Uttara Model Town to provide managerial issues which is not availed by LE enterprises. Participation of LE enterprises in fairs is not significant. Such programs may not be useful to LE enterprises if not catered to their special needs. It is felt that the foundation cannot expand its credit program unless it gets special fund from the government for this purpose.

It deserves mention that all LE enterprises are not SMEs. So, a vast majority of SMEs are not entitled to SMEF services. So far SMEF's credit outreach to LE sector is less than 5% of enterprises.

Table 2: Preparedness/ Support of SME Foundation to Overcome Challenges Faced by LE Sector

Serial	Challenges	Preparedness of SME Foundation
1	Backward technology	Provides loans to purchase machinery, but in a limited amount upto Tk 10 lakh to each firm.
2	Lack of Skills	Some management skills are developed, but few LE members participate
3	Lack of infrastructure	No project for infrastructure
4	Small scale operation	No program to increase scale of production
5	Poor quality	It organizes Training on management, but not on engineering skills
6	Competition with imported spares	No program to help the enterprises to face competition with imported products or no initiative to policy advocacy to reduce imports.
7	Uncertainty of demand	No program or initiative to enhance demand of LE sector products
8	Lack of Marketing	No program to improve marketing
9	Lack of policy support	It does not take initiative for policy advocacy.
10	Lack of Finance	Provided funds to a small number of LE firms.

Table 3: Preparedness/ Support of SME Foundation to Capture Opportunities by LE Sector

Serial	Challenges	Preparedness of SME Foundation
1	Export opportunity	No program to export linkage
2	Growth of local industry	No program to industry linkage
3	Vibrant banking system	No linkage is established
4	TVET Institutes	No program to link TVET institutes to supply expert staff

5	Sub-contracting supply	No program to build linkage or capacity
6	Household demand	No program to boost demand
7	Cluster development	Clusters have been identified and documented.

6.2 Bangladesh Small and Cottage Industries Corporation (BSCIC)

BSCIC was created in 1957 by an act of parliament with the objectives of creating employment opportunities, poverty alleviation, balanced regional growth and optimum utilization of economic and human resources. This is a sector corporation. The major services it provides are registering small & cottage industries, skills training, infrastructural facilities development, extending credit facilities, providing technical/ consultancy services for establishing new unit or quality improvement, development & distribution of new designs, innovation & adaptation of appropriate technology for SCI sector, conduct research & survey for SCI sector etc.

The mandate of the creation of BSCIC enables it to provide technology, training, credit, innovation, design and other services for the LE sector. These are the crucial needs of the LE sector as almost all challenges of LE sector revolves around these areas which BSCIC is supposed to work in. Historically BSCIC came forward to help the LE sector before any other Government department. During 1984-1987 BSCIC provided loans to LE enterprises. A total of BDT 5.0 crore was loaned to 243 Dholaikhal and Jinjira based LE enterprises to purchase machines in order to upgrade technology to enable them to supply spare parts to the industrial sector of Bangladesh. The fund was provided to BSCIC by Bangladesh Bank under an MOU among Bangladesh Bank, Ministry industries and BSCIC in a rate which was lower than market rate. BSCIC lent it to enterprises at 8% interest rate for fixed asset purchase and at 12% interest rate for working capital. With its success BSCIC approached Bangladesh Bank for further fund for LE enterprises in different districts. BB suggested BSCIC to borrow fund from commercial banks at 12% and loan it to LE enterprises at 14%. BSCIC implemented the financing program.

The credit facility proved to be highly successful. BSCIC did not continue the loan distribution after 1987. However, the recovery of due loan from defaulter LE enterprises is still in the list of functions of BSCIC. BSCIC says that it cannot restart the loan program if it does not get support from Bangladesh Bank as it does not have financial capacity. BSCIC did not approach the Ministry of Industries or Bangladesh Bank with any loan formula after 1990.

