UNLEASHING THE EXPORT POTENTIAL OF LIGHT ENGINEERING PRODUCTS: EVIDENCE FROM A FIRM-LEVEL SURVEY

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Abstract

Based on a firm-level survey, this article analyzes the export potential, capacity, and challenges of the light engineering industries (LEI) in Bangladesh. The light engineering sector accounts for 2.5% of the country's GDP and employs over 10 million people. Many of the firms operating in this industry are small-scale and decentralized, which makes them more accessible to local communities and helps in the promotion of inclusive growth. The industry's products are affordable and customized to meet the needs of local consumers, making them an essential component of the country's development strategy. However, there is a lack of credible information regarding the location of the light engineering enterprises and their export potential. The contribution of this paper is to fill this critical gap. The paper finds that the LE firms' location and specialization depend on the availability of raw materials and local demand; the firms operate with a small number of workers (less than 10) and mostly use domestic raw materials and conventional machines. However, they rarely replace their machinery, which affects productivity. Major findings also include that light engineering firms mostly produce agricultural machinery, spare parts, and machinery and parts for the construction sector, transport, textile, food processing, and molding industries. Meanwhile, the paper finds that less than 2% of the firms are currently exporting due to limited production capacity, lack of quality raw materials, insufficient capital, unskilled workers, and lack of policy support. Around 16% of the surveyed firms believe they have high export potential, whereas 82.4% of firms have no plans regarding exporting their products to the global market. To promote the industry's export competitiveness and overcome ongoing challenges, a set of

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Social Science Review [The Dhaka University Studies, Part-D], Vol. 41, No.1, June 2024
DOI: https://doi.org/10.3329/ssr.v41i1.79128.

policy recommendations are given, including effective policy implementation, utilization of firm-level dataset, product quality improvement, skills development, use of modern technologies, and adequate policy support from the government.

Keywords: Light engineering industries, socioeconomic development, export promotion.

Introduction

The Light Engineering Industry (LEI) is a highly promising manufacturing sector in Bangladesh that has been identified as a 'thrust sector' with the potential to accelerate and diversify export growth. This sector acts as the foundation for many other manufacturing industries, such as textiles, paper, cement, jute, sugar, railway, and food processing; and has been termed as the "mother of all sectors" (Majumder & Dey, 2020). Therefore, this is a subsector that functions as the primary provider of capital equipment, spares, and accessories to the majority of the industrial sector (Chakma, 2020). In recent decades, the light engineering industry has made significant contributions to the economic growth of Bangladesh by reducing poverty by creating huge job sectors and producing import substitute products, and supplying necessary items to many other manufacturing industries (Hasan, 2021). Meanwhile, it has generated large-scale employment opportunities (Haque, 2014). Due to having a large domestic market with a growing middle-income class, growing manufacturing industries, and duty-free market access for exports, the LEIs have immense potential to contribute to the economic development of Bangladesh.

Despite the significant potential of the Light Engineering Industry (LEI) in both the domestic and global markets, the lack of disaggregated data on potential manufacturers and exporters of LEI products is a major challenge. Although the Export Promotion Bureau (EPB) provides an aggregate view of LEI exports, there is a serious lack of data at the firm level. This limitation often impedes efforts to attract higher levels of foreign direct investment (FDI) in the LEI sector. The lack of relevant data makes it difficult for potential buyers to assess the capacity of LEI firms. Given this situation, it is imperative to develop a comprehensive database of light engineering manufacturers and potential exporters that can provide a basis for generating evidence-based policies and developing an export promotion strategy for LEI products.

Objective of the Paper

Within the aforementioned context, the objective of the paper is to provide an analysis of the export potential, capacity, and challenges of the light engineering

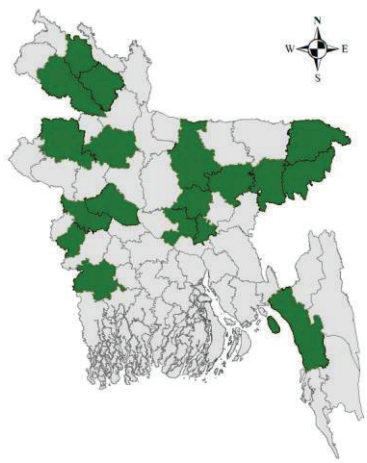
industries (LEI) in Bangladesh. In doing so, the research team conducts a firm-level survey involving light engineering manufacturers and potential exporters. The specific objectives of the paper include:

- To locate the LEIs across the country and assess their operational activities;
- To understand the quality of products and services offered by LEIs;
- To identify the firms that have export potential but not currently exporting;
- To assess the challenges for export promotion and required policy support; and
- To provide evidence-based policy recommendations for export promotion of the sector.

Methodology of the Paper

To attain the objective, the paper utilizes a mixed-method research approach. The use of mixed methods research is very prevalent, particularly when finding solutions to problems for policymakers. As a part of the quantitative research method, the research team conducted a firm-level survey to gather detailed information about light engineering firms. A questionnaire survey through in-person interviews was administered with 500 light engineering firms across 18 districts in Bangladesh (Figure 1). The survey areas have been Dhaka, Narayangonj, Gazipur, Bogura, Dinajpur, Nilphamari, Pabna, Rangpur, Naogaon, Habiganj, Moulvibazar, Sylhet, Kishoreganj, Mymensingh, Chuadanga, Jessore, Kushtia, and Chittagong.

Figure 1: Survey area coverage



Source: RAPID firm-level survey of LE sector, 2022.

Along with the firm-level surveys, the research team has conducted 5 focused group discussions (FGDs) and ten (10) key informant interviews to get further insights into the whole scenario of the light engineering industry. Meanwhile, the research team conducted in-depth desk research to review and analyze the secondary data and information, different policies concerning the light engineering sector, reports, and other secondary literature. The secondary data and information were collected from the Export Promotion Bureau (EPB), Bangladesh Bureau of Statistics, International Trade Centre (ITC) trade map, etc. Although the findings are mainly based on the data collected through the firm-level survey, the researchers use qualitative information to supplement the survey findings.

