



# Study on the Current Conditions of Occupational Health and Safety (OHS) for Bangladeshi Ready-Made Garments (RMG) Workers

A.S.M. Hoque<sup>1</sup>, M. Shojib<sup>1</sup>, M.T. Islam<sup>1</sup>, M.S. Parvez<sup>2</sup>

Department of Industrial and Production Engineering, Jessore University of Science and Technology, Jessore, Bangladesh<sup>1</sup>  
Department of Industrial Engineering and Management, Kulna University of Engineering and Technology, Kulna, Bangladesh<sup>2</sup>

## ABSTRACT

This study aimed to present an overview of the situation of different types of occupational health hazards and safety threats in garment industries of Bangladesh to achieve information related to employer physical condition, health facilities, accident indicators, occupational health and safety and safety activities. A structured questionnaire (comprising check-box questions and open-ended questions) was developed to collect data about participants' socio-demographic characteristics and other different OHS matters. The sample consisted of 100 workers taking randomly from two small-sized garment factories. Four problem areas (health, environment, task & management and OHS & ergonomics) were generated to categorize different types of problems. The results showed that back pain (27%) was the most threatening among the health related problems while dust (36%), machine hazard (33%) and lack of hazard analysis (48%) were most threatening among environment, task & management and OHS & ergonomics related problems respectively. An Analysis of Variance (ANOVA) test was performed to check whether the problem areas and the problems of both the companies were same. The test result showed no significant difference in problem areas and problems between two companies, which meant the data, were relevant. The study also presented some recommendations about how the present condition can be improved.

**Keywords:** Occupational Health and Safety (OHS); Ready-Made Garments (RMG); Analysis of Variance (ANOVA)

## 1. INTRODUCTION

In a developing country like Bangladesh, Ready-Made Garments (RMG) sector plays a dominant role in the overall economic development. Curiously the export of RMG plays an immensely important role in the socio-economic development of Bangladesh accounting for more than 75 percent of Bangladesh's total export earnings (Biswas, 2006). According to the World Bank report, more than 10 million people's livelihoods directly and indirectly depend on this sector and it accounts 40 percent of industrial employment (World Bank, 2006). Workers in the RMG sector work in clothes designing, sewing or cutting services, and clothes wholesaling (Sarder, 2002). As a result of the nature of these jobs, the prevalence of work-related musculoskeletal disorders is high. Sarder (Sarder, 2002) says that "*the nature and severity of the disorders have been considered to be the results of the job characteristics constrained and sustained work postures, highly repetitive actions, and strong visual demands*". Due to lack of/little knowledge about the health condition from the ergonomics points of view of the garment workers, hence decreased productivity and overall inefficiency.

Health is associated to the physical conditions of both mind and body, all people at the work place and safety is related to the physical condition at the work-site and applies to a state (Khan, 2014). Therefore, Occupational Health and Safety (OHS) is an area concerned for work or employment people with protecting the safety, health and welfare and its seeks to maintain the working ability of the labour force as well as to

identify, assess and prevent hazards within the working environment. It covers a wide field, for example work physiology, occupational hygiene, occupational psychology, occupational toxicology etc. (Harrington and Gill, 1990).

Paul-Majumder (2003) conducted a study on the physical and mental health status of garment workers. They showed problem affecting labour productivity, competitiveness of the garment industry in the world market and the working life of the workers, particularly of female workers. Many of workers were found to continue their work even they were suffering from various diseases and illness like anaemia, female diseases, dysentery, etc. Most of the health problems that the garment workers suffered arising from the occupational hazards including at least 12 hours working hours, Zero leave facilities, over-crowded working conditions and lack of health facilities, safety measures, staff amenities, safe drinking water etc. Currently, there is also very small number of garments factory that have better working facilities. In this regard, the attitude of concerned parties (e.g., workers, employers, labour unions, Inspectorates, etc.) are important to improve working conditions on OHS and ergonomics applications.

In Bangladesh, most of the accidents in RMG have occurred from fire and its subsequent impact on human mind (panic, stampede etc.) (Financial Express, 2013). Other incidences like collapse of buildings (ready-made garments' industry) have also claimed high toll on human lives and property. Also, substandard equipment fails to control proper electrical flow, causing over heat, spark or fire (Akther et al., 2010).

