

Evaluation of environmental compliance and challenges on mitigation measures for EMS, Energy & GHG, Water & Wastewater, Air Emission, Waste & Chemical Management due to decreased profit margin.

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Abstract— Environmental standards are updating bit by bit, but the profit margin or price rate of product is not increasing correspondingly. In this connection ZDHC MRSL Version 1.1 update to MRSL Version 3.0 including new hazardous chemical group, brands asking for Oekotex 100, Oekotex SteP, GOTS, OCS, GRS,ISO-14001, SEDEX 4 pillar, ZDHC WWGL 2.1 wastewater & sludge test reports, ZDHC Level 3 conformant chemical input, No detection of ZDHC MRSL parameter in the outlet, HIGG INDEX, carbon reduction initiatives, SBTi, updated technologies etc. but regarding corresponding funding no one is giving more profit margin, or more price rate to upgrade the environmental compliance status or to implement the mitigation measures or abatement process. So, the more the environmental requirements the more the RMG sector is being riskier to survive in market. Moreover, sometimes the facilities are bound to import raw materials from the nominated areas. Which finally & heavily impact on environmental compliance in the factory level. Therefore, in this study we are trying to disclose the environmental compliance status & challenges on mitigation measures.

Index Terms— EPA-Environmental Protection Agency, GHG-Greenhouse Gases, OSHA-Occupational Safety and Health Administration, MRSL- Manufacturing Restricted Substances List, SBTi-The Science Based Targets initiative, GOTS-Global Organic Textile Standard, OCS- Organic Content Standard, SEDEX- Supplier Ethical Data Exchange, VOC-Volatile Organic Compounds, WWGL-Waste Water Guidline, ZDHC- Zero Discharge of Hazardous Chemicals.

1 INTRODUCTION

Under Mughal rule, Bengal Subah was a midpoint of the worldwide muslin and silk trades during the 16th to 18th centuries. During the Mughal era, the most important center of cotton production was Bengal, particularly around its capital city of Dhaka, leading to muslin being called "daka" in distant markets such as Central Asia. Bengal also exported cotton and silk textiles to markets such as Europe, Indonesia and Japan. Bengal produced more than 50% of textiles and around 80% of silks imported by the Dutch from Asia, for example. Bengal was conquered by the British East India Company after the Battle of Plassey in 1757 and the Bengal Presidency was founded in 1765. British colonization forced open the Bengali market to British goods, while at the same time Britain implemented protectionist policies such as bans and high tariffs that restricted Bengali imports to Britain. Raw cotton was also imported without taxes or tariffs to British factories, which used them to manufacture textiles, many of which were exported back to Bengal. British economic policies led to deindustrialization in Bengal.

1.2. Background of the study:

However post-liberation war, Bangladesh continued to focus on the agricultural sector to feed its rural and poor masses. Even in 1978, there were only nine "export-oriented" garment manufacturing units. That same year the first direct export of garments, 10,000 shirts to a Parisian firm, was shipped from a Bangladeshi firm. The Bangladeshi government began to realize potential for the industry to flourish and offered develop-

ment stimulus such as "duty-free import machinery and raw materials, bonded warehouse facilities and cash incentives." The (RMG) industry of Bangladesh has emerged as a competent garment producer in global garment business in recent times. This industry has successfully transformed Bangladesh into an export-oriented economy. Garment exports from Bangladesh began in the late 1970s. As a result of the Multi Fiber Agreement (MFA) and the huge quota allocated to Bangladesh, in Dhaka in the 1980s, a completely new industry has developed. The Bangladesh Garment Manufacturers and Exporters Association (BGMEA) reported a growth in the RMG industry from 30 enterprises in 1980 to 4482 in 2016-2017. Conversely meeting the best compliance standards of the world, now in Bangladesh 150 factories are being prepared as green factories on the other hand more than 4,000 woven and knitwear garment factories are under pressure from their international buyers to improve their environmental status to global standards due to lacking local environmental laws. Former environmental laws in Bangladesh include the Bangladesh Wildlife (Preservation) Order of 1973, the Marine Fisheries Ordinance of 1983 and the Brick Burning (Control) Act of 1989. Other major preservation laws enacted before the independence of Bangladesh include the Public Parks Act of 1904, the Agricultural and Sanitary Improvement Act of 1920, Forest Act of 1927, and the Protection and Conservation of Fish Act of 1950. The Act followed the establishment of the Ministry of Environment and Forest in 1989 and the National Environment Management Action Plan (NEMAP) in 1992, as well as the Forest Policy in 1994 and the Forestry Master Plan (1993-