Salient Features of the Light Engineering Industry

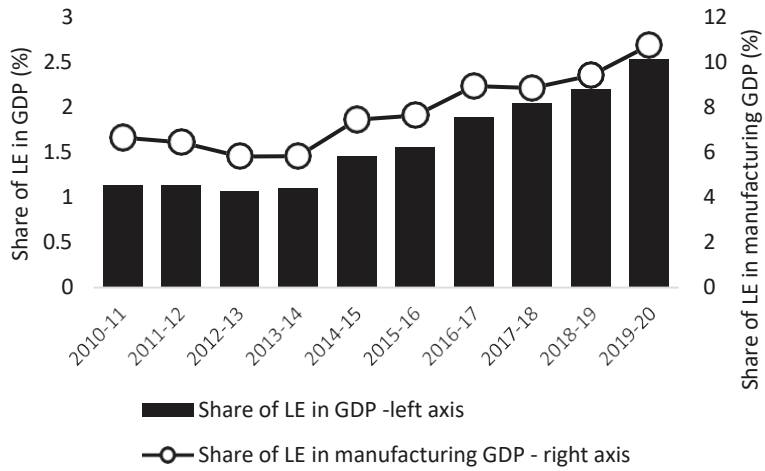
In the 1950s, the light engineering industry started assisting with the upkeep of the country's manufacturing facilities. After 1985, the sector acquired steam and grew rapidly due to the modernization of other manufacturing industries. Some of the very first indigenous light engineering workshops appeared in the 1980s in and around Dholaikhal, Jinjira, Mirpur, and Syedpur. Although the LE workshops had commendable potential, they could not produce quality products due to inadequacies of quality raw materials, use of conventional technology, and unproductive workers (Talukder & Jahan, 2016).

Domestic market size and production

Light engineering firms are micro, small, or medium-sized enterprises that employ engineering or technological procedures to produce or repair metallic components, equipment, tools, or sanitary ware for commercial, agricultural, or automotive machines. They have emerged as a lynchpin of Bangladesh's economic growth and development.

Through strengthening industrial expansion with technical innovation, this sector contributes significantly to economic growth and creates a vast scope for employment generation. Prior to COVID-19, the annual domestic market size of this sector was estimated at roughly Tk. 25,000 crores, growing at a pace of 20 to 25 per cent (Hasan, 2021). The sector contributes 2.5 per cent to GDP and around 10 per cent to manufacturing GDP (Figure 2). Although local production is increasing rapidly, it can only meet half of the domestic demand.

Figure 2: Contribution of LEI to GDP (%)



Source: Author's calculation based on Bangladesh Bureau of Statistics data.

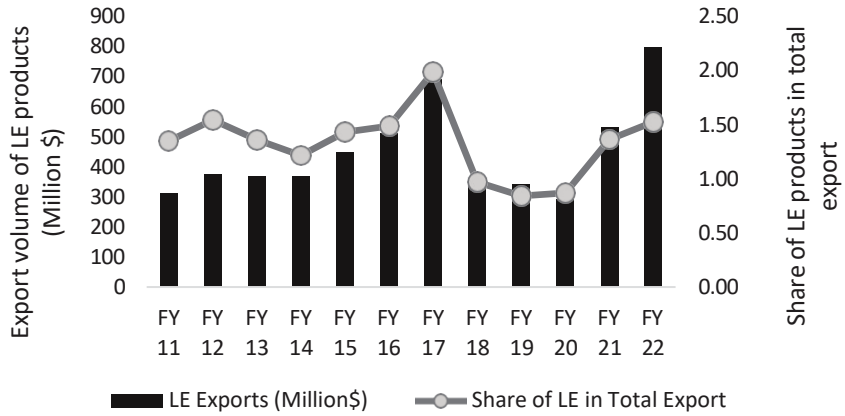
Currently, approximately 10 million people work in this industry, but it still has immense potential to create significantly more employment opportunities, thereby assisting our country in reducing poverty and improving labor market efficiency (Hasan, 2021).

Export of Light Engineering Products: Trends and Prospects

The global light engineering products export market has expanded from $309 million in 2011 to $795.63 million in 2022. Meanwhile, the share of LEI products in overall exports increased from 1.35 per cent to 1.53 per cent during the same reference period. However, exports of light engineering products experienced fluctuations over time. After experiencing negative growth for three consecutive years, the light engineering sector achieved a remarkable growth of 80 per cent in 2020-21 (Figure 3). Bicycles have experienced a major increase in the global demand for light engineering goods under the HS 8712 category. Due to COVID-19, the demand for bicycles has increased globally to maintain social distancing.

Bangladesh exports a handful of LE products, with bicycles being the most prominent, accounting for over one-fourth of total LE export earnings in FY 2021-22. Other LE products exported from Bangladesh are electrical equipment such as lead accumulators, refrigerators, transistors, diodes, etc. Despite having high export potential, the share of LE products in total exports remained at around one per cent.