The main clients of LE sector were Bangladesh Railway, Titas, Sugar & Food Corporation, Textile Mills Corporation etc. The Ministry of Industries passed a circular making purchase of local spare parts mandatory for manufacturing sector if the spare part is available locally. BSCIC enlisted the interested LE enterprises for the supply. This demand creation and supply side capacity strengthened by loans marked a sharp rise of the sector. The sector made international headlines. The Government policy through BSCIC played a vital role in improving the capacity of LE sector before 1990.

The operation of the circular of mandatory purchase of local spare parts lost its effect after Public Procurement Law was passed in 2003. The enlistment program of BSCIC exists still now, but there is no implication of it. The sector corporations no longer take help of the list of LE enterprises made by BSCIC. There are 1278 LE enterprises enlisted with BSCIC. But BSCIC did not develop any formula for linkage of enlisted LEs with the public sector corporations.

Recently, BSCIC has taken up a project to establish an Industrial Park in Munshigonj at a cost of BDT 162 crore for automobile, LE, chemical and plastic sector industries. This is not dedicated to LE enterprises. But LE enterprises will get chance to set up production facility in the Park. Although, industrial parks around the country are open for any enterprise including LE, special needs of the sector are not met in the common industrial parks. As a result only few LE enterprises have got plots in district level BSCIC industrial parks.

BSCIC's design department does not provide any service to LE sector. There is no training program for LE sector in the training department of BSCIC. Currently BSCIC has very limited support system to overcome challenges and capture opportunities for the LE sector.

Table 4: Preparedness/ Support of BSCIC to Overcome Challenges Faced by LE Sector

Serial	Challenges	Preparedness of SME Foundation
1	Backward technology	No program to upgrade technology
2	Lack of skills	No program to enhance skills by training or any other way.
3	Lack of infrastructure	BSCIC Industrial Parks provide plots to LE enterprises in a limited scale. It is going to establish an industrial park that will focus on LE sector.
4	Small scale operation	No program
5	Poor quality	No program to address quality issues, although it has mandate.
6	Competition with imported spares	No program to help LE firms to face competition with imported products either by improving capacity or by providing protection
7	Uncertainty of demand	No program to enhance demand. In the past it played the major role in issuing a circular to connect public sector corporations to buy LE products
8	Lack of Marketing	No program to develop market linkage or to improve marketing skills.
9	Lack of policy support	No program to provide policy support on tax, space etc issues.
10	Lack of Finance	No program to help finance the LE firms

Table 5: Preparedness/ Support of BSCIC to Capture Opportunities by LE Sector

Serial	Challenges	Preparedness of SME Foundation
1	Export opportunity	No program to make export linkage with foreign customers
2	Growth of local industry	There is a list of 1278 LE enterprises which can supply products to local manufacturing sector. But there is no linkage with local industry.
3	Vibrant banking system	No initiative to make linkage with banking system
4	TVET Institutes	No program to link LE sector with TVET institutes to supply expert staff
5	Sub-contracting supply	No program to build linkage with foreign purchasers of parts or build capacity to make quality parts for sub-contracting supply order
6	Household demand	No program to boost demand
7	Cluster development	No program of cluster development

6.3 Bangladesh Industrial Technical Assistance Centre (BITAC)

BITAC was established in 1962 with the aim of designing products and processes and develop skills for industrial sector. Excluding Dhaka it has four other centres in Chittagong, Khulna, Bogra and Chandpur. Its current program is limited to training and producing spare parts for industrial sector. It runs a modern workshop that contains CNC machines, Boring Machine, Vertical Lathe Machine, Heat Treatment Machines and Wire Cut machines which are small in size. It has got some testing facilities. It has taken up a project for establishing a testing laboratory for the industrial sector including LE. BITAC has got wide ranging training programs for industrial staff including light engineering. It conducts training on payment by any project of other departments or on payment by the trainees. So, it does not require much of finance for conducting training. BITAC conducts training programs under different projects. It has got sufficient technical staff for conducting training programs. With the modern workshop it is very suited to conduct training for the LE sector. However, many LE staffs do not have educational qualification as per course design. As it conducts training for many other sectors it meets a tiny part of the training need of the LE sector. BITAC has become a modern light engineering workshop. BITAC takes part in the tender as competitors of LE firms. Some complain that role of BITAC has shifted from becoming a facilitator of technology, design, training and innovation to a manufacturing service provider. Instead of becoming a savior for LE firms it has become a competitor of them. However, its training program provides critical technical capabilities to LE staff, although the outreach is limited to Dhaka, Bogra, Khulna and Chandpur. It has got some capability to provide technical advices to LE enterprises.