2012) in 1993. The act was put in place on 30 May 1995. In 1992, Environmental Policy 1992, Department of Environment, Bangladesh government was published for the management of environment. Gradually the state felt the importance of a complete environmental act and eventually the act was published in 1995. The Act is a set of laws enacted by the Government of Bangladesh in 1995, to conserve the nation's environment. Its main goals were to 'provide for conservation of the environment, improvement of the environmental standards, and control and mitigation of environmental pollution'. The readymade garments (RMG) industry of Bangladesh has contributed extensively to the export-oriented growth of the country. With the four million workforces it employs directly and another one million in linkage industries, it supports the livelihood of some 10 million Bangladeshis, laws regarding environmental pollution, however, wasn't not satisfactory. Then in 1997, Environmental Conservation Rules (ECR)-97 was published & after that some consequent changes of ECR-95,97 was made in 2004,2006,2010,2011,2012,2013; Environmental court law 2010 & Biodiversity act-2017 were published. But still there are some criticisms, some lacking law for proper environmental management & guideline regarding the environmental protection & sustainable development of RMG sector that is why industrialists, stakeholders & international buyers need to depend on international laws & regulations like US-EPA, OSHA, GHS. In 2012 a tool was developed by Sustainable Apparel Coalition called Higg Index. The Higg Index is an apparel and footwear industry self-assessment standard for assessing environmental and social sustainability throughout the supply chain, a nonprofit organization founded by a group of fashion companies, the United States government Environmental Protection Agency, and other nonprofit entities.

1.3 Importance of the Study

There were approximately 5,000 garment factories, employing about 4 million people by 2013 & this number is increasing day by day owing to the availability of cheap salaried working force, natural resources like energy, gas, water, raw materials, safety, security, working environment etc. So, the RMG sector is mostly depends on availability of electricity, Natural gas, diesel, ground water, cheap rated working force and hence if the sustainable consumption & management of these components are not ensured, the natural resource may be unavailable in near future & the RMG industry sector may move to another region. On the other hand the RMG sector is one of the most pollutant disposer i.e. solid wastes like metal, glass, tin, aluminum, plastics, zipper, button, HTL, Medical waste, electrical waste, electronics wastes etc.; liquid wastes like industrial waste water, domestic waste water, Hazardous chemicals etc. and air emissions like CO, CO₂, SO_x, NO_x, VOCs, GHGs, SPM, PM_{2.5}, PM₁₀, PM₂₀, O₃, dusts, etc. If the proper manage-

ment and valid disposal wastes are not ensured the environment may not remain worthy of living; ecology & biodiversity may be endangered; health & safety of the working force may be hampered. So, the study is about the evaluation of environmental protection & sustainable Environmental development of Environmental Management system, Energy & GHG management, Water resource management, Wastewater management, Air emission management, Waste management, Chemical management, Fire safety management, electrical & structural management & environmental health & safety management in the RMG sector. This study will identify the major impacts & development gap regarding the mentioned areas.

1.4 Objectives of the Study

1.4.1 Major Objective:

The aim of the study is to evaluate the environmental protection status & sustainable development of Dekko Accessories Limited.

1.4.2 Specific Objectives:

The following specific objectives are to be fulfilled to achieve the broad objective:

1. To investigate the actual practice of the sampling area in terms of global standard guideline.
2. To find out the major & specific impacts on individual & environment due to the lack of local environmental laws, regulations & guidelines; lack of monitoring; environmental violations & bad practices.
3. To recommend some mitigation measure to be taken for the improvement of the sustainable environmental protection system of RMG sector.

