

Industrial Safety in the Plastic Sector

A Review of Policies, Laws, and Institutions



**Khondaker Golam Moazzem
Jebunnesa**

INDUSTRIAL SAFETY IN THE PLASTIC SECTOR

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**FRIEDRICH
EBERT
STIFTUNG**
Bangladesh



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Abstract

The frequent incidents of industrial accidents in the plastic sector indicate that the Occupational Safety And Health (OSH) standards of plastic factories are below the minimum level of compliance. A total of 1,034 workers were killed in workplace accidents in 2022, according to a survey by the Bangladesh Institute of Labour Studies (BILS). However, undertaking OSH-related remedial measures in the plastic sector is difficult. Unlike the RMG sector, which operates in the global value chain, most plastic sector enterprises operate within the domestic value chain.

In this backdrop, the study reviews the existing law, rules and regulations related to OSH in the plastic sector, apprehend the specific responsibilities assigned to the regulatory bodies and traces out the policy gaps. Based on the analysis, the study puts forward a set of recommendations for ensuring the monitoring, transparency, accountability, and efficiency of public actions.

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Acronyms

BBS	Bangladesh Bureau of Statistics
BERC	Bangladesh Energy Regulatory Commission
BFSCD	Bangladesh Fire Service and Civil Defence
BIDA	Bangladesh Investment Development Authority
BILS	Bangladesh Institute of Labour Studies
BLA	Bangladesh Labour Act
BLR	Bangladesh Labour Rules
BMD	Bulk Mixing and Delivery Vehicles
BNBC	Bangladesh National Building Code
BPGMEA	Bangladesh Plastic Goods Manufacturers & Exporters Association
BSCI	Business Social Compliance Initiative
CO	Carbon Monoxide
CoC	Code of Conduct
CSOs	Civil Society Organisations
DIFE	Department of Inspection for Factories and Establishments
DoE	Department of Environment
DoL	Department of Labour
ECC	Environmental Compliance Certificate
ECR	Environmental Conservation Rules
EIA	Environmental Impact Assessment
EO	Employers' Organisations
ERP	Enterprise Resource Planning
FBCCI	Federation of Bangladesh Chambers of Commerce and Industry
FGD	Focus Group Discussion
FSCD	Fire Service and Civil Defence
GoB	Government of Bangladesh
GVC	Global Value Chain
ILO	International Labour Organization
ISO	International Organisation for Standardisation
ITC	International Trade Centre
KIIs	Key Informant Interviews
Kg	Kilograms
kV	Kilovolt
LIMA	Licensing Industry Manufacturers Association

m ²	Metres Squared
MoPEMR	Ministry of Power, Energy, and Mineral Resources
MSDS	Material Safety Data Sheet
OSH	Occupational Safety and Health
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
RAJUK	Rajdhani Unnayan Kartripakkha–Capital Development Authority
SMEs	Small and Medium-sized Enterprises
SMI	Survey of Manufacturing Industries

1. Introduction

1.1 Background

The challenge of industrial safety in Bangladesh has been exposed again through an accident at a plastic factory, located in Chawkbazar, Dhaka, causing the deaths of six workers. Once again, industrial accidents of Bangladesh have made it to the headlines in the international media. Failure to address this vital issue and undertake proper remedial measures in industrial establishments across the country would frequently cause similar incidences. Bangladesh's growing reputation, as an industrial hub, would be at risk at regional and global levels. Overall, workers' safety and rights issues would continue to face a crisis. While the export oriented Readymade Garments (RMG) sector has been undertaking necessary remediation measures since 2013, such actions are mostly absent in the non-RMG sectors.

The safety standards of the non-RMG factories and establishments are still poor and insufficient compared to what RMG factories had been practising even before the pre-Rana Plaza catastrophe in Savar in April 2013. Since most of these non-RMG factories operate with fewer workers vis-à-vis those of RMG factories, the casualties in a single incidence were comparatively lower. Treated as negligible, such casualties could thus hardly catch the attention of the concerned authorities. Fire incidences have, however, been increasing over the years with a rising number of casualties. Unless necessary remediation measures are undertaken fast, the number of accidents will rise further, which will cause more casualties of workers.

Undertaking remedial measures in non-RMG factories would, however, be a difficult task. While the RMG sector operates in the Global Value Chain (GVC), most non-RMG sectors operate within the domestic value chain. These domestic value chains hardly follow any Code of Conduct (CoC) in respect of either workplace safety or workers' rights. Moreover, there is no pressure for compliance around such CoCs from other stakeholders, including consumers, workers,

and Civil Society Organisations (CSOs), let alone ensuring compliance standards. Given the weak state of transparency and accountability in monitoring and enforcement of compliances by different public agencies, such as Department of Inspection in Factories and Establishments (DIFE), Department of Labour (DoL), Fire Service and Civil Defence (FSCD), Rajdhani Unnayan Kartripakkha–Capital Development Authority (RAJUK), City Corporations, and Union Parishad, these factories have been in operation with lack of safety standards.

1.2 Objective

The main objective of this study is to identify the state of progress of industrial safety, particularly in plastic factories and establishments in Bangladesh, through the necessary review of policies, laws, and rules; identifying the safety concerns at the micro level; providing a set of recommendations that are expected to contribute to workers' workplace safety and security in the plastic factories. More specifically, the objectives of the study include the following-

- (a) To review the policies, laws, and rules related to fire, electrical, and structural safety of industrial and commercial units; to identify weaknesses in legal issues for undertaking proper remediation measures.
- (b) To review the institutional capacities of public and private agencies, particularly DIFE, FSCD, RAJUK, City Corporations, and Union Parishads, etc., in undertaking technical assessments involving fire, electrical and structural issues of industrial and commercial units and pursuing regular monitoring of the compliance standards of those units.
- (c) To verify the field-level scenario of the Occupational Safety and Health (OSH) profile in the plastic sector from different stakeholders, followed by some recommendations to improve the status.

1.3 Methodology

The study focused on industrial safety-related issues from the point of view of OSH in the plastic

sector. The OSH-related issues are examined in terms of workers' workplace safety, particularly related to fire, electrical and structural safety in industrial premises. The study focused on the laws, rules, and practices to understand the significant regulatory challenges in ensuring compliance. It covered the safety issues of the plastic sector, which is labour-intensive in nature and involves significant safety threats.

The secondary data on industrial safety were collected from web-based platforms, public agencies, and media reports. Primary data and information to verify the current scenario were gathered from eight Key Informant Interviews (KIIs), and a Focus Group Discussion (FGD) was conducted with key stakeholders. The KIIs and the FGD highlighted workplace safety at the field-level, like the level of awareness and preparedness of factory management on industrial safety, the level of engagement of public agencies in factory inspection, the focus on domestic and export markets, and the financial situation of the enterprises, etc. Such data provided a strong base to understand workplace safety and worker-related compliances. Based on that knowledge, the study team identified the activities undertaken by the public and private sector agencies to understand their effectiveness and put forward necessary suggestions for maintaining transparency, accountability, and efficiency in those initiatives.