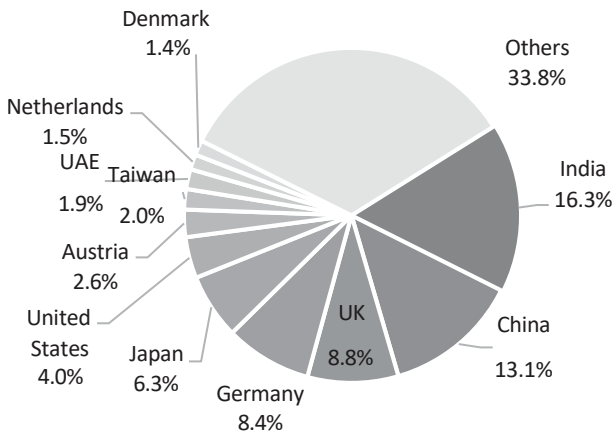
Figure 3: Export of Light engineering products



Source: Author's calculation based on Export Promotion Bureau data. Note: LE = Light Engineering

The export markets for LE items are quite diversified. India is the largest destination, comprising 16.3 per cent of total LE exports, followed by China (13.1 per cent), the United Kingdom (8.8 per cent), Germany (8.4 per cent), Japan (6.3 per cent), the United States (4 per cent), Austria (2.6 per cent), Taiwan (2 per cent) and the United Arab Emirates (19 per cent) (Figure 4).

Figure 4: Bangladesh's major export destination



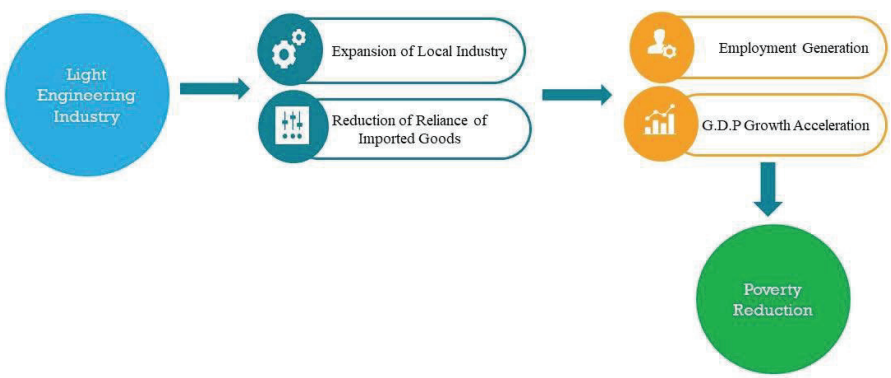
Source: Author's calculation based on International Trade Map data.

Bangladesh's presence in the global LE market is negligible. The world's import of LE products, as defined by the EPB, stood at over $9 trillion. Bangladesh's share of the world market is just 0.006 percent. Bangladesh captures 1.1 percent of the global bicycle market. Given the huge demand for LE goods, there is a huge potential for boosting exports from Bangladesh, which can contribute to export diversification.

Contribution of light engineering industry to poverty reduction

The LEI sector contributes to the country's manufacturing sectors by manufacturing spare parts and capital machinery and providing maintenance and repair services. Meanwhile, this sector has a lot of promising aspects in poverty alleviation through generating employment and accelerating GDP growth. Over the period, light engineering firms have sprung up as small and micro enterprises in local cities. According to the Bangladesh Light Engineering Industry Owners Association (BEIOA), there are about 40,000 LE firms operating across Bangladesh, which have expanded the local industry remarkably. Moreover, such LE firms have decreased reliance on imported goods in the local market. It supplies at least 50% of the country's imports with domestic alternatives. In addition, this sector provides import substitute products with an annual turnover of US $200 million (BIDA, 2021). Therefore, the industry has great potential to earn substantial amounts of foreign currency. With the increased earnings of foreign currency, economic growth gets stimulated through increasing investment, exports, and government revenue. Therefore, there will be immense employment generation in the economy.

Figure 5: Framework of the contribution of the light engineering industry in poverty reduction



Source: Author's representation based on existing literature.

In the context of Bangladesh, the major factor of poverty reduction has been the earnings from labour. With the expansion of local industries and reduction of reliance on imported goods, the LE sector remains a key contributor to poverty reduction and the expansion of the economy by creating employment opportunities. As a labor-intensive sector, the LEIs have created huge employment opportunities for skilled and semi-skilled workers. The 40,000 light engineering firms across the country are employing roughly 0.8 million semi-skilled, skilled, and technically skilled workers, as well as innovative entrepreneurs (USAID, 2019). Choudhury (2020) mentioned that the LEIs created about 3,00,000 direct employment and, at the same time, around 30,00,000 indirect job opportunities in different supportive industries. In addition, the LEI sector employs over 0.8 million people with a mix of education levels (including those with only a high school diploma or less) (USAID, 2019). In the future, there will be a rapid increase in projected labor demand due to high projections of GDP growth, which has been assumed to be sustainable with the same elasticity of employment as experienced during the last decade. The demand for skilled workers in the LE sector is expected to rise to 76.95% in the 2025-26 fiscal year (BIDS, 2017). Therefore, the sector will require workers with a wide range of skill sets and there will be huge employment opportunities for the workers. Since LEIs are dispersed all across the country, they have the potential to create jobs in a wider geographic region. People can earn a living and support their families when more employment is available. This, in turn, leads to poverty reduction.

However, economic growth has been vital for reducing extreme poverty and improving the lives of many poor around the world. The LEI sector has been a driving force behind national prosperity for decades. It is a significant contributor to the country's GDP, making up almost 2.5 per cent in 2020. According to Bangladesh Industrial Technical Assistance Centre (BITAC), the export earnings from the LEI sector are projected to reach $9.0 billion by 2030, and $15 billion by 2041 (Majumder, 2022). As the economy grows, more wealth is distributed. This can lift people out of poverty by providing them with the means to purchase the basic necessities of life.

Findings from the Firm-level Survey

The firm-level surveys were carried out in all major regional hubs throughout the country. Light engineering industries have been found to spring up in industrial zones to cater to the demand of domestic manufacturers. The location of the firms and their specialization also depend on the availability of raw materials and labor. The Dhaka-Narayanganj-Gazipur LE hub specializes in producing capital machinery and equipment for heavy industries, such as transportation, construction, and textile industries, as well as spare parts for agro-processing

industries and bicycles. Besides, due to the availability of raw materials, the Chittagong LE manufacturing hub is a shipbuilding and breaking hub for related spare parts and machinery. The specialization of LE manufacturing hubs is provided in Table 1.