1.5 Scope of the Study

The scope of the study covers the application of the Labor Law act 2006, and its amendment in 2013 and the subsequent labor rule of 2015, concerning provisions of work facilities and work environment, safety and security, health and hygiene, welfare, working hours, leaves, wages, maternity benefits, provident funds at the work place, fire, electrical & structural safety and environment, chemical & waste management system in RMG sector of Bangladesh. This study focuses the theoretical knowledge regarding the matter and has a great scope to match it with the practical one.

As we know that, RMG, textiles and garments accessories are people, planet (environment) and profit oriented industry so there is a lot of compliance issues including: social compliance is major part including child & young labor, working hour, compensation & benefits, leave, maternity, grievance mechanism, labor union are the concern area to check the actual standard against local & international laws. Buyer COC now-a-days, fire safety is one of the burning issue in manufacturing sectors. In this connection, a factory must comply with local & international laws & rules including Fire Act- 2003, BNBC - 2006, ACCORD/ ALLIANCE and NFPA which were our as-

sessing area as well. In a manufacturing industry, electrical safety is very much important for both owner and workers. There are some standards such as Electricity Act (amended)-2012, BNBC and NFPA which were also our scope area. To comply with structural safety, a factory must follow BNBC and Building Construction Rues, 1996 are our scope area.

Dekko accessories Ltd uses a huge volume of ground water and natural gas for the production & produces a huge volume of waste water like industrial and domestic; ETP sludge; food wastes; chemical wastes like chemical drums, ink-pots, expired chemicals etc.; solid wastes like cartons, bobbins, broken needles, polythene, elastics, fabrics, drawstrings, woven belts, cottons, fused bulb, nut bolts etc.; air emissions like CO₂,CO,GHG_s,PM,NOX,SOX,VOCs etc.; medical wastes; generator wastes. People who work in generator section, chemical process section, PP Section, vertical-brushing section, woven level section are in physical and mental risk. So, the scope of the study is to identify the compliance practice & the impact and hazards of the facility in accordance with the national & international rules and regulations like ECR, US-EPA, OSHA, and WHO etc.

1.6 Limitations of the Study:

Limitations of a study are the constraints that a researcher must face during the time of study. This study has also some limitations. These are given below-

1. In the study area, there are so many garments, but the respondents were only from a single garment. As the working conditions and economic benefits of workers vary a large degree from garments to garments, most of the respondents became homogeneous in some extent. As a result, the research lost some of its representative-ness.
2. Due to the researcher’s personal inability, it was not possible to become enough intimate with the workers to extract out the actual answers. So, the lack of validity is prevailed through this research. Despite conducting pilot survey, there was some vagueness in the questionnaire that made some confusion while collecting data.
3. Garment workers and garment management or representatives are always busy with their own tasks, so they had little opportunity to give the adequate time in this regard.
4. In some cases, it seemed that the female workers are not open minded in answering the questions. The reason may be lied in their fear of management or not having the clear idea about the interview or study.
5. In some cases, management did not co-operate appropriately to get the direct interview of the workers.

2. Literature Review:

Environmental protection is a practice of protecting the natural environment on individual, organizational or govern-

mental levels, for the benefit of both the natural environment and humans. Environmental protection implies the conformity to standards. In the case of garments industry, the standards comprise of the relevant laws, regulations & legislatives of the respective country, US-EPA, OSHA, Buyer’s Code of Conduct (COC) etc. Broader issues of environmental protection in garments industries are sometimes categorized into EHS, OHS, Physical safety, working area safety, chemical safety, building safety, electrical safety, fire safety, pollution safety, evacuation safety, rescue safety etc. The environmental protection in garments industries refers the protection of individual, protection of organization, protection of surrounding area, protection of biodiversity, protection of wetlands, protection of natural environment & its components.