2. Current Profile of the Plastic Sector in Bangladesh

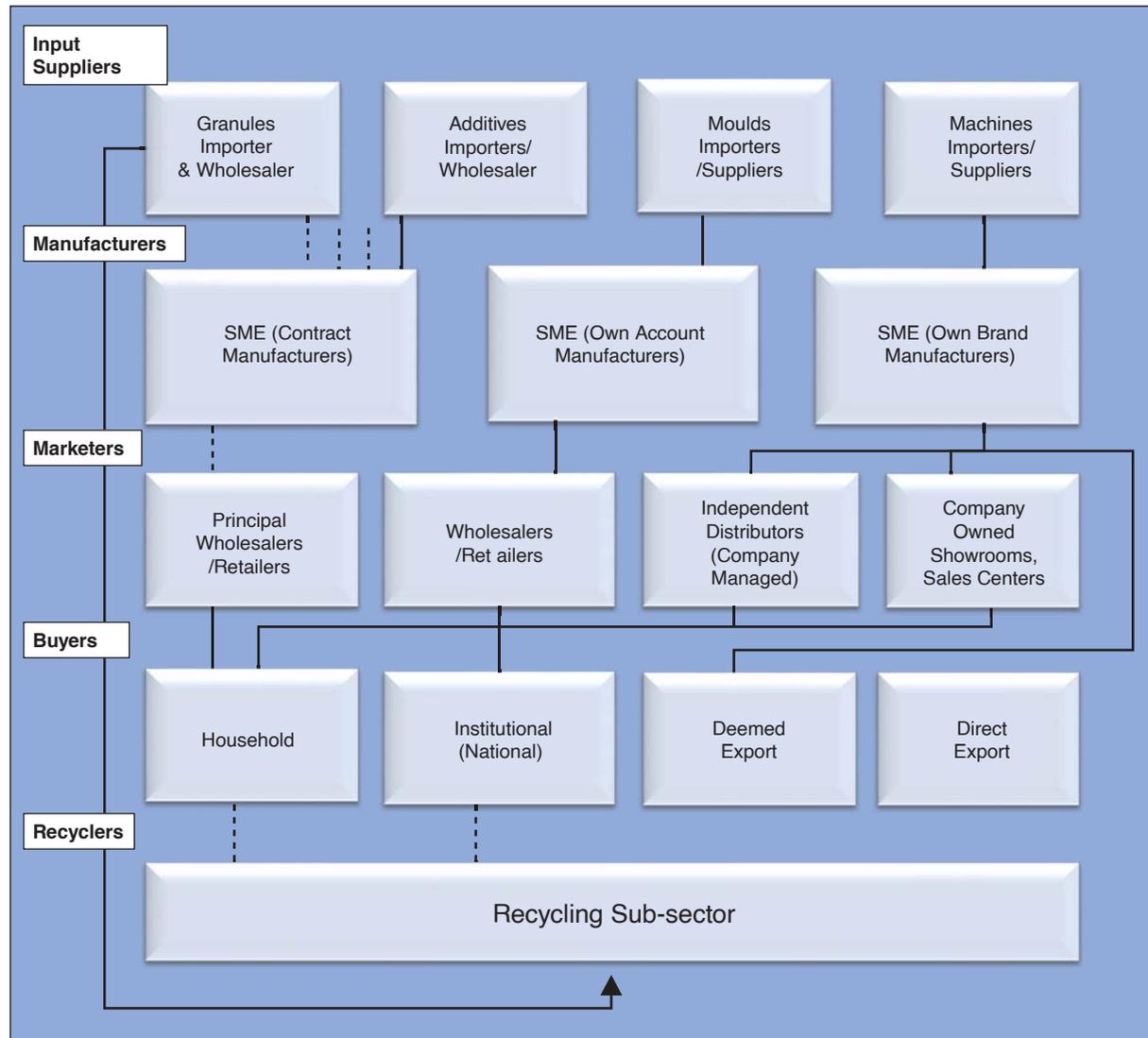
To better understand the OSH status of the plastic sector, it is important to have a better knowledge of the full structure of the plastic industry in the country with reference to the complete value chain, size, spatial distribution, raw materials, types of products produced, domestic enterprises, investment profile, market size, demand-supply situation, key market players, etc.

2.1 Value Chain of the Plastic Sector in Bangladesh

Plastic sector value chain in Bangladesh is nearly identical to that of the RMG sector except for a few changes (Figure 1). According to the Bangladeshi RMG sector's industrialisation trend, the sector's performance greatly contributes to that sector's welfare. To understand if the trend also persists in the plastic sector, it's important to look at this sector's total value chain and overall performance. The Bangladeshi plastic sector has a weak backward linkage like the RMG sector. Most of the raw materials, in both cases, are imported from abroad.

Micro and small industries in the plastic sector primarily rely on contract manufacturing, whereas medium and large manufacturers rely on their own-account manufacturing. In the case of selling

Figure 1: Value Chain of the Plastic Sector in Bangladesh



Source: Prepared based on UNESCAP (2013).

the final products, which is the final stage of the value chain, large manufacturers sell their products to domestic and global markets. On the other hand, small and micro manufacturers sell their products at the national level, particularly to households.

2.2 Size and Spatial Distribution of Plastics Factories

There is a significant diversity of enterprises (Table 1) ranging from large players to very small manufacturing units in the plastic sector of Bangladesh. The size of these factories plays

a vital role in their OSH profile. Up-to-date data on the size and the number of factories within the sector in Bangladesh has yet to be made available. Classifications of the factories are also not uniform. *According to the Survey of Manufacturing Industries (SMI) in 2019*, published by the Bangladesh Bureau of Statistics (BBS), the number of enterprises producing rubber and plastic items includes 943 enterprises. About 4 per cent of those are micro enterprises (employing 10–25 workers), and 33 per cent are small enterprises (employing 25–99 workers). While medium-sized enterprises constitute 22 per cent (employing

Table 1: Structure and Composition of the Plastic Industry

Size Class	Person Engaged	Total Manufactures in Plastic & Rubber	Total Manufacturing Industries in Bangladesh
Large	TEP>=250 persons	29	2,856
Medium	100<=TPE>250	49	3,178
Small	25<=TPE>99	399	23,306
Micro	10<=TPE>25	466	16,770
Total		943	46,110

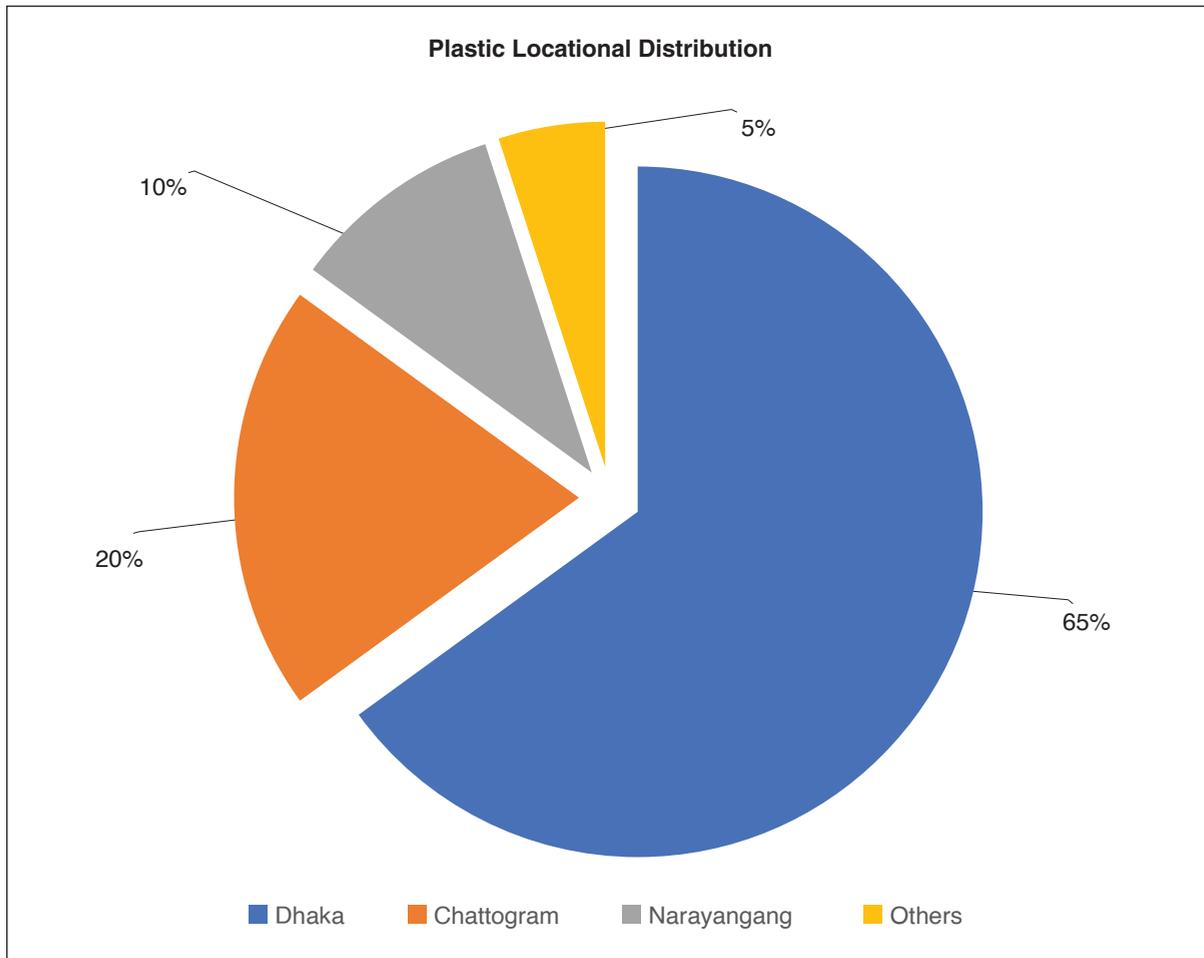
Source: SMI Report 2019.