Nowadays unplanned work environment, disorganized workers, electric short circuit, faulty electrical wiring, smoking materials, boiler explosion, kitchen stove and carelessness, fire from existing structure, poor building design etc. are common in most of the garments’ factory in Bangladesh. Lots of workers have died due to stampede, locked exit route, inadequate number of stairs, deliberately blocked pathways, smoke and suffocation. Health and Safety regulations, as prescribed in Factory Rules 1979 (Absar, 2001; Begum, 1995) are routinely ignored by management and are hardly enforced by government. In spite of their importance, these factors have received little attention in RMG safety study. Moreover, RMG safety study provides very limited explanations regarding how to categorize different types of problems or how to reduce the possibility of errors and accidents.

So, keeping the above view in mind the present study was undertaken to find out the health and safety issues of the garments workers and to measure the extent of occupational health hazards in Garments industries. The study proposed suggestions to alleviate the chances of casualty in RMG factories.

**2. METHODOLOGY**

Our research was conducted in two small-sized garments company namely Sharot Apparels Ltd. and Riya Vision Garments Ltd. respectively. The study was conducted on 100 workers.

**(I) Selection of Samples**

A check-list was developed that included questions on: (1) Demography of the participants included questions such as gender, age, marital status, educational level, and experience. (2) OHS issues included questions regarding absenteeism and number of injuries. (3) Ergonomic issues included questions regarding health and safety such as back pain, musculoskeletal pain, headache, fatigue, and eye strain. (4) Environmental factors included questions on the perception of noise, dust, light, heat and humidity and (5) Safety and management issues included questions regarding worker training and motivation, awareness program, use of personal protective equipment (PPE) and OHS regulations. In purpose of making data collection easier, all the problems were distributed into four problem areas and then the employees were asked to respond which is the most critical problem in each problem area.

Check-lists were distributed to the workers of the participating garment industries. The objectives of survey, the content of the questionnaire, and how to complete it were explained by several well-trained investigators to all the workers before the survey. During the data collection, the investigators answered any queries raised by the workers. All the questionnaires were immediately checked for missing data or errors to ensure they were correctly completed.

**(II) Data Analysis**

To compare among problems, problem areas and correlation, an Analysis of Variance (ANOVA) test was conducted using

worker’s response as the independent variable. The step by step ANOVA procedure is given in Table 1

**Table 1: The step by step ANOVA procedure**

Step	Explanation
Set up the Hypothesis and Alternative	H <sub>0</sub> which means: $\mu_1=\mu_2=\mu_3=\mu_4$ the alternative, H <sub>1</sub> which means: $\mu_1\neq\mu_2\neq\mu_3\neq\mu_4$
Calculate Degrees of Freedom between and within groups	Degrees of Freedom between groups: $df_B = k-1$ Degree of Freedom within groups: $df_W = N-k$
Compute mean of each group	$\bar{X} = \frac{\sum Xi1}{Xn1}$
Compute Grand mean	$\bar{\bar{X}} = \frac{G}{N}$
Calculate Sum of square within groups	$SSW = \sum(X1 - \bar{X}1)^2 + (X2 - \bar{X}2)^2 + (X3 - \bar{X}3)^2 + \dots$
Calculate Sum of square total	$SST = \sum(X - \bar{X})^2$
Calculate Sum of square between groups	$SSB = SST - SSW$
Calculate Mean square between groups and within groups	$MSB = \frac{SSB}{dfB}$ , $MSW = \frac{SSW}{dfW}$
Calculate Mean square total or Error	$MST$ or Error = $MSW(\text{problem area}) + MSW(\text{problems})$
Calculate F	$F = \frac{MSB}{MST}$
Now, find out F <sub>critical</sub> from F-ratio table and compare it with the calculated F	If the calculated F value is equal or greater than the F <sub>critical</sub> value, then the null Hypothesis is rejected, otherwise accept it.