The local laws & regulations applicable for the garments industries environmental protection & sustainable development are as follows:

Relevant Act and Regulatory Authority	Scope and Goals of Legislation	Applicable local laws and regulations for environmental management & protection of RMG sector.
National Environment Policy 1992 Department of Environment, Bangladesh Government	Rules- 3.2, 3.4, 3.5, 3.11	Reduction of environmental pollution from factory. Reduce the use of energy which causes pollution. Effective use of water. Reducing the impact of transportation in environment
Bangladesh Environment Conservation Act 1995	The main objectives of the ECA are: Conservation and improvement of environment, and Control and mitigation of pollution of environment	Air, Water, Waste, Noise,
Environment Conservation Rules, 1997, Department of Environment, Bangladesh Government	With a view to meet the different standard defined by the regulatory body (Air, water, sound, emission and odor).	Schedule 2,3,4,5,6,7,8 The Act determination the standards about Standards for Air, Standards for Water, Standards for Sound, Standards for Emission, Standards for Odor and other environmental component.
The Bangladesh Environment Conservation (Amendment) Act, 2010, Department of Environment Bangladesh government	Amendment (2010) on the provision of The Bangladesh Environment Conservation Act,1995	Restriction on production, import, storage, loading, transportation etc. of hazardous waste.- to protect the environmental damage, Govt. with respect to provision of other law can control by means of provision production, processing, contain, storage, loading, supply, transportation, import, export, disposal, dumping etc. of hazardous waste.
National Environment Policy 1992 Department of Environment, Bangladesh Government	Rules- 3.2, 3.4, 3.5, 3.11	Reduction of environmental pollution from factory. Reduce the use of energy which causes pollution. Effective use of water. Reducing the impact of transportation in environment
Bangladesh Environment Conservation Act 1995	The main objectives of the ECA are:	Air, Water, Waste, Noise,

3. Methodology

This section presents an overview of the methods which are used in the study. Areas covered include the research design,

population, sample and sampling techniques, data collection and analysis.

3.1 Research Design

This study is both statistical and analytical type of data-based research. The statistical and analytical portion of the study presents the key features of the environmental protection at the sampling areas. It also tries to make a comparative analysis understanding of the sampling area practices with the international rules, regulations & guidelines, like SAC (higg index), NFPA, ECA/ ECR,EPA,OSHA,SAC etc.

The analytical portion of the study reveals the impact of those practices in the industries & the workers of the sampling areas through questionnaire, field visit, management interview, personal observations.

3.2 Population

Here the research area is the factory facilities. The sampling was performed by selecting 6000 total numbers of workers of different process in different industries.

Here, the population size is 2000, among them 300 person from management team (20 person is management representative, 50 person is compliance representative, 20 person is fire safety representative, 100 person is environment & chemical representative, 10 person is electrical & structural safety representative, 70 person is ETP,WTP representative, 10 person is maintenance representative & 20 person from generator & boiler operation) & among rest of the person 1000 were male and 700 were female workers of different industries.

3.3 Sample and Sampling Technique

The researcher has adopted the survey type of research in which a sample from the target population is used for the study. For an effective analysis, in total, 2000 people were selected from the target population and they were surveyed through the questionnaire.

The sampling technique used in the study is multistage stratified sampling technique.

3.4 Sources of Data Collection

3.4.1 Sources of Primary Data

The sources of primary data were collected from the workers who were selected as sample from the population. An interview questionnaire was provided to those workers and collected in person.

3.4.2 Sources of Secondary Data

Sources of secondary data include Environmental compliance, maintenance, ETP & WTP, Chemical Management, Waste management departmental documents, various journals, research reports related to this field, different audit reports, Buyer COC, web sources, and newspapers, etc.

3.5 Data Analysis

3.5.1 Method of Data Analysis

One of the popular psychometric scales named Likert scale is used in this study to analyze the data gathered through survey questionnaire from the sample.

3.5.2 Representation of Data Analysis

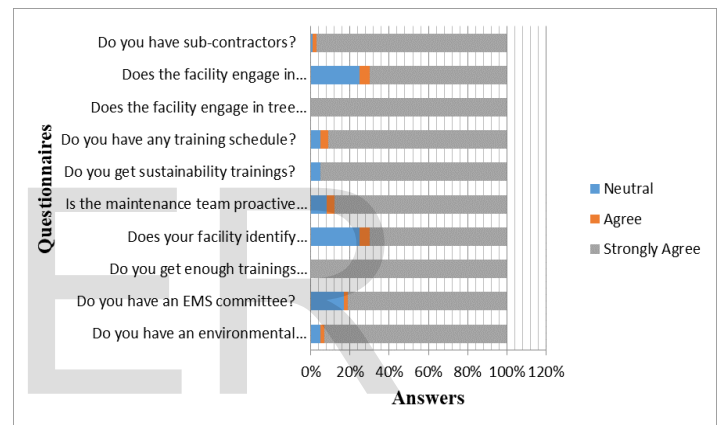
The tools which are used to represent the analysis of the data are tables and graphs.