over 100 workers), large enterprises constitute only 5 per cent (employing 250 workers). But unfortunately, the SMI definition does not include factories with less than ten workers, and thus the total number of factories and people engaged in the plastic sector is underestimated in the SMI report. According to Bangladesh Plastic Goods Manufacturers & Exporters Association (BPGMEA) data, over 5,000 plastic manufacturing units are currently in operation, with the majority being small-scale (roughly 70 per cent) and concentrated on the domestic market. Currently, nearly 20 per cent of units are involved in the export market. This may lead to complications in including the marginal factories under any initiatives.

The OSH profile of the plastic sector is not only characterised and differentiated by factory size, but also somewhat related to its location and/or the positioning of the factory. The factories established in old Dhaka have different safety issues than the factories in any other place.

Approximately 65 per cent of the plastic industries in Bangladesh are located in Dhaka and surrounding areas, 20 per cent in Chattogram, 10 per cent in Narayangonj, and the remaining 5 per cent in Khulna, Cumilla, Bogura, and Rajshahi Districts. (Figure 2) However, given the increase in domestic and export demand, plastic enterprises' constituents have undergone some changes in recent years.

Figure 2: Plastic Factories Distribution – By Location



Source: BPGMEA, Export Promotion Bureau.

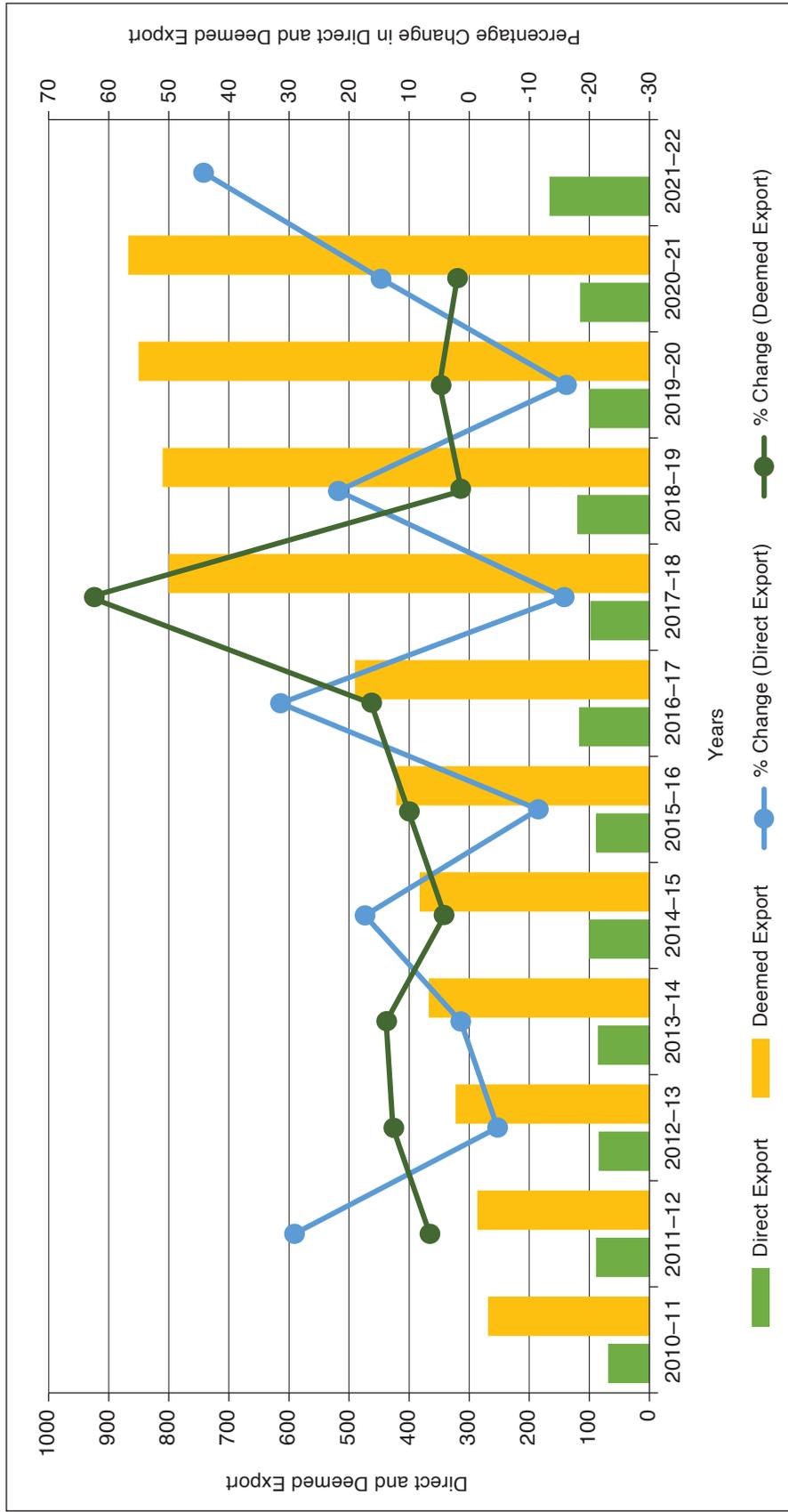
2.3 Global and Domestic Market

International brand buyers play a vital role in ensuring occupational health and safety worldwide due to their brand value. Plastic goods from Bangladesh are exported in two ways: directly to the international market and indirectly as packaging materials and accessories for other finished export items. According to the BPGMEA, the direct export market was worth USD 982.7 million (in FY2020–21), of which USD 867.4 million had been deemed export and USD 115.3

million was direct export (Figure 3). With more than BDT 40,000 crore worth of annual domestic sales, the industry meets more than 80 per cent of local demand. According to the Bangladesh Investment Development Authority (BIDA), the country has 5,030 plastic factories, with small and medium-sized businesses owning 98 per cent of them.¹ According to the BPGMEA data, the local market for the plastic sector is worth approximately USD 2.5 billion. As a result, Bangladeshi plastic products have a global market share of about 0.5 per cent at home and abroad.

¹<https://www.tbsnews.net/economy/bangladesh-plastics-aim-global-market-pie-301183>

Figure 3: Direct and Deemed Export of Plastic Products



Source: BPGMEA, Export Promotion Bureau.

2.4 Types of Products and the Raw Materials

The plastic industries in Bangladesh have successfully been producing nearly all the plastic items required for household purposes and for other uses. According to the BPGMEA, nearly all of the plastic packaging used by the country's export markets are now manufactured in Bangladesh. Domestically produced materials are used by various industries to meet different purposes like retail packaging, industrial and bulk packaging, household uses, office equipment, building materials, engineering and industrial parts, medical instruments, agricultural products, poultry and fishing items, automobile and cycle parts, electronics, textile articles, engineering products, musical products etc.

The thermoplastic moulding compound is the primary raw material used in all plastic industries to produce specified products. Bangladesh lacks a backward linkage industry for the plastics sector, particularly for raw materials. As a result, almost all raw materials are imported from various countries. However, most of the raw materials used by plastic factories (Table 2) are highly flammable, making them more vulnerable to fire and electric accidents.