**3. RESULTS AND DISCUSSION**

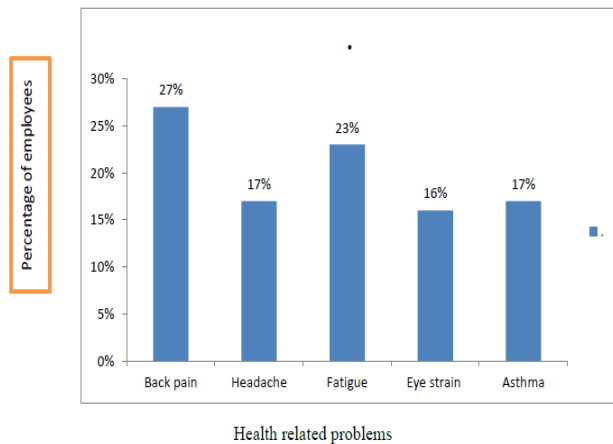
The data were inserted from the check sheets of employees in which their responses were received. Analysis indicated that specific problems exist in most of the garments’ company. They included (1) employees: back pains, headache, upper body pain, hand and wrist pain, eye strain and fatigue; (2) work and workplace design: manual materials handling, hand tools, machines and workstations; (3) environment: heat, humidity, light, noise and dust; and (4) ergonomics: OHS programs, ergonomic knowledge, task analysis and hazard analysis. Table 2 shows the demographic characteristics of the employees. The number of employees was 100 in two participating garments companies. Majority of the employees were local and comprised 73% are female of the total employees. Communication was conducted in ‘Bangla’ language.

**Table 2: Demography characteristics of the employees**

Demography characteristics of the employees:		Number	Percentage
Gender	Male	27	27
	Female	73	73
Marital Status	Married	36	36
	Unmarried	56	56
	Other	8	8
Education Level	Primary or below	21	21
	SSC or below	79	79
	HSC or higher	0	0

**(I) Employee health complaints**

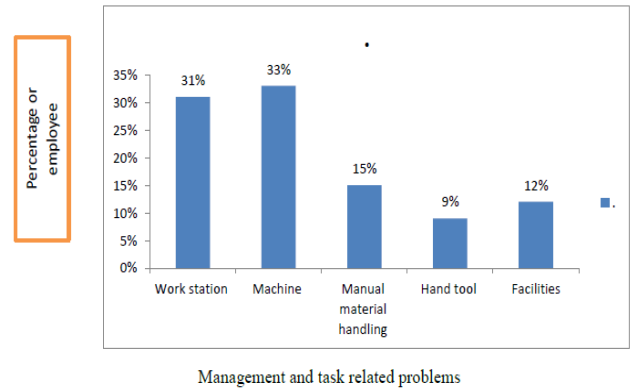
Figure 1 shows the employees’ health related complaints received. Twenty-seven percent employees complained of back pain while 17% received complaints of headache and 23% of fatigue and 16% of eye strain, respectively. Employee asthma was reported in 17%. These are clear indications of OHS deficiencies in the employees survey. Analysis of the number of complaints or injuries and severity of injuries per worker in each category was beyond the scope of this research as these statistics were not available with the managers.



**Figure 1: Some major employee complaints**

**(II) Task and management related problems**

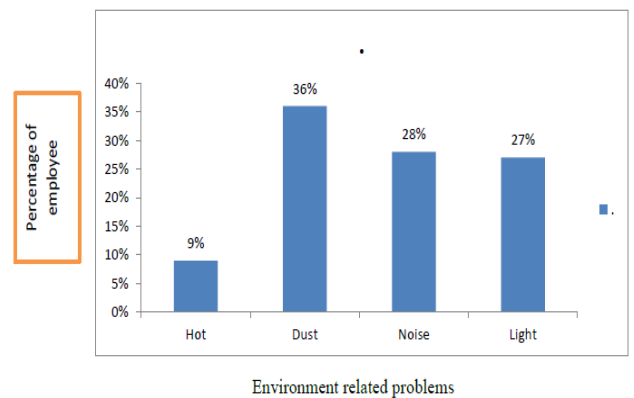
With regard to tasks and management related problem area (Figure 2), 31% of the employee survey indicated that they have inadequate work station design, 33% reported on problems with machine, 9% of the employee reported problems with hand tools, 15% with manual materials handling & 12% reported lack or facilities. These indicated that managers consider their employees have well-maintained tools and equipment. Hand tool was not considered a major problem as the worker perhaps unable to recognize this as a source of back pain.



**Figure 2: Problems related to task and management**

**(III) Environmental problems**

There was a clear evidence of environmental problems in the participating employees. Figure 3 shows the major environmental problems. Noise and dust environmental conditions appeared to be a major concern. 9% of the employees indicated that they have problems with hot and humid conditions, 36% with dust and 28% on high noise levels, while 27% complained of light. However, they showed the standard level of magnitude also responsible for environmental problem. There are specific company policies regarding exposure to noise levels, heat, manual handling and toxic chemicals. For example, the noise level standard for 8 h exposure is 85 dBA. There were a limited number of inspectors responsible for OHS.