3.6 Key Variables

One of the main focuses of this study is the discussion with 100 people to know and analyze the environmental protection status of the sampling area. Key variables practices are organogram and policies, strategies, inventories, disposal records, log books, trainings, RSL/MRSL lists, implementation plan, provident fund, health and hygiene, safety and security, welfare and working hours, leaves and holiday provision.

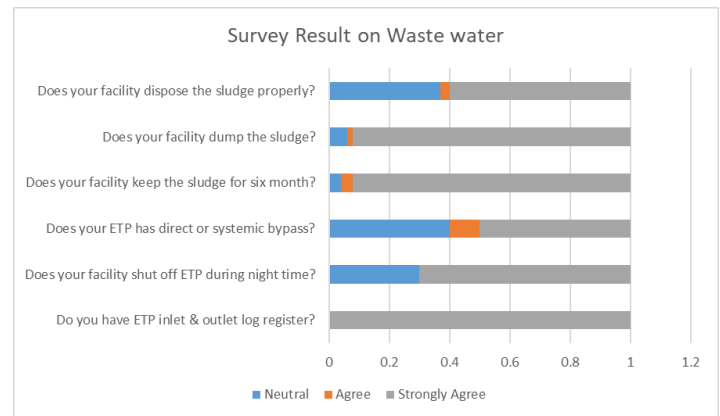
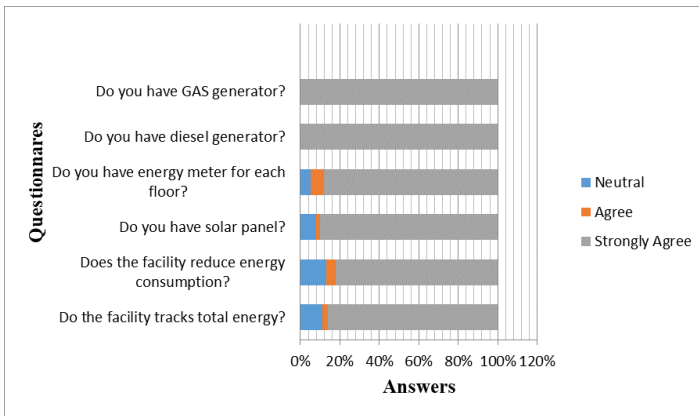
4. Results & Discussion:

4.1 Statistical Analysis on Surveyed method of Environmental Management System:



The first observation criteria was environmental management system with responsible person (strongly agree 93%, agree 2%, neutral 5%); EMS committee (strongly agree 81%, agree 2%, neutral 17%); EMS awareness training (strongly agree 93%); Significant impacts identification (strongly agree 70%, agree 5%, neutral 25%); proactive & punctual maintenance team (strongly agree 88%, agree 4%, neutral 8%); sustainability trainings (strongly agree 95%, neutral 5%); training schedule (strongly agree 91%, agree 4%, neutral 5%); tree plantation (strongly agree 91%); financial help (strongly agree 70%, agree 5%, neutral 25%); sub-contractors (strongly agree 97%, agree 2%, neutral 1%).

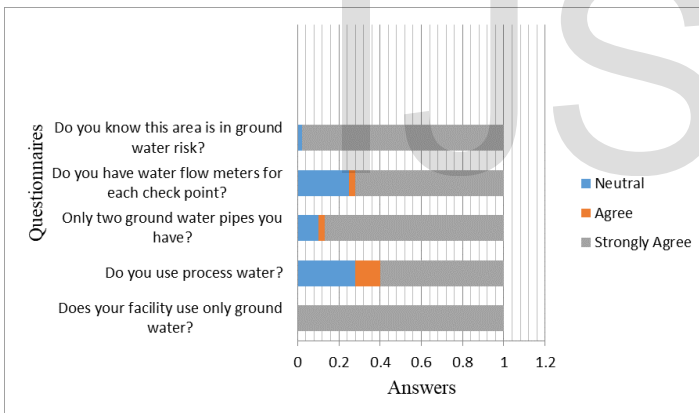
4.2 Statistical Analysis on Surveyed method of Energy & GHG:



The second observation criteria was the impact of energy & GHG with tracking of total energy (strongly agree 86%, agree 3%, neutral 11%); reducing energy consumption (strongly agree 86%, agree 3%, neutral 11%); solar panel (strongly agree 90%, agree 2%, neutral 8%); energy meter for each floor (strongly agree 88%, agree 7%, neutral 5%); diesel generator (strongly agree 100%); GAS generator (strongly agree 100%).

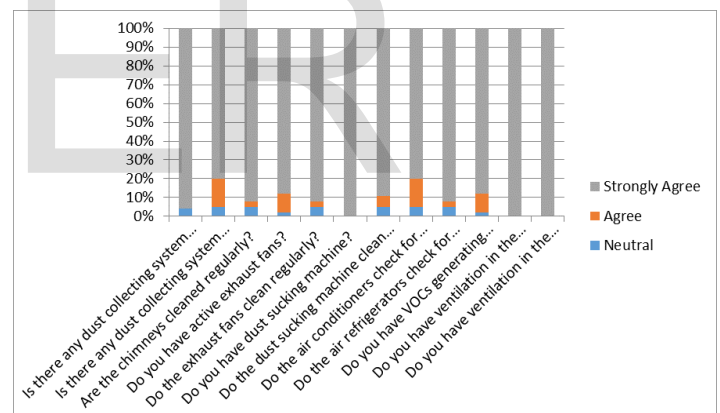
The 4th observation criteria was the impact of waste water with ETP inlet & outlet log register (strongly agree 100%); ETP shut off during night time (strongly agree 70%, neutral 30%); ETP bypass (strongly agree 50%, agree 10%, neutral 40%); facility keep the sludge for six month (strongly agree 92%, agree 4%, neutral 4%); facility dump the sludge (strongly agree 92%, agree 2%, neutral 6%); your facility dispose the sludge properly (strongly agree 60%, agree 3%, neutral 37%).

4.3 Statistical Analysis on Surveyed method of Water management:



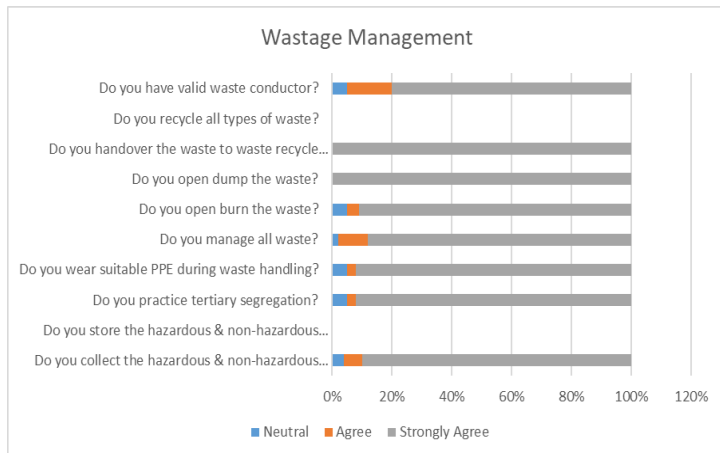
The third observation criteria was the impact of water management with Only ground water source (strongly agree 100%); water reuse or recycle (strongly agree 60%, agree 12%, neutral 28%); only two ground water pipes (strongly agree 87%, agree 3%, neutral 10%); water flow meters for each check point (strongly agree 72%, agree 3%, neutral 25%); this area is in ground water risk (strongly agree 98%, neutral 2%);