Table 1: LE cluster and their specialization

Hub of LE firms	Focus of Production
Dhaka, Narayanganj, Gazipur	Spare parts and capital machinery for transportation, construction industry, textile industry, cottage industry, agro-processing, and bicycles.
Bogura, Pabna, Naogaon	Spare parts foundry, agro-machineries, transportation industry, construction industry, and cylinders.
Dinajpur, Nilphamari, Rangpur	Spare parts for automobiles, railways, mills, factories, and agriculture
Hobigonj, Moulavibazar, Sylhet, Sreemangal	Spare parts for agro-machineries, the tea industry, the food industry, mills, and factories.
Kishoreganj, Mymensingh	Spare parts for the agricultural industry, construction industry, and food industry.
Chuadanga, Jessore, Kushtia	Spare parts for mills, motor cars, pharmaceutical industry, food industry, kitchen and bathroom fittings, agriculture industry, and construction industry.
Chittagong	Ship-breaking linked factories that are concentrated in the transportation industry, food industry, and construction industry.

Source: RAPID firm-level survey of LE sector, 2022.

More over 90 per cent of the LE firms are owned by following sole proprietorship, whereas only 6 per cent are operating under partnership (Figure 6). Less than one per cent of the firms are operating under a company. The sole proprietorship was established for the purpose of livelihood maintenance. Therefore, this kind of ownership is found to be popular in the light engineering sector. The surveyed LE firms have their own engineering aspects in the designing and making of a product.

Due to a lack of technical knowledge and capital, LE firms are found to be widely involved in contract manufacturing and repairing services. Around 70 per cent of the firms are engaged in contract manufacturing, and more than three-quarters are involved in repair and installation activities (Figure 7). Around 44 per cent of surveyed firms manufacture and sell their own products.

Figure 6: Ownership structure of the firm (% of firms)

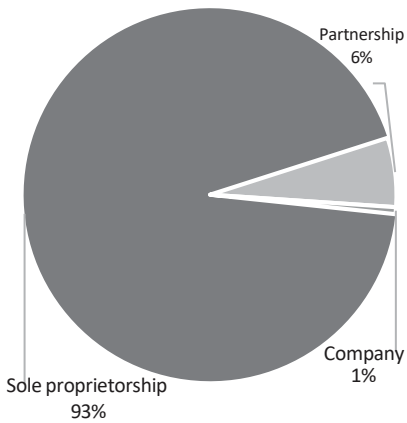
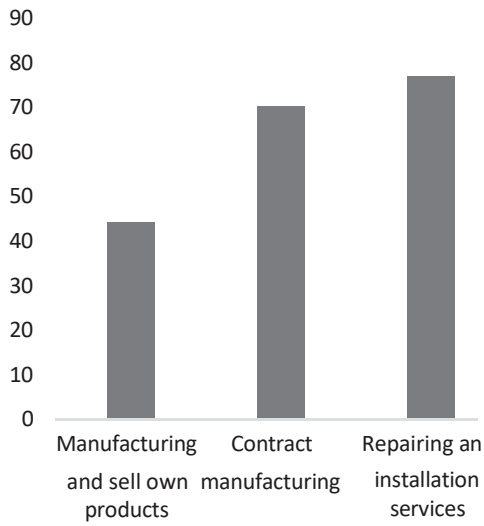


Figure 7: Primary mode operation of the firms (% of firms)



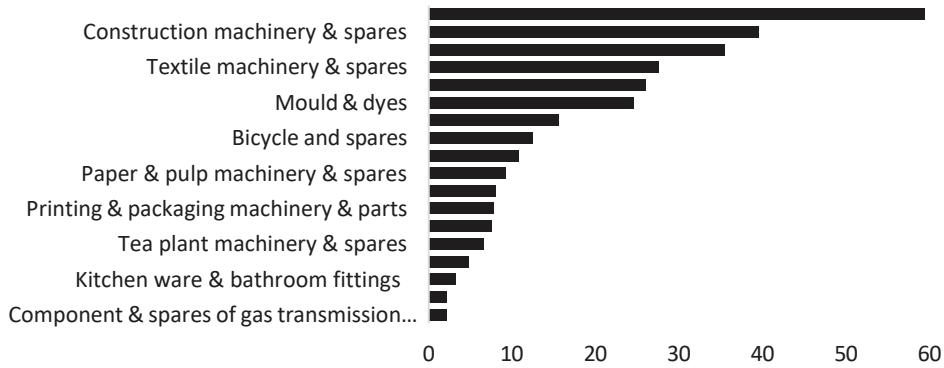
Note: The statistics on the mode of operation of the firms are based on multiple responses meaning that a firm operates in multiple modes.

Source: RAPID firm-level survey of LE sector, 2022.

LE firms produce and supply machinery and spare parts for different types of industries and provide repair services. They provide support to the automobile, industrial, agricultural, and construction sectors by supplying low-cost spare parts, castings, moulds and dice, oil and gas pipeline fittings, light machinery, and repair services (Figure 8). The same LE firms are involved in producing different products and support multiple sectors. Around 60 per cent of surveyed firms produce agricultural machinery and spare parts, while 40 per cent serve the construction sector by producing machinery and parts. 35 per cent of surveyed firms produce and repair spares for motor and maritime transports, 28 percent support the textile sector, 26 percent produce food processing spares, and around a quarter are involved in moulding. Other activities of LE firms are manufacturing

machinery for the jute industry, poultry, paper and pulp, printing and packaging, tea industry, etc.