BITAC seems to be providing the best service to LE enterprises in the country although the range of services and outreach is far from desired scope.

Table 6: Preparedness/ support of BITAC to Overcome Challenges Faced by LE Sector

Serial	Challenges	Preparedness of SME Foundation
1	Backward technology	Has got machines to give production support
2	Lack of Skills	Runs technical training
3	Lack of infrastructure	No program to develop infrastructure of LE enterprises
4	Small scale operation	No program to improve scale of operations of LE enterprises
5	Poor quality	Runs technical training , which helps LE enterprises in improving quality of products
6	Competition with imported spares	No program to help LE firms to face competition with imported products either by improving capacity or by providing protection
7	Uncertainty of demand	No program to enhance demand. In the past it played the major role in issuing a circular to connect public sector corporations to buy LE products
8	Lack of Marketing	No program to develop market linkage or improve marketing skills.
9	Lack of policy support	No program to provide policy support on tax, space etc issues.
10	Lack of Finance	No program to help finance the LE firms

Table 7: Preparedness/ Support of BITAC to Capture Opportunities by LE Sector

Serial	Challenges	Preparedness of SME Foundation
1	Export opportunity	No program to make export linkage with foreign customers
2	Growth of local industry	BITAC has got linkage with local manufacturing industry which it can use to support LE sector to sell products to other industries. But it does not provide this service to the LE sector.
3	Vibrant banking system	BITAC does not have capacity to make linkage with banking system
4	TVET Institutes	BITAC has no initiative to link TVET institutes with LE sector although it provides training to TVET institutes.
5	Sub-contracting supply	BITAC could take an initiative to enhance capacity of LE producers to supply sub-contracting orders. It could make linkage with foreign customers. But it has got no initiative in this regard.
6	Household demand	No program to boost local demand of LE sector products
7	Cluster development	No program for customer development.

6.4 Bangladesh Engineering Industry Owners Association (BEIOA)

Bangladesh Engineering Industry Owners' Association (BEIOA) is the only association in Bangladesh that represents LE enterprises. It was established in 1984. Its current number of members is 4000. BEIOA's

activities include organizing seminars, training workshops, and fairs and providing information, counsel, supports and services to its members for promotion of engineering industry in the country.

BEIOA has a training centre that conducts technical training to LE staff and unemployed youth with job placements. It runs a national skills database. It conducts training program on operation of lathe, milling, welding and CNC machines and CAD CAM design. These are very practical and high level training. The current training program is financed by SEIP (Skills for Employment Investment Program) project financed by donors. These are focused training.

BEIOA feels the pain of sickness of the LE sector. But it does not get backing of the stakeholders to fight the odds together. It has become tired of getting the attention of the Government policy makers. With limited means it is trying to keep the hope alive. Other than training and motivation it cannot provide any other service to overcome challenges and capture opportunities of the sector.

6.5 Export Promotion Bureau

EPB's main activities are development of exportable product ideas, database management of market information and arrangement of export fairs. In practice, it mainly organizes international trade fairs in Dhaka every year. It also organizes regional trade fares in divisional towns once a year which are rarely international in nature. It takes space in international fairs abroad in collaboration with local industries who would like to take part in the fairs. It makes a calendar for about 30 fairs abroad. It does not have the capacity of product development. Its database comprises of a few lists of foreign importers and local suppliers which are of little use to local exporters or foreign importers. EPB does not have any data on LE sector.

For the last 3 years no LE enterprise participated in the overseas fairs. EPB claims that the LE sector association did never ask EPB to keep space for it in overseas fairs. EPB invites proposals from different sectors to participate in overseas fairs and extends help accordingly.