4.5 Statistical Analysis on Surveyed method of Air emission:



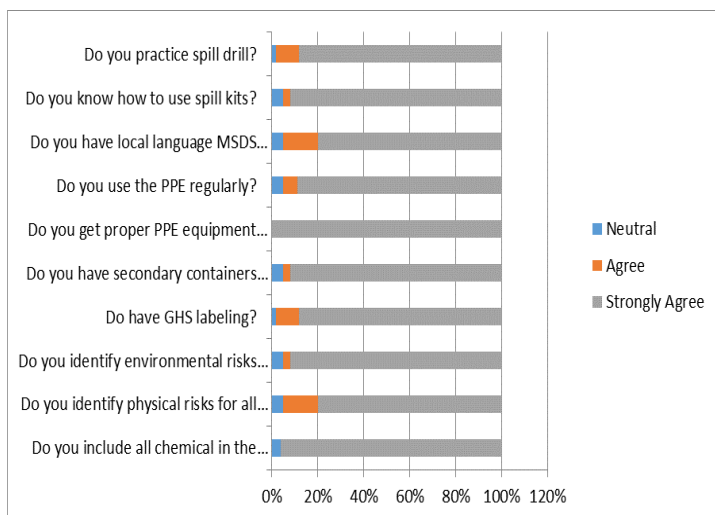
The 5th observation criteria was the impact of air emission with the dust collecting system in the generator chimney (strongly agree 96%, neutral 4%); dust collecting system in the boiler chimney (strongly agree 80%, agree 15%, neutral 5%); chimneys cleaned regularly (strongly agree 92%, agree 3%, neutral 5%); active exhaust fans (strongly agree 88%, agree 10%, neutral 2%); exhaust fans clean regularly (strongly agree 92%, agree 3%, neutral 5%); dust sucking machine (strongly agree 100%); dust sucking machine clean regularly (strongly agree 89%, agree 6%, neutral 5%); air conditioners check for leakage regularly (strongly agree 80%, agree 15%, neutral 5%); VOCs generating chemicals (strongly agree 88%, agree 10%, neutral 2%); ventilation in the waste storage area (strongly agree 100%); ventilation in the chemical store (strongly agree 100%).

4.6 Statistical Analysis on Surveyed method of Wastage Management:



The 6th observation criteria was the impact of waste with the collect the hazardous & non-hazardous wastes separately (strongly agree 90%, agree 6%, neutral 4%); store the hazardous & non-hazardous wastes separately (strongly agree 92%, agree 3%, neutral 5%); practice tertiary segregation (strongly agree 92%, agree 3%, neutral 5%); wear suitable PPE during waste handling (strongly agree 88%, agree 10%, neutral 2%); manage all waste (strongly agree 91%, agree 4%, neutral 5%); open burn the waste (strongly agree 100%); open dump the waste (strongly agree 100%); handover the waste to waste recycle company (strongly agree 80%, agree 15%, neutral 5%); recycle all types of waste (strongly agree 92%, agree 3%, neutral 5%); valid waste conductor (strongly agree 88%, agree 10%, neutral 2%); final disposal by the conductor (strongly agree 100%).

4. 7 Statistical Analysis on Surveyed method of Chemical Management:



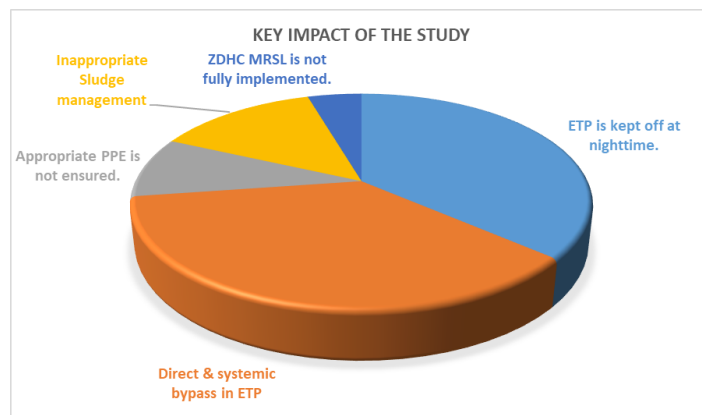
The 7th observation criteria was the impact of chemical management with include all chemical in the inventory (strongly agree 96%, neutral 4%); identify physical risks for all chemicals (strongly agree 80%, agree 15%, neutral 5%); identify environmental risks for all chemicals (strongly agree 92%, agree 3%, neutral 5%); GHS labeling (strongly agree 88%, agree 10%, neutral 2%); secondary containers for all chemicals (strongly agree 92%, agree 3%, neutral 5%); proper PPE equipment for chemical handling (strongly agree 100%); local language MSDS for all chemicals (strongly agree 89%, agree 6%, neutral 5%); how to use spill kits (strongly agree 80%, agree 15%, neutral 5%); practice spill drill (strongly agree 88%, agree 10%, neutral 2%).