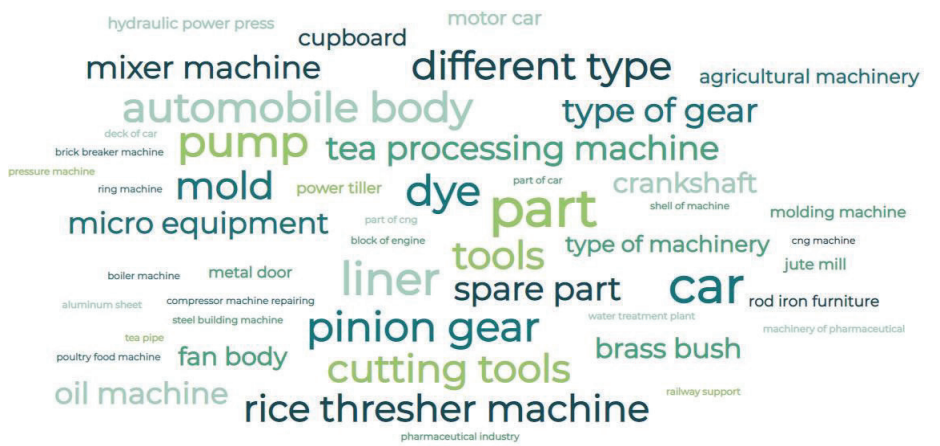
Figure 8: Operational activities of the surveyed firms (% of firms).



Source: RAPID firm-level survey of LE sector, 2022.

The major products of the surveyed firms are liner, pinion, tea processing machines, bush, shaft, gear, moulds, mixer machines, rice thresher machines, automobile body and parts, cutting tools, oil machines, crankshaft, etc. The major production items are provided in Figure 9.

Figure 9: Major products of LE firms



Source: RAPID firm-level survey of LE sector, 2022.

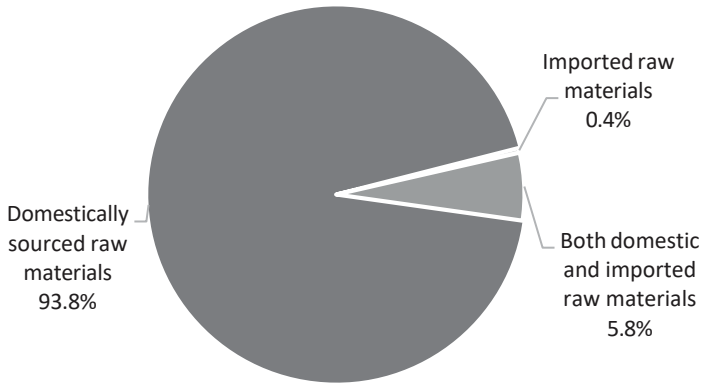
Most of the surveyed LE firms are relatively small and operate with less than 10 workers. On average, each firm has 14 workers (Figure 10). More than two-thirds of the firms have 10 workers or less, while a quarter has 11-30 workers. Less than 2 per cent of surveyed LE firms have more than 100 workers in their factories. Around 85 per cent of workers are permanent in nature, and 88 per cent of workers are employed for manufacturing purposes (Figure 10). There is little representation of female workers in the light engineering sector due to its nature, which requires hard labor, and there are no specific working hours. More than 90 per cent of firms have no female workers. The share of female workers in this sector is less than 5 per cent.

Figure 10: State of employment in the light engineering industry

Source: RAPID firm-level survey of LE sector, 2022.

The light engineering firms in Bangladesh mostly use domestic raw materials for their production. It is found that around 94 per cent of firms use domestic raw materials and the remaining 6 per cent use some imported inputs (Figure 11). Firms that use imported raw materials have a share of such inputs of around 40 per cent. The major inputs from the domestic sources for the LE products are scrap materials of ships, aluminum, brass, iron, rod, different types of sheets, coke, limestone, ferrosilicon, ferromanganese, etc. Around 90 per cent of the raw materials are procured from the shipbreaking industry (Hasan, 2022). The surveyed firms use scrap metal from shipbreaking industries, aluminum, brass, pig iron, cast iron, etc., from domestic sources.

Figure 11: Sources of raw materials



Source: RAPID firm-level survey of LE sector, 2022.

Due to import tariffs, VAT, and other taxes, light engineering firms are less likely to use imported raw materials. Aluminum, roller chain, V-belt, nut-bolt, iron, casting iron, S.S. and M.S. steel, ferromanganese, graphite, filter paper, etc., are major imported raw materials. Major imported raw materials also include roller chains, V-Belt, nut-bolt, cast iron and different types of iron/aluminum steels. India and China are major sources of imported raw materials. Other source countries include Germany, Holland, Japan, the Republic of Korea, Taiwan etc.

Figure 12: Sources of imported raw materials for LE firms

Source: RAPID firm-level survey of LE sector, 2022.

The LE firms mostly use conventional machines such as lathes, boring, milling, shaping, drilling, grinding, and honing rather than advanced technologies such as Computer Aided Numerically Controlled (CNC) machines, Computer-Aided Design (CAD), heat treatment facilities, and testing machines. The usage of machines depends on the product they produce. The firm-level survey shows that almost all firms use drill machines, and around 90 per cent use lathe, honing, and welding machines. 20-30 per cent of light engineering factories use boring, milling, and shaping machines (Figure 13). On the other hand, only a limited number of light engineering manufacturers bought CNC machines. Most of the firm owners reported that backdated machinery is sufficient for serving the domestic market. Industry insiders think that the relatively high price, lack of working capital, and shortage of skilled labor to operate modern machinery are major reasons for not using advanced technologies in the sector. Most of the surveyed firms are found to operate two or three machines, doing work for local small shops.

This paper also revealed that LE firms rarely replace their machinery. Most of the machines are old, and the average age of the conventional machines ranges from 12 to 21 years (Figure 14). Many firms are found to use second-hand machines. The usage of conventional and old machines is accountable for the low productivity of light engineering workshops. China, India, Japan, Taiwan, and Pakistan are major sources of machines used in the LE sector. However, the majority of firms use planers, honing, and welding machines made in Bangladesh.