Apart from that, plastic production requires refining petroleum products, the most common of which are crude oil and natural gas. Fires in the plastic industry can produce black, acrid smoke and poisonous gases such as Carbon Monoxide (CO). Fire can spread quickly which can be difficult to put out. To avoid the fire ignition, sources should be controlled by prohibiting cigarette smoking and hot work in high-risk areas.

The plastic industry is constantly evolving in terms of technological development. Production process and other relevant activities are becoming increasingly mechanised. Traditional types of machinery used in producing plastic products, such as injection molding, circular weaving loom, flexographic printing, gravure printing, offset printing, sewing machines, lamination, vacuum molding, and mould injection, etc., are likely to be replaced by more sophisticated machines and advanced system. Bangladesh did not yet capture the industry to produce the capital equipment needed for plastic production. As nearly all raw materials and equipment are imported from other countries, local workers find it difficult to operate the machines efficiently since most of the guiding manuals are written in English. Due to a lack of investment on training in medium and smaller

Table 2: Raw Materials Used in the Plastic Sector

HS Code	Description
32121000	Stamping Foils of a kind used in the Printing of Book Bindings or Hatband Leather
32129000	Pigments (Metallic.) dispersed in non-Aqueous Media. Ex. Stamping Foils
32151100	Printing, Ink, Black
32151900	Other Inks, Whether Concentrated or Solid
32159010	Fountain Pen Ink
32159020	Ball Pen Ink
32159090	Printing Ink, Writing or Drawing Ink and Other Inks, whether or not Concentrated or Solid
39011000	Polyethylene having a specific gravity of less than 0.94
39012000	Polyethylene having a specific gravity of 0.94 or more
39013000	Ethylene-Vinyl Acetate Copolymers
39019000	Other Polymers of Ethylene
39021000	Polypropylene
39022000	Poly Iso Butylene
39023000	Propylene Copolymers
39029000	Plastic Granules

(Table 2 contd.)

(Table 2 contd.)

HS Code	Description
39031100	Expansible Polystyrene in Primary Forms
39031900	Polystyrene (Excl. Expansible), in Primary Forms
39032000	Styrene-Acrylonitrile (San) Copolymers, in Primary Forms
39033000	Acrylonitrile-Butadiene-Styrene (Abs) Copolymers
39039000	Styrene Polymers, in Primary Forms
39041000	Polyvinyl Chloride, not mixed with other Substances, in Primary Forms
39042100	Non-Plasticised Polyvinyl Chloride, in Primary Forms
39042200	Plasticised
39043000	Vinyl, Chloride, Acetate
39044000	Polymers of Vinyl Chloride or other Halogenated Olefins, in Primary Forms
39046100	Polytetrafluoroethylene, in Primary Forms
39046900	Fluoropolymer, in Primary Forms
39049000	Polymers of Halogenated Olefins, in Primary Forms, Nes
39051200	Polyvinyl, Acetate, Aqueous
39051900	Other Polymers of Vinyl Acetate or of other Vinyl Esters, in Primary Forms
39052100	Vinyl Acetate Copolymers: in Aqueous Dispersion
39052900	Vinyl, Acetate, Copolymers
39053000	Polyvinyl Alcohol, whether or not Containing Unhydrolysed Acetate Groups
39059100	Copolymers, Vinyl, Primary.
39059900	Polymers of other Vinyl Esters & other Vinyl Polymers in Primary Forms Nes
39061000	Polymethyl, Methacrylate, Primary
39069000	Flocculating Agent Chemical
39071000	Polyacetals, in Primary Forms
39072000	Polyethers, other than Polyacetals, in Primary Forms
39073000	Epoxide Resins
39074000	Polycarbonates, in Primary Forms
39075000	Alkyd, Resins, Primary
39076010	Poly (Ethylene Terephthalate)
39076090	Poly (Ethylene Terephthalate): other (including clean, Colorless Grades)
39077000	Other Polyesters: Poly (Lactic Acid)
39079100	Unsaturated Polyester Primary Forms
39079900	Polyethylene Naphthalene-2,6-Dicarboxylate", Saturated, in Primary Forms
39081000	Polyamide-6, -11, -12, -6,6, -6,9, -6,10 Or -6,12 in Primary Form
39089000	Polyamides in Primary Forms
39091000	Urea, Resins, Thiourea
39092000	Melamine Resins, in Primary Forms
39093000	Amino-Resins, in Primary Forms (Excl. Urea, Thiourea and Melamine Resins and Mdi)
39094000	Phenolic, Resins, Primary
39095000	Amino - Resins, Phenolic Resins and Polyurethanes, in Primary Forms—Polyurethanes
39100000	Silicones, in Primary Forms

(Table 2 contd.)

(Table 2 contd.)

HS Code	Description
39204910	Pvc Film & Pvdc Film for Blister Pack for Medicine
39204920	Plates, Sheets, Film, Foil and Strips, of Non-Cellular Polymers of Vinyl Chloride

Source: BPGMEA, International Trade Centre (ITC).

factories, the common method of training on operating these types of machinery are carried out by mid-level or junior-level workers. According to the management of small and medium-sized factories, there is higher rate of migration among mid-level workers, which make it difficult to ensure using the machine in a proper and safer way.

3. Industrial Safety Concerns in the Plastic Sector

Plastic industry workers are regularly engaged in activities on technical processes such as moulding, casting, curing, trimming, crashing and demolding. Involvement in these tasks requires knowledge about chemical management, boiler usage,

extensive hot work and constant use of machinery. Because of the work processes and unsafe working conditions in Bangladesh, accidents, deaths, and injuries are taking place frequently on small and medium sized factories (Table 3).

There were 14 fire incidents in the plastic sector from January to September 2022, mostly resulting from electric short circuits and gas cylinder explosions, causing seven deaths, according to the authors' compilation from the different newspapers. This trend of accidents is increasing, as seen in table 4 on fire incidents reported in different places and sectors. Besides that, many workplace injury cases remain unreported in absence of proper monitoring and record-keeping in the plastic sector.

Table 3: Accidents from FY2015–16 to FY2020–21

	Total Establishment		Export Oriented Establishments		Total Incidents
	Registered	Non-Registered	Registered	Non-Registered	
Plastic	607	421	19	0	4
Rubber	102	16	1	0	0
Total	709	437	20	0	4

Source: Safety Council, Federation of Bangladesh Chambers of Commerce and Industry (FBCCI).

Table 4: Fire Incidents Reported in Different Places and Sectors (Year wise)²

Sectors and Places	Number of Fire Incidents					
	2015	2016	2017	2018	2019	2020
Home and Kitchen	6316 (36.9)	6451 (38.8)	7005 (39.4)	7216 (37.2)	8466 (35.4)	8776 (42)
Cow-house and Haystacks	2666 (15.6)	2480 (14.9)	2436 (13.7)	2741 (14.1)	4714 (19.7)	3091 (14.8)
Shops and All Bazaars	2829 (16.5)	2855 (17.2)	3012 (16.9)	3312 (17.1)	4057 (17)	2984 (14.3)
Factories and Warehouse	1099 (6.4)	934 (5.6)	1157 (6.5)	1281 (6.6)	1245 (5.2)	401 (2.4)

(Table 4 contd.)

²Value in parenthesis is in percentage (%).

(Table 4 contd.)

Offices, Hospitals, Schools, Boarding, and Hotels	533 (3.1)	656 (3.9)	654 (3.7)	819 (4.2)	738 (3.1)	495 (2.4)
Jute related Warehouse, Mills, Shops and Transports	145 (0.8)	198 (1.2)	249 (1.4)	155 (0.8)	207 (0.9)	80 (0.4)
Ships, Automobile, Cars, and Normal Transports	991 (5.8)	397 (2.4)	359 (2.0)	505 (2.6)	364 (1.5)	307 (1.5)
Others	2532 (14.8)	2644 (15.9)	2905 (16.3)	3359 (17.3)	4134 (17.3)	4666 (22.3)
Grand Total	17111	16615	17777	19388	23925	20896

Source: Authors' illustration from FSCD yearly statistics 2015, 2016, 2017, 2018, 2019, 2020.