5. Major impacts identified by the Study:

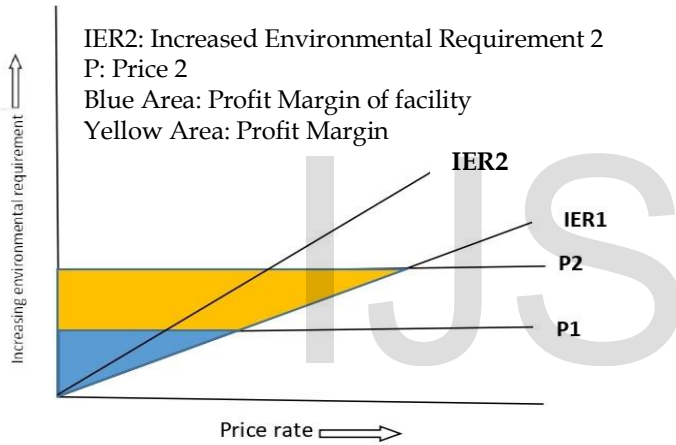
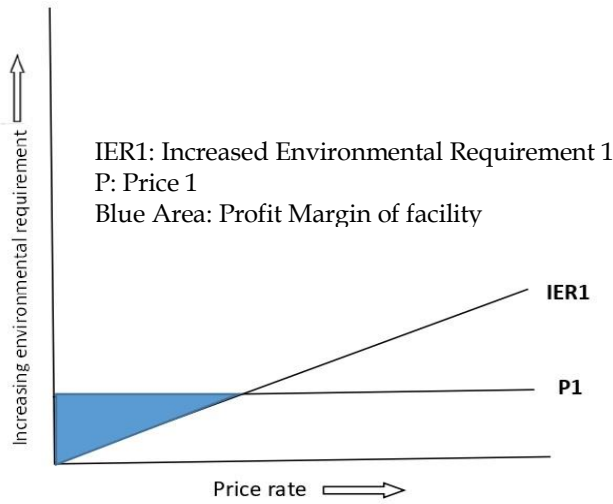
After analyzing all data, personal observation, management interview & feedback the significant impact of the study was identified as below:

- ✓ Most of the ETP is kept off at nighttime.
- ✓ Direct & systemic bypass in is available in the ETPs
- ✓ Appropriate PPE is not ensured.
- ✓ Inappropriate Sludge management
- ✓ Documented & evaluated ZDHC MRSL is not fully implemented.

This data is shown through the pie chart for further analysis as below:



4.8 Challenges on mitigation measures:



So, from the above analysis its clear that due to the increased demand of environmental compliance criteria the profit margin of the facilities is decreasing & hence its reflecting on most of the ETP is kept off at nighttime, direct & systemic bypass in is available in the ETPs, appropriate PPE is not ensured, inappropriate Sludge management, ZDHC MRSL is not implemented correctly to cope up with the decreased profit margin & to survive on market.

6. Conclusions:

This is a pioneering study to explore the challenges faced by industrialists in ensuring environmental compliance in the RMG industry in Bangladesh. Due the irrationality between increase percentage of environmental compliance requirement & decrease percentage of price rate, in some cases the price rate remains same as previous but the environmental requirements day by day updates & requires huge funding & hence the facilities are facing challenges to mitigate the im-

pact properly.

Especially the price of the product is declining day by day which makes this sector riskier in term of implementing environmental compliance management system due to **decreasing profit margin. on their other hand**, Raw material price is increasing day by day and government and buyers are pressuring supplier to reduce the price, some cases facilities are compelled to import nominated raw materials & forbidden to use own country raw material. So, all these challenges finally affects the mitigation measures of the environmental non compliance impact.

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