Figure 13: Share of firms using different types of machines

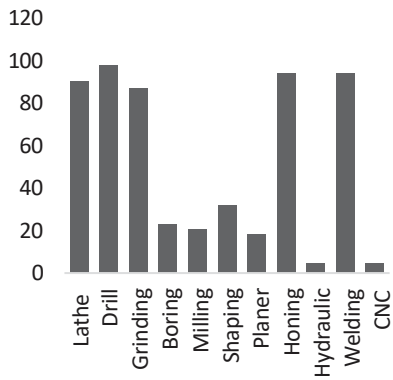
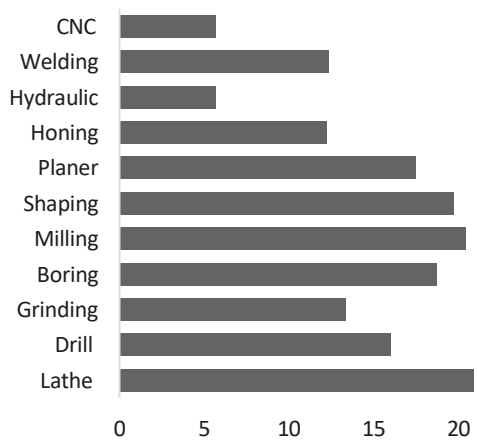


Figure 14: Average age of the machine used by LE firms



Source: RAPID firm-level survey of LE sector, 2022.

Table 2: Number of machines used per firm, by employment size

Name of the machine	1-10 employees	11-30 employees	31-100 employees	More than 100 employees	All firms	Major Sources of machine (% of firms reported)
Lathe	2.4	4.4	8.4	21.8	3.58	India (54%), China (17%), Pakistan (16%), Japan (12%), Bangladesh (11%)
Drill	1.8	3.0	5.4	9.3	2.38	China (53%), India (22%), Bangladesh (17%), Japan (5%), Pakistan (4%)
Grinding	2.0	4.2	6.5	8.1	2.90	China (56%), India (22%), Bangladesh (13%), Japan (5%)
Boring	1.2	2.0	2.3	2.3	1.62	China (52%), India (26%), Pakistan (10%), Bangladesh (4%)
Milling	1.3	1.5	2.0	1.3	1.41	India (22%), China (18%), Japan (15%), Taiwan (11%), Sweden (6%), USA (5%), Bangladesh (4%)
Shaping	1.1	1.3	3.8	2.0	1.46	India (37%), Japan (16%), China 12%), Taiwan (12%), Germany (7%)
Planer	1.6	2.3	5.4	3.5	2.24	Bangladesh (43%), India (14%), China (13%), Japan (8%), Pakistan (7%), Taiwan (3%)
Honing	2.0	4.4	7.7	14.8	3.03	Bangladesh (58%), China

						(32%), India (11%), Japan (3%)
Hydraulic or Ball Press	2.4	2.3	4.0	2.0	2.30	China (61%), USA (17%), Taiwan (13%), India (9%)
Welding	1.9	4.4	7.7	14.8	3.03	Bangladesh (58%), China (31%), India (11%)
Computerized and Numeric Controlled (CNC)	2.4	2.3	4.0	3.0	2.30	China (57%), USA (17%), Taiwan (13%)

Note: The average is calculated for the firms that use the machine, rather than considering all samples.

Source: RAPID firm-level survey of LE sector, 2022.

Export potential of LE firms

Most LE firms in Bangladesh cater to the domestic market only. Among the surveyed firms, more than 98 per cent operate in the domestic market only. This is due to the huge demand, limited production capacity, lack of knowledge about exports, lack of marketing, low-quality products, lack of working capital, and difficulties in accessing finance, etc.

The survey shows that less than 2 per cent of the firms are currently exporting. However, these firms are also selling their products in the domestic market (Figure 15). Small-sized firms have less capacity and are almost absent in the export market. About 8 per cent of firms with employees 31-100 are currently exporting their products. The corresponding figure is 22 per cent for large firms with more than 100 workers. Exporting firms earn more than $ 300,000 per annum on average by shipping their products (Figure 16).

Figure 15: Share of firms currently exporting by firm size

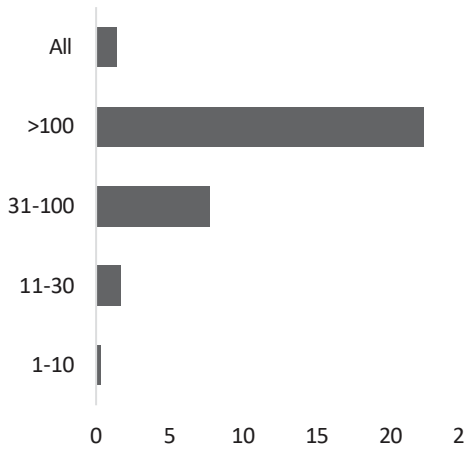
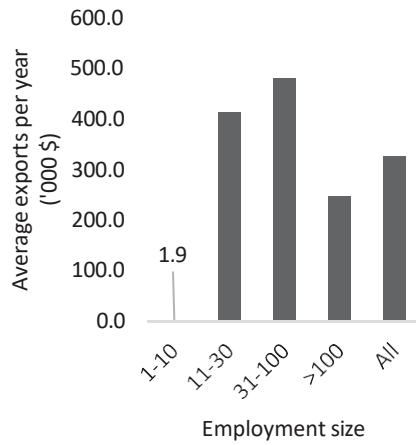


Figure 16: Average exports per firm by employment size



Source: RAPID firm-level survey of LE sector, 2022.

The surveyed firms' major exports include fertilizer mixers, thresher machines, dredging machines and spare parts, head gaskets, mixer machines, pumps, parts, washing machines, etc. The exporters reported that India, China, Japan, and the United States are the major export markets.