**Figure 3: Major environmental problems**

**(IV) OHS and Ergonomics related problems**

Figure 4 indicates that most of the employee (48%) pointed out lack of hazard analysis and OSH & ergonomic knowledge (35%). However, only 17% indicated problems in task analysis. Some of the managers implied that they comply with OHS regulations of the government and the company. More emphasis was placed on office environment and design. Since it is a requirement to provide a safe workplace, ergonomic is needed to be considered in all work and facilities design. The results indicated that OSH was not widely applied in the workplaces. This is probably due to lack of awareness, and communication and resource constraints.

Ergonomics and OHS are the responsibility of both staff and management. If managers have lack of knowledge in OSH & ergonomics and staff were not trained in ergonomics & OSH they would not be able to implement it. Although managers are not expected to be specialist in ergonomics, they should, in order to improve health and safety in their units, have at least a working knowledge of ergonomics and be able to implement it.

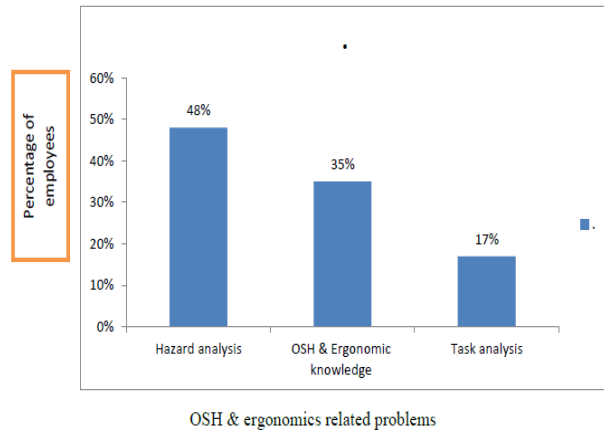


Figure 4: Problems related to Ergonomic and safety issues

(V) Problem Comparison and Correlation Test

The ANOVA (Analysis of Variance) test is conducted to find if there was any significant difference among problem areas and problems. Data used in ANOVA was collected from employees through a survey and grouped into four criteria according to the problems. First, ANOVA test was done for problem areas (Table 3) and then for problems (table 4). Here, ANOVA test was conducted in one way and all calculations was done by Microsoft Excel sheet. The summary of ANOVA result is given in Table 5.

Table 3: Data Table for Problem Areas

Problem Area	Sharot Apparels Ltd.	Riya Vision Garments Ltd.
Employee Health	51	49
Task and Management	49	51
Environment	57	43
OHS and Ergonomics	48	52

To compare among problems and problem areas, ANOVA was conducted using employee response as the independent variable. The four problem areas and one in ergonomics, two in safety and two health related attributes as defined below (table 6) were considered as the main effects (factors) in the analysis.

Table 4: Data Table for Problems

Problems	Sharot Apparels Ltd.	Riya Vision Garments Ltd.
Back pain	12	15
Headache	9	8
Fatigue	15	8
Eye Strain	7	9
Asthma	8	9
Work Station	17	14
Machine	16	17
Manual Material Handling	7	8
Hand tool	4	5
Facilities	5	7
Heat	4	5
Dust	17	19
Noise	20	8
Light	16	11
Hazard Analysis	23	25
OHS and Ergonomic knowledge	16	19
Task Analysis	9	8

Table 5: Summary of ANOVA test

Source	df	MS	F	F critical
Problem area	1	12.5	0.25	5.99
Problem	1	2.941	.06	4.15
Error	38	49.84		
Total	40			

Table 6: problem areas, ergonomics, safety and health related attributes

Problem area	Explanation
Worker health (WH)	Problems related to WH, such as complaints of back pain, upper body or neck pain, hand and wrist pain, headache, fatigue, stress, and dissatisfaction
Work and facility (WF)	Problems related to WF, such as manual materials handling, hand tools, machines, workstations, workers, worker motivation, facility and resources, and worker training
Environment (ENV)	Problems related to environment, such as heat, noise, light and dust
Safety assessment (SA)	Ergonomics and safety assessment attributes related to assessments, such as ergonomics assessment, hazard analysis, task analysis, OHS standards