4. National Policies, Rules and Regulations Related to the Plastic Sector: Implications on Industrial Safety

Ensuring OSH involves adequate measures to address and mitigate workplace hazards, accidents, and diseases. The process starts with structural integrity and ends with proper and constant monitoring of safety-related issues. The National OSH Policy clearly stipulates the need to ensure workplace safety and health protection considering international conventions/declarations/recommendations / documents (Art. 3.a.1); implement national laws and regulations in relation with workplace safety and occupational health (Art. 3.a.2); setting up national standards on OSH (Art. 3. a15, Art. 4a. 20); develop a strategy and action plan to ensure proper implementation of national laws and regulations (Art.4. a.3); including OSH issues in the policies and programs of all related ministries and agencies (Art.4.a13); establishing labour courts in the industrial zone for implementing mandatory OSH provisions (Art. 4. A.15); imposing mandatory terms and conditions upon construction agencies to follow OSH policies during government run construction works (Art. 4. A.22); providing financial support to the establishments that maintain and practice the OSH rules and regulations (Art. 4.a.24); and ensure maximum safety standards during factory construction and implementing all standards and regulations on internal safety environment (Art. 4.d.1).

In Bangladesh, an adequate number of legal bindings are in place under the cover of rules and regulations to ensure workplace safety, and these need to be maintained properly. The objective of the existing and newly developed policies, rules, and regulations relating to OSH can be categorised as a) mitigating hazards, b) lowering the risk of accidents, and c) preventing the spread of disease. Policies, rules, and regulations that fall under the three categories are summarised below:

4.1 Legal Provisions for Mitigating Hazard

Factory Construction and Storage Facilities:

According to the National OSH policy (Clause 4.d.1), it is mandatory to ensure maximum safety standards during factory construction and to comply with all standards and regulations on the internal safety environment. The Bangladesh National Building Code (BNBC) 2006 provides in detail for building safety, like minimum ceiling heights, wall width, and staircases requirements etc. According to the BNBC 2006, an industrial establishment must have a ceiling height of 3.5 metres for non-air-conditioned buildings and 3.0 metres for air-conditioned buildings (Section 1.12.2.), and the minimum width of the staircases must be at least 2.0 metres. Handrails will have a minimum height of 0.9 metres (Section 1.12.5). Additionally, according to section 2.4.1, the exterior walls of industrial buildings shall have a fire resistance option lasting for at least 2–3 hours, which would help to minimise the damage from fire-related accidents.

As the plastic sector is deeply chemical-oriented, the Environmental Conservation Act (ECA), 1995, Environmental Conservation Rules (ECR) 1997 and National 3-R strategy 2010 are also valid for storing and using chemicals in establishments or facilities. These acts and rules provide necessary standards for properly using chemicals depending on their categories (i.e., Green, Orange-A, Orange-B, Red category) for industrial units.

Material Safety Data Sheet: Bangladesh Labour Rules 2015 states that the factory and establishment owners shall place the Material Safety Data Sheet (MSDS) of dangerous materials in an easily noticeable place within the factory premises so that the employed workers can be well informed about the possible hazard (Rule 68, 10). The factory owner must get the factory's layout plan and extension layout plan approved by DIFE (Section 326, BLA and Rule 353, BLR). If asbestos is used, there should also be a specially constructed facility for the removal and handling of it in the yard, alongside the necessary provisions relevant to asbestos handling systems and also for 'showering it off' (Section 17.9).

Electric Supply and Safety: According to the Bangladesh Labour Rules 2015, electricity supply lines and accompanying apparatus in all factories will have to be of sufficient size, strength and risk-absorbing and should be set, installed, protected, and maintained in such a manner that would not pose a risk of serious bodily harm to workers (Section 58, BLR).

Additionally, according to Electricity Grid Code 2019 adopted by Bangladesh Energy Regulatory Commission (BERC), at least one busbar protection system shall be installed at the 132 Kilovolt (kV) level, and redundant (Main-1 & Main-2) busbar protection systems shall be installed at the 230 kV and 400 kV levels. The busbar protection relay is designed for high-impedance applications in utility substations and industrial power systems. The relay can also protect generators, motors, transformers, and reactors in restricted earth-fault and residual earth-fault applications, decreasing the probability of fire incidents out of electrical fault.

Chimneys, Ventilation, and Boiler Management:

The Bangladesh National Building Code 2006 mandates that all chimneys, vents, and ventilation ducts should be designed with non-combustible materials. The code also stipulates that every boiler, central heating plant, electrical room, or hot water supply boiler must be separate and placed at a distance from the main workplace building(s) to prevent major hazards (Section 2.11.7). Apart from that, the boiler owner cannot use or permit the boiler function unless it has been registered per the Boilers Act of 1923.

Floor Safety: All floors, stairs, passages, and gangways of the factories should be of sound construction and properly maintained, and strong railing should be in place as applicable to ensure safety. The passages and stairs ought to be kept open to facilitate easy exit during the continuance of work (Section 72 BLA (Amendment) 2013).

Fire Licence, Fire Resistance, and Firefighting

Requirements: According to the Fire Prevention and Extinction Act 2003, to use a building or certain part of a building or establishment as a warehouse or workshop, a certain person/group needs a permissible licence under the Act from the Director General of the Fire Service and Civil Defence Department (Section 4, 7).

The fire hazard-related directives in Bangladesh, the National Building Code 2006, necessitates that all elevator shafts, vent shafts, and other vertical openings in the workplaces shall have to be fully enclosed with the provision of a minimum four-hour fire-resistance protection option and that all fire exits to be compatible with existing National Acts (Section 2.11.5). The Bangladesh Labour Act 2006 (BLA) requires that every establishment shall have a firefighting apparatus/fire extinguisher and fire exit. Where the factory owner employs 50 or more workers for his business, the employer shall have to arrange fire-fighting drills at least once every six months and maintain a record book for monitoring compliance (Section 62, BLA). The BLA (Amendment 2013) requires every establishment to provide means of exit, including at least one alternative staircase linked to every floor and the requisite number of firefighting equipment on

every floor (Section 62(1)). Also, the amended Act ensures that in every factory/establishment, no room exit shall be kept locked during work, no exit shall be hindered, or no barrier shall be put in the way (Section 62(3a)). In factories with more than 50 workers, mock fire drills should be carried out at least once every six months (Section 62(8))

The BNBC 2006 also provides detailed provisions for fire exits; they must be easily discernible and accessible from any part of the building. In addition, all exit points should be located and arranged so that they provide continuous and unobstructed ways and means for an escape to the exterior of the building, leading to a street or other designated areas of refuge (Section 3.4). It also requires the installation of automatic fire and smoke detection systems when the size, arrangements, and occupancy within the factory/establishment become such that the fire itself cannot provide adequate warning to its occupants for their safety. The automatic fire and smoke detection system shall include lien-type heat-sensitive and optical, ionised, or chemical-sensitive type and smoke detectors (Section 4.41).

The Code also recommends the correct type of fire extinguishing system to be installed for necessary use in different industrial establishments. In low-hazard industries, manually operated fire alarm systems and portable fire extinguishing sets must be installed. For moderate hazard industries, areas up to 750 Metres Squared (m²) should be covered by automated fire alarm systems and have portable fire extinguishers. In areas above 750 m², the unit should be fitted with automatic sprinklers or automated fire alarm systems, along with a portable fire extinguishing system (Section 5.8).

4.2 Legal Provisions for Reducing the Risk of Accidents

Safety Committee: The BLA 2006, section 90a, calls for the formation of a safety committee in every factory where 50 (Fifty) or more workers are employed. The safety committee has to be constituted as prescribed in section 30 of the Act. As per Bangladesh Labour Rules 2015, if the

factory has 50 or more workers, the factory owner must form and ensure the functioning of a safety committee following the instructions detailed in Bangladesh Labour Rules (BLR) (Section 90A, BLA 2006). Procedures for formulation and role of the safety committees are specified in Bangladesh Labour Rules (Chapter 8 and Schedule 4, BLR 2015).