Around 16 per cent of surveyed firms think that they have high export potential. Proportionately, medium—to large-sized firms plan to explore export markets for their products (Figures 17 and 18). The LE firms want to export agricultural machinery and parts, thresher machines, liners and pistons, tube wells, mixers, pumps, drill machines, motor vehicle bodies and parts, etc.

Figure 17: State of exports (% of surveyed firms)

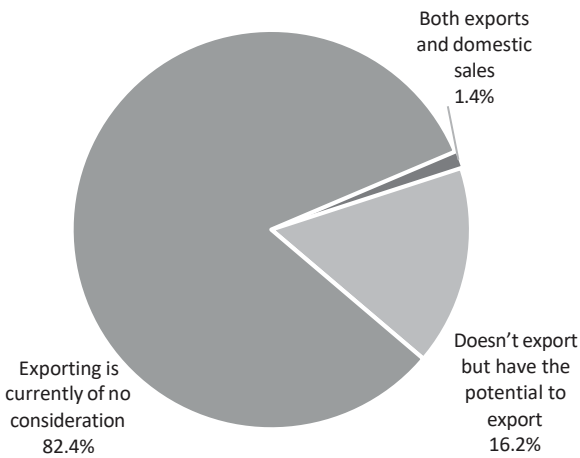
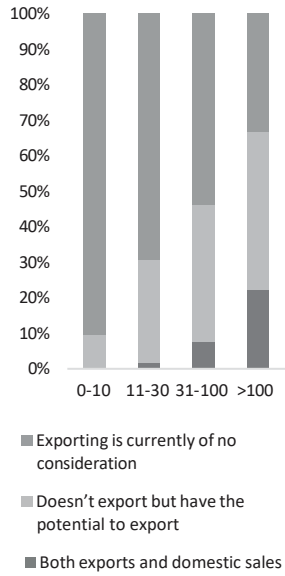


Figure 18: Export status by firm size (%)



Source: RAPID firm-level survey of LE sector, 2022.

Policy Recommendations

Effective utilization of the firm-level database will help boost exports and attract investment.

As a part of this paper, a comprehensive database of 500 manufacturers has been developed.[5] The database incorporates information on their business profiles, current specialization and produced items, usages and sources of raw materials, potential exportable items, and the challenges faced by the firms. An effective implementation of this database can help promote the production and exports of the LE industry. This database can be used by exporters, importers, potential investors, and policymakers. Besides, this database can be used to attract foreign direct investment in this sector. The policymakers can also determine the key areas for developing an effective set of policies with the efficient use of this dataset.

[5] The research team has submitted the database to the Light Engineering Business Promotion Council of the Ministry of Commerce.

Prioritizing initiatives aimed at enhancing technological advancements is crucial to facilitating the expansion of exports for light engineering (LE) products.

The majority of small and medium-sized enterprises in the LE sector still rely on traditional technology that is outdated and far from state-of-the-art. Such outdated technology presents a considerable obstacle to achieving product quality standards and diversifying the range of high-quality products produced.

The government must facilitate LEI firms to incorporate modern technology by offering adequate technical training, as well as, financial incentives. Even though the SME Foundation provides a few institutions with a small loan, it is not enough to buy modern equipment. Since the LE sector needs technical upgradation, public institutions and authorities involved in this sector, such as the Bangladesh Industrial Technical Assistance Centre (BITAC) and NSDA, should be better equipped and staffed with technical experts to create a platform for LEI firms to have adequate access to all forms of technical and industrial assistance.

Access to finance for adopting modern technologies in the LE sector remains a major constraint. Due to small family-based businesses, high level of informality, and inability to submit necessary documents for institutional loans, the light engineering firms become ineligible to get finance from the formal sector. SME loans are also inadequate and require a long list of documentation and collateral to qualify for loans. The eligibility criteria for micro-enterprises in the light engineering sector should be minimized to open the door for adequate financing to adopt new technologies in the light engineering sector.

It is crucial to provide affordable financing to labor-intensive LE firms in order to achieve economies of scale and expand operations.

Limited access to affordable financing is a significant hurdle for expanding the LE sector's export in the world market. Achieving economies of scale is crucial for export competitiveness in the global market. However, entrepreneurs and exporters require sufficient low-cost funding to attain the necessary scale of production. New exporters, particularly those from small and medium-sized LE firms, face challenges entering the market due to the lack of access to trade finance. Reducing payment risk and generating working capital are critical components of trade finance. Purchasing new capital equipment and raw materials during start-up presents another significant financial obstacle for potential exporters. Although Bangladesh Bank has maintained a lending rate cap of 9% interest for the past few years, it is anticipated that the bank may discontinue this policy to address the exchange rate crisis. Therefore, subsidized loans must be provided to light engineering firms to maintain their competitive edge in the world market.

At present, the Export Development Fund (EDF) of Bangladesh provides trade finance at a discounted interest rate, while the Export Credit Guarantee Scheme (ECGS), managed by the Sadharon Bima Corporation, offers financing for pre- and post-shipment, entire turnover export finance (pre-shipment) guarantees, and export payment risk insurance. It is crucial to evaluate the utilization of these programs and determine how different types of LE firms can benefit from them. Besides, Bangladesh should also reach out to countries like India, Indonesia, Sri Lanka, and Indonesia to learn from their experiences with effective export credit agencies. Before deciding to open up to the market for trade finance, careful consideration is necessary because access to international credits can expand coverage and reduce borrowing costs. However, utilizing trade financing programs offered by institutions like the Asian Development Bank and the World Bank/IFC may also be a viable option.

It is crucial to improve vocational training and involve the private sector in skill development to ensure an adequate supply of skilled labor in the LE sectors.