EPB should have extended policy support to exporters, identify the policy gap and manage critical data on products, market segments, consumer behavior, customer profile etc. for LE products. EPB has taken no initiative for country branding for boosting exports. Current role and activities of EPB are ineffective for export including LE products. EPB does not have any program to help LE sector to overcome challenges and capitalize opportunities.

VII. Conclusion

7.1 The LE Sector is Facing Serious Challenges: The sector does not provide attractive return to LE firms due to poor margin, weak demand and high cost of doing business. They cannot improve operations due to high cost of machines, lack of access to finance, scarcity of skilled staff and absence of government support. If the situation persists for long the sector may not survive.

7.2 The Institutions are not Providing Support to LE Sector: The institutions that are considered by experts as most influential for LE sector are providing negligible support to the sector although they were created with clear mandate. The reasons may be lack of focus, lack of resources, lack of vision of management etc. The study of five high impact institutions gives very disappointing indications.

7.3 The LE Sector Has Implications for Inclusive Growth: LE sector draws employment from the poorer sections of the society. It produces low cost machinery and spares that are helpful for development of labour intensive manufacturing activities in the rural areas. It helps reducing regional disparity by providing opportunities to the people of remote areas to engage in productive activities. While the government is pursuing accelerating poverty in papers the performance of the institutions in supporting such an important sector for inclusive growth shows an opposite picture.

VIII. Recommendations

8.1 Establish LE Development Foundation: Although there is no accurate data on LE enterprises, there are LE enterprises all over the country. The 31 LE clusters documented by SME Foundation contain 6000 firms. There are many LE firms outside these clusters. No government or private institutions are providing dedicated support to this sector. Existing institutions like SME Foundation, BSCIC, BITAC and EPB do not understand the complex realities of LE sector. So, they have stayed away from this sector. Therefore, there is an urgent need to establish a Government institution with the sole purpose of supporting the LE sector.

8.2 Establish CFCs in All Major Clusters and Regions: The LE enterprises cannot own all costly machines needed for their work as most of them are needed for part of the job of the enterprises. These machines should be owned by a third party who would provide the service for rent. Such a third party is known as CFC. CFC is a high-tech and capital intensive venture. Private sector does not come forward to invest in such centres in developing countries. India and Pakistan have set up CFCs under government patronization. Each centre might require machines costing BDT 5-10 crore. There should be CFCs at all big clusters and in the regions.

8.3 Arrange Low Interest Credit for LE Sector: In the traditional SME loans donors provide the money at a very low interest rate (0.01% for example), which Bangladesh Bank supplies to commercial banks at a much higher rate (5%). The banks provide it to the enterprises at market rate (13%-16%) which is too costly to enterprises. With uncertain rates of return, incapacity to deal with complexity of market mechanism and incapacity to provide collateral which is in-built in the system of collateral such credit facility is useless for Micro, Small and Medium Enterprises (MSMEs) of the LE sector. A separate credit model is to be used at a lower interest rate for the LE sector so that investment is feasible, poses less risk to the investor and they are considered fit to take loan.

8.4 Establish LE Industrial Park in Major Regions: Both India and Pakistan have set up numerous industrial parks for LE enterprises. In India there are 16000 industrial parks including 1400 LE industrial parks. In such industrial parks enterprises can avail all utilities, facilities and environment that provide enabling conditions to them to produce quality products as per requirement of local manufacturing sector as well as for foreign buyers.

8.5 Organize Massive Training Program for LE Sector: The proposed LE Development Foundation can undertake the massive training program with the help of private training service providers. Short term training course should be completely free with scholarships so that the whole sector can benefit by basic training. Higher level training courses may be sponsored by projects. Some of the courses can charge reasonable fees. If the training centre asked to operate at own revenue the much needed training service may be overlooked and charges may be higher than the trainees afford.

8.6 Make LE Development Policy: The policy papers on Industrial Policies or SME Development Policies are too broad to accommodate dynamics of LE Sector.

8.7 Offer Protection to LE Sector Firms in Domestic Market: Within the broad framework of open market policies the critical industries are given protection against imported goods through tariff and non-tariff mechanisms in different countries. The exact nature of support is to be smartly designed.

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