Load Handling: No person should be engaged in any factory to lift, carry or move any heavy load susceptible to causing injury (Sections 74, 83-86, 90,323, BLA.). Adding to it, the highest load capacity for adult males has been specified as 50 kilograms (Kg) and 30 Kg for adult females.

Safety of Machinery Use: BLA 2006 prescribes that inspectors may prohibit any building, machinery, or plant of any establishment if it appears dangerous to human life or safety (Section 61 (2)). When the machines are in motion or in use, they should be securely fenced by/encircled within substantially protected construction (Section 63, BLA). Every screw, belt, key, revolving shaft, spindle wheel, pinion or any other spares shall have to be encased or otherwise effectively guarded to prevent minimum damage and danger (Section 67, BLA).

Safety Equipment/Tools and Facilities: No factory owner, industrial boss or any authority shall engage any worker(s) in work whatsoever without providing them with personal safety equipment/protective gear and ensuring the correct use thereof. The BLA 2006 states that suitable goggles should be provided for workers where eyes are at risk of exposure to excessive light or heat (Section 75.).

The BLA section 78A sets clear guidance on the use of safety appliances; the employer is required to provide safety appliances to factory workers and shall not employ any person before ensuring the use thereof. By law, a record book shall have to be maintained by the employer in a prescribed manner. The workers concerned shall be held responsible if they do not use the safety equipment supplied by the employer. Additionally,

all the workers would have to be well-trained on the safety issue and made aware of the risks at work, thereby ensuring occupational health, safety, and protection in the workplace.

Record Keeping and Planning: The employer shall maintain a record book on this matter in the prescribed manner (Section 78A, BLA (Amendment) 2013). The National OSH Policy obligates the employer(s) to provide training and guidelines to the workers on safety and Personal Protective Equipment (PPE) and ensure their use in the workplace (Clause 4.d.7). It suggests necessary OSH-related guidelines for the employers to pass on to the workers (Clause 4.e.1). It also states that workers should take care of their own as well as co-workers' health and safety (Clause 4.e.2).

Imminent Danger: The BLA clearly states that if a labour inspector finds a building, or any part of a building, or its machinery and plant, posing a serious threat to workers, then s/he is duty-bound to issue a written notice to the factory/establishment owner to do the needful. The owner must seek necessary remediation for the building and act on the notice according to the deadline (Section 61).

4.3 Legal Provisions for Preventing the Spread of Disease

Disease Prevention and Safeguards: Both the National OSH Policy and the National Child Labour Elimination Policy include disease(s) prevention and safeguarding clauses. The National OSH Policy calls for identifying the risk of health and safety (Clause. A3), imparting orientation to the persons engaged in formal and informal workplaces on the risk of a possible accident as well as health risks and safety issues (Clause 3.4), and making provisions for a specialist doctor who can identify occupational diseases' and ensure health safety in the factory and establishment (Clause 3.10). The Penal Code ensures punishment by law in case of negligent and malignant acts resulting in the spread of infection of diseases dangerous to life (Sections 269 and 270).

Sick Room and Dispensary: According to Bangladesh Labour Act 2006, in every

establishment, there has to be the first-aid box or cupboard equipped with necessary primary treatment items prescribed by BLR to be readily accessible to all during working hours (Section 89); in addition, a sick room furnished with a dispensary of suitable size and possessing required equipment and such facilities as prescribed under section 77 of the BLR has to be provided and managed by a medical practitioner and nursing staff as may be prescribed under the BLR, (Section 89 (5) and Section 77, BLR 2015), where 300 (Three Hundred) or more workers are ordinarily employed.

Medical Centre: In respect of any establishment(s) where 5,000 (Five Thousand) or more workers are employed, the employer/employers thereof shall be required to maintain and operate a permanent medical centres in such manner as may be prescribed by BLR (Section 89 (6), BLA 2006 and Section 78, BLR 2015).

Welfare Officer: The employer of any establishment/ factory running with 500 (Five Hundred) workers or more shall have to appoint a welfare officer in the manner prescribed by section 79 of the BLR (Section 89 (8), BLA 2006 and Section 79, BLR 2015).

Drinking Water: The BLA 2006 mandates that factories/establishments provide purified potable water for workers at a suitable point in the factory/ establishment (BLA Section 58 (1)). During hot summers, provisions shall be made for cooling potable water for establishments / factories employing more than 250 workers (Section 58.3).

Restroom: BLA makes it mandatory that a an employer operating a factory with more than 50 workers has to maintain a restroom for the workers, with an arrangement for drinking water, where they can have their meals and also take rest (Section 93 (1), BLA)). Separate restrooms shall be provided for male and female workers where the number of female workers is more than 25 (Section 93(3), BLA)).

4.4 Legal Provisions on Overall Concerns

Awareness Raising: Section 78A (3) of the BLA mentions that a factory owner must arrange

training for all workers to make them aware of workplace hazards. The National OSH Policy 2013 describes the role of employers in identifying OSH risks and informing every person in the workplace about occupational health and safety risks.

According to the rule 351 of Bangladesh Labour Rules 2015, one of the key roles of a labour inspector is to conduct trainings and workshops to raise the knowledge and skills of workers, members of trade unions, and employers.

The National OSH Policy mandates the treatment and compensation of any injured worker and rehabilitate victimised workers as per his/her capability (Clause 4.b.11 and 3.a.12). For raising awareness on OSH issues, the policy includes a number of clauses/obligatory directives like regular observance of Occupational Health and Safety Day on April 28 each year by the state (Clause 4.a.25); publicity and promotional measures on OSH related issues through government and private TV channels and other media (clause 4.a.26); inclusion of OSH issues in the curriculum of Secondary and Higher Secondary Education (Clause 4.a.27); motivate all employers to implement the OSH policy, BLA and related laws on OSH (Clause 4.b.1.); arrange discussions, consultations and trainings, for employees of the member organisations (Clause 4.b.2); provide information on laws related to OSH, rights and responsibilities of trade unions regarding safe and healthy workplaces and arrange orientation to the workers (Clause 4.c.1); and motivate the workers through the trade unions to follow the laws on OSH (Clause 4.c.2). Employers must identify all OSH risks and orientate all workers on such risks and the potential causes of accidents (Clause 4.d.2). The policy also suggests developing a safe work-plan and ensuring its effective practice (Clause 4.d.8.)

Record Keeping and Planning: The National OSH Policy stresses the collection and maintenance of all records on OSH-related accidents, injuries, death, treatment, compensation, cases, and decisions, etc., (Clause 3.a.7; 4.a.8; and 4.d.5).

The policy also recommends that the respective institutions use the data and information to make action plans and take guidance from OSH specialists for ensuring OSH standards in the workplace (Clause 3.a.8,4. a.9 and 4.d.65). Section 90 of BLA 2006 provides for the compulsory obligation of keeping and maintaining a safety record book and a safety board in every establishment and factory, wherein more than 25 workers are employed. According to the Bangladesh Labour Rules 2015, the authorities of all factories are obliged to keep a register of all accidents and dangerous incidents that occur from time to time in that factory (Rule 73).

Penalty System: The Labour Law of Bangladesh provides many financial and imprisonment penalties for violating labour law. Some of these penalties (Section 289, 290, 291, and 294) are (a) imprisonment for a term, which may extend to one year, or fine up to five thousand takas (BDT 5,000) or both for the employer if he pays a wage below than the rate of minimum wage; (b) Failure to give proper instructions in case of any fire incidents will result in fine up to three thousand takas (BDT 3,000) and imprisonment up to six months, or both. Apart from that, based on the severity of accidents, due to the lack of compliance, the same penalties will be imposed. (c) maximum fine of ten thousand takas (BDT 10,000) and imprisonment up to two years for unfair labour practices; and (d) one-year imprisonment and a fine up to five thousand takas (BDT 5,000), or both for illegal strike or lock-out. These penalties are not severe, and trade union leaders of Bangladesh and civil society actors have long been demanding for a stronger punishment system. Yet, for many types of law violations, the penalty has been reduced to a low amount (BDT 5,000), and imprisonment provision has been waived to absolve the labour law violating employers from imprisonment punishment. In the recent move, change has been brought in Article 307 of the BLA 2006 related to penalties for offences for which no specific penalty has been imposed in other law articles. According to this change, employers are now required to pay only BDT 5,000 as a fine instead of the previous punishment—'Imprisonment up to three months,

or fine up to BDT 1,000, or both'. Accordingly, the current penalty system does not consider the need for striking a balance between savings accrued by violating labour law provisions and the cost of compliance.