To resolve the scarcity of semi-skilled and skilled workers, the government and industry skills councils (ISC) must take the necessary steps to educate the workers in the sector. Based on industrial demand, the National Skill Development Authority (NSDA) and the respective ISC should develop different effective training programs. This will help industries receive competent labor to meet their needs. Moreover, an up-to-date curriculum and training materials can be developed to enhance the skills of the workers involved in LEIs.

However, different advanced technical skills development courses, such as skill development programs in the information and communication sector, short-term BSC courses, and diploma courses, can be provided to the workers. The courses should be offered free of cost, and the development partners and NGOs/INGOs can also help by funding the courses. Moreover, Bangladesh's government can establish training institutions and research laboratories with essential logistical assistance and can create strong connections between technical training institutes and light engineering industries in order to supply a skilled workforce to LE firms.

Establishing common facility centers in all light engineering clusters can help facilitate industry growth.

It is not rationalized for the LE firms to buy all the expensive machinery specifically required for certain sections in the production process. In this case, a common facility center can minimize the problem by offering all major operational facilities for all firms. All the expensive equipment can be owned by a third party that will rent out the services. The common facility center can be established in all of the country's light engineering clusters to provide adequate

support in the production process, while Experts must be appointed to encourage product innovation in order to enhance the CFC's performance. Meanwhile, CFCs can also help with product certification for light engineering, heat treatment, and metal testing. These facilities must be made available to all small and medium-sized businesses at reasonable prices.

Adequate policy support should be provided to the light engineering industry

The government should provide adequate policy support to facilitate the growth of the light engineering sector. The first and foremost priority should be to ensure protection for domestic industries against imported goods through tariff and non-tariff mechanisms. The imported duty fee on raw materials ranges from 32 to 35 per cent; this works as a major barrier to domestic production. Therefore, the tariff structure should be rationalized to provide incentives to domestic firms and protection against imports. In order to provide a business-friendly environment, the tax and VAT structure on imported raw materials, replacement parts, and other necessities used in light engineering industries must be reduced.

In order to reduce the barriers to finance, the government must ensure that Bangladesh Bank provides loans at low interest rates on favorable conditions. The collateral requirements should be relaxed. However, to build a market connection both locally and globally, the government should take the initiative to create a forum for buying agents for the LEI industry, similar to the one for garment exports. The government should consider protecting LE manufacturers against imports. It should facilitate the light engineering firms participating in trade fairs to showcase Bangladeshi-made products. However, the government can also take the initiative to establish a Light Engineering Development Board (LEDB) to address specific needs and support the country's light engineering sector. Industry associations, including the BEIOA, Bangladesh Automobile Manufacturers and Assemblers Association (BAAMA), etc.

Conclusion

The light engineering (LE) industry has immense potential to contribute to socioeconomic development, employment generation, and poverty alleviation. Despite its strong linkages with various sectors, progress in the LE industry has been slow due to several challenges faced by manufacturers and exporters. To address this, a comprehensive database of 500 LE manufacturers and exporters has been developed to promote the production and exports of the LE industry and to develop evidence-based policy. The paper finds that the availability of raw materials and local demand heavily influence firms' location and specialization. Ownership structures are predominantly sole ownership, reflecting the sector's primary focus on livelihood maintenance. The paper also finds that due to limited

technical knowledge and capital, LE firms engage primarily in contract manufacturing and repair services, with a focus on producing machinery and spare parts for various industries.

Meanwhile, agricultural and construction machinery are the most common product categories produced by the surveyed firms, with around 60% of firms producing agricultural machinery and parts. The firms typically employ a small number of workers, with over two-thirds of firms having ten workers or less. Female workers are underrepresented in the sector due to the nature of the work.

The paper notes that the LE sector relies heavily on domestic raw materials, with 94% of surveyed firms sourcing materials domestically. Import tariffs, VAT, and other taxes discourage the use of imported raw materials, which are sourced primarily from countries such as India, China, and Japan.

Regarding technology adoption, the paper finds that the LE sector predominantly relies on conventional machines rather than advanced technologies such as CNC machines and CAD. Relatively high prices, a lack of working capital, and a shortage of skilled labor are cited as the primary reasons for this. Additionally, most machines in use are old, with an average age ranging from 12-21 years.

This paper reveals that LE firms are primarily focused on meeting domestic demand, with less than 2% of firms currently exporting. However, approximately 16% of firms believe they have high export potential, with medium to large-sized firms planning to explore export markets for agricultural machinery, thresher machines, parts for motor vehicles, and other products. Major export markets include India, China, and Japan.

However, the paper also provides several policy recommendations to promote export competitiveness and overcome the challenges faced by the light engineering sector, including ensuring effective policy implementation, proper utilization of firm-level database, improving product quality, developing worker skills, adopting modern technologies, and providing adequate policy support from the government.

To achieve global competitiveness, Bangladesh's LEI sector must adopt appropriate technologies, upgrade skill sets, shift to need-based products, improve product quality, achieve economies of scale, and fit into market-based financing mechanisms.

Acknowledgements

This paper is based on a survey conducted by Research and Policy Integration for Development (RAPID) with support from the Light Engineering Business Promotion Council of the Ministry of Commerce and Bangladesh Engineering

Industry Owners' Association (BEIOA). Mohammed Abu Eusuf led the firm-level survey. The paper team members register their deep appreciation to Dr Mohammad A. Razzaque who provided guidance for undertaking the survey. The authors also thank Ms Sumaeya Akhter and Ms Rawnak Jahan for their research assistance. Helpful comments and feedback on an earlier draft were received during a learning session that took place at the Ministry of Commerce. This paper has benefited from the inputs received from various stakeholders that took part during the learning session involving manufacturers, exporters, industry experts, government officials, and other stakeholder groups associated with the light engineering sector. Any limitations and/or views expressed in this paper are those of the authors and should not be attributed to the institutions named.

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