Apart from these national rules and regulations, many international CoCs regarding workplace safety need to be fulfilled to enter the international market. Some of them are—Basel, Rotterdam, Stockholm Conventions, Business Social Compliance Initiative (BSCI), Enterprise Resource Planning (ERP), International Organisation for Standardisation (ISO), etc. But most of them, apart from BSCI, focus on the health and climate impact for consuming plastics rather than on worker-level safety.

5. Monitoring and Regulatory Authorities Accountable for Industrial Safety

5.1 Capital Development Authority of the Government of Bangladesh (GoB) – RAJUK

The RAJUK, Capital Development Authority, is the authoritative national board on building

planning, estates and resources, plot allotment, and construction approvals in respect of relevant proposals from public and private entities. The RAJUK is responsible to prepare the Master Plan, structural and detailed area plans within its jurisdiction area, accord approval, monitor and supervise development and control of building construction and private residential land development projects.

5.2 Department of Inspection for Factories and Establishments (DIFE)

The DIFE is the national labour inspectorate under Bangladesh Labour Act 2006 and has got working linkage with International Labour Organization (ILO) Labour Inspection Convention, 1947 (No 81); it is solely responsible for enforcing labour laws and rules through inspection at the workplaces. The DIFE is responsible for implementing all the provisions of the Labour Act 2006 except Chapter 13—Trade Union and Industrial Relations and Chapter 14—Arbitration, Labour Courts, Labour Appellate Tribunal, and Rules of Procedures. The key functions of DIFE include: inspecting factories, shops, industries, and commercial establishments, especially high-risk ones; enforcing the terms of employment, safety, and health issues, and labour welfare under the Bangladesh Labour Act 2006 and

Table 5: Labour Inspection Status of Import-oriented Non-RMG Sectors (As of November 2021)

Sector/ Factory Group	Total Factories	Proactive Inspection	Reactive Inspection	Follow-up Inspection
Food Production	12678	2934	1227	124
Engineering	2721	542	472	6
Brick Field	5611	884	491	3
Chemical	1209	235	52	3
Wood and Construction	2798	791	147	3
Plastic	1166	295	129	3
Textile	4323	878	196	3
Leather	435	36	7	0
Packaging ³	562	106	53	0

Source: Website of FBCCI; LIMA, and DIFE.

Bangladesh Labour Rules 2015; and prosecuting the violators in labour courts. Table 5 displays that 1,166 plastic factories out of 5000 manufacturing units (according to BPGMEA data) have been inspected at least once so far. This shows that the extent of inspection, conducted in the plastic sector, is very low.

Apart from conducting inspections, DIFE is also responsible for examination and verification of certificates issued by the relevant authorities relating to safe and secure operation in factories/ establishments. Investigation of complaints, received from workers on their labour rights, working environment, establishing communication with various government organisations, employers' associations, and trade unions for the proper implementation of labour laws, also fall under their supervision.

5.3 Bangladesh Fire Service and Civil Defence (BFSCD)

Bangladesh Fire Service and Civil Defence, an important wing within GoB Ministry of Home Affairs, is responsible for fire prevention, firefighting, rescue missions, and fire safety during any natural or man-made disaster as per the Fire Prevention and Extinction Law 2003. It responds to fire hazard occurrences through a network of more than 340 fire stations across the entire country and maintains a hotline, 9555555, to receive fire incidents notification.

5.4. Office of the Chief Inspector of Boilers

This division inspects boilers and ensures boiler safety throughout the country. It advises the factory owners regarding the design, construction, maintenance, working of boilers, water treatment of feed water, and cleaning of boilers. The division also examines the design, drawings, and specifications of the boilers to be imported from abroad or manufactured within the country,

enquires into boiler or steam pipes accidents, inspect hydraulic testing of every working boiler annually, and awards certificates thereof, if found fit.

5.5 Department of Environment (DoE)

As specified in the Environment Conservation Rules 1997, clause 7, all new industries and projects must apply for an Environmental Compliance Certificate (ECC). ECC certificates are issued by DOE after their initial field visit and assessment. Industries are classified according to their potential impact on the environment into four categories: Green, Orange-A, Orange-B, and Red. Industries belonging to Green category are automatically granted ECC. Those under Orange-A category must submit further information and plans and may be subject to field inspection. And those belonging to highly polluting categories, Orange-B and Red, are required to conduct a detailed Environmental Impact Assessment (EIA) and prepare environmental management plans satisfactory to the Department.

5.6 Department of Explosives

The Department of Explosives, under the Ministry of Power, Energy, and Mineral Resources (MoPEMR), controls the use of explosives to minimise hazards. Some of the major functions of the Department of Explosives include: (i) scrutiny and approving site, layout, and construction plans for explosives manufacturing factories, explosives storage premises, manufacturing of explosives at the site in Bulk Mixing and Delivery Vehicles (BMD); (ii) public display of fireworks, storage installations for compressed gases in unfired pressure vessels, filling plants for gas cylinders; (iii) advising Sea/ River Port, Airport, and Railway authorities on the classification of hazardous substances; (iv) packing and determination of conditions for storage/ transport of dangerous substances; (v) setting and layout of facilities for the loading/unloading and

³The number of factories for all sectors is considered from the sectoral priority list of DIFE except the packaging sector which is collected from the LIMA establishment list.

transit storage of explosives, flammable and other dangerous substances; (vi) examination/testing of explosives/hazardous substances for classification of hazard; (vii) advising the Government, the Industry, and various organisations on matters relating to the handling of explosives, flammable and other dangerous substances.

5.7 Private Sector Organisations

Employers' Organisations (EOs) are formal groups of employers/factory owners, set up to represent, advise, and defend affiliated employers and to strengthen their position in the industrial sector concerning labour matters. Bangladesh Plastic Packaging Association, Roll Manufacturers Owners Association, Bangladesh Plastic Babosayee Samity, Bangladesh PVC Compound Manufacturers Association, Bangladesh PVC Pipe Manufacturers Association, etc., are some of the private sector organisations that work for the betterment of plastic industries.

The principal objective of these associations is to safeguard the interest of the plastic sector of Bangladesh and the development of trade and business across national and international fields by removing challenges like industrial accidents and injuries. Some of the responsibilities of these organisations include: promoting and protecting the interest of employers engaged in industry; trade and commerce in the country; studying, analysing, and disseminating information relating to labour policy; labour management relations; collective bargaining and offering advice to member factories concerning various aspects of labour policy.

6. Current Occupational Health and Safety Scenario of the Plastic Industry in Bangladesh

According to the findings from KIs conducted at the management level, the safety culture has not been developed in the plastic sector. The informants confirm that the factory owners do not consider safety and security in the workplace as a vital component and thus consider investment on account of safety as financially not beneficial.

Based on the FGD, the OSH situation in the plastic sector can be portrayed on the basis of the following groups: Large factories, medium factories and small factories.

6.1 Large Factories

Most of the large category factories own a bigger portion of the domestic market share or export globally; they seem to fulfill structural compliances like layout approval, well-structured chemical pipelines, separate storage for raw materials, and finished products, sprinklers, busbar, and electric cables as per the Labour Act and Rules of their own accord. They also have their inter-company safety protocols/guidelines to follow, and ensures trainings on firefighting, using PPE, and machinery operation. Risk assessment reports are available for every section of the factory, covering the production process comprising various work events. These factories also claim to be fulfilling many international rules and regulations to get the licence for entry into the domestic market. Almost all of the licences the factories arrange for operation focus on the quality of the plastic and the environmental impact of the used product. They also seem to have information on forming the safety committee and claim it is available in their factories. But whether or not they are functioning properly is still a concern.

6.2 Medium Factories

Owners of medium-sized factories have the bare minimum to get away with getting the licences to operate in the market. There is still a need to set-up in-house company policies regarding safety issues. Most medium-category factories do not have safety committees and very few of them recruit safety officers. According to them, the severe accidents might hardly occur in their factories. However, workers frequently get injured in small and medium factories while operating machinery, since they mostly use manually operated machines. Very few factories own the whole building and mostly operate on a single floor of an apartment or market building, making it more difficult to be structurally compliant.

6.3 Small Factories

Small-sized factories have to maintain and fulfill the lowest number of compliances. Even after that, comparatively, they are mostly lagging behind in safety issues. They work with little to no capital to hire a safety officer solely for safety purposes. They claim to acquire more capability and competence to afford to be structurally compliant as they mostly operate in rented facilities.

7. Recommendations

- i. **Relevant Information:** Availability of required, relevant and appropriate information needs to be ensured among different stakeholders. Availability of data is the first requirement to fulfill the process towards working with a sector. With the prevalence of different classifications, mismatch in the total number of plastic factories creates barriers in implementing any legal procedure. According to BLA, every establishment needs a licence to start operating in the economy whereas the number of plastic factories registered to DIFE shows only 712 factories on their website LIMA. To bring every plastic factory under any initiative, the availability of correct information needs to be increased.
- ii. **Designing Factory-level Safety Book Manual:** The availability of guidelines, consisting of a set of manuals, such as manuals for handling chemicals, electric wiring and hot work, and for operating machinery, was the first claim that the representatives of different factories made during the KII. A machine operating guide, specifically focusing on the machines used in plastic industries, should be available in the factory when the industries proceed to register their company.
- iii. **Financial Assistance towards Investment in Safety:** Since factory owners need to invest in the overall safety and security of all concerned in the workplaces regardless of their sizes, factories that lack the affordability to invest in safety ought to be covered under a loan scheme with the provision of a longer period of repayment.
- iv. **A Separated Plastic Zone for Small and Medium-sized Enterprises (SMEs):** Most micro and small factories cannot ensure bare minimum safety protocol; they need to be relocated to a different plastic zone, if not given any financial assistance.
- v. **Awareness of the Factory Owners on Legal Issues:** Even though Bangladesh has recently been focusing on occupational health and safety, it still needs factory-level law enforcement to be alert about these frequent accidents in the workplace. Most factories are not aware of the legal bindings or guidelines for factory-level compliances.
- vi. **Proper Investigation of the Previous Accidental Incidents:** Increase of risk is directly proportional to the increase in incident occurrences as well as increase in the severity of injuries. Proper investigation of the past accidents and injuries sustained by the workers and effective analysis thereof would help minimise the incidence of accidents to a great extent and injury severity can also be reduced.
- vii. **Training on Safety Issues and Cooperation from Government Bodies:** Training the workers as well as the factory employers on the overall issue of safety in the workplace is contributory to better risk-free environment there. Although the migration of trained labour from the factory might imply some sort of loss for the employer(s), it bears good results for the industry as a whole as workers who left the company do not necessarily leave their field of expertise. Educating the employers and workers regarding the character, scope, importance, and needs of industrial safety, sometimes with joint initiatives from the government bodies, would prove helpful to decrease the risk of injury and accidents.
- viii. **Strengthening the Trade Bodies:** With the constant increase of establishments/factories, it would be difficult for public institutions to single-handedly ensure occupational safety followed by proper compliance. In this case, trade bodies and associations can be effective in the primary and field-level screening for OSH

compliances. If they are responsible enough during the first stage of screening to register their organisation as part of government monitoring and accountability compliance, it would lessen the non-compliance aspect and make it more efficient to keep all the factories under the radar.

- ix. **Proper Monitoring and Inspection with better Transparency:** According to the factory owners, some factories get inspections regularly done in a repeated way, while others do not seem to have any contact with the inspector after acquiring the licence. Some of them contact FSCD for fire safety training, but the owners who are unwilling to invest money and spend time in occupational health and safety can easily get away without arranging such trainings. Proper monitoring and regular inspection with required transparency on the issue is likely to involve all the factory owners in the process.

- x. **Further Survey and Analysis:** While the study thoroughly covered existing laws, rules, and policies on OSH, the current scenario of the plastic sector containing various findings were depicted solely on the basis of KIIIs and in consideration of some documents; but, extensive review of relevant facts, figures and aspects relating to the issue in hand, viz., industrial safety and work-related issues could not be undertaken as such due to time and budget constraints. While the KIIIs with management, owner, and association level representatives provided a broader perspective, there is still a need to assess the micro-level scenario through a nationally representative survey from both management and workers points of view. Hence, further survey and analysis on the subject-matter need to be attempted in near future for the sake of proper scenario of the plastic sector.

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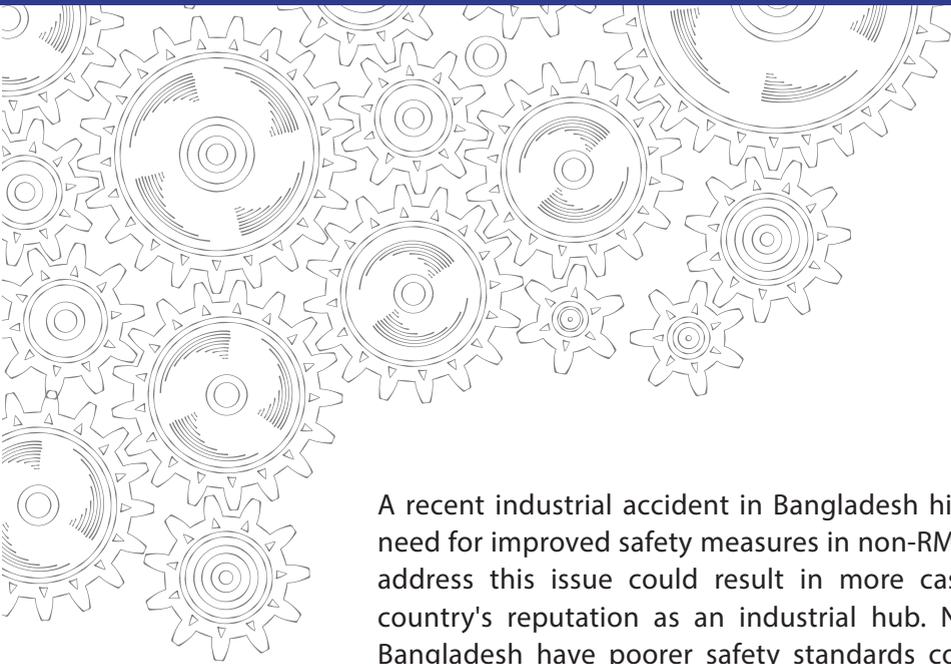
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A recent industrial accident in Bangladesh highlighted the urgent need for improved safety measures in non-RMG factories. Failure to address this issue could result in more casualties and risk the country's reputation as an industrial hub. Non-RMG factories in Bangladesh have poorer safety standards compared to the RMG sector, and fire incidents with rising casualties are becoming increasingly common. Undertaking remedial measures in these factories is difficult due to the lack of compliance standards and stakeholder pressure. This study aims to identify the state of progress of industrial safety in plastic factories and establishments in Bangladesh, review policies and laws related to safety concerns, and provide recommendations for improving workplace safety and security. The study examines OSH-related issues, including fire and electrical issues, from the perspective of structural safety. It also identifies regulatory challenges in ensuring compliance. Primary data was gathered through interviews with key stakeholders, providing insights into workplace safety and worker-related compliances. The study recommends maintaining transparency, accountability, and efficiency in public and private sector initiatives to improve industrial safety. It emphasises the need for compliance standards and stakeholder pressure to drive change and reduce the risk of future industrial accidents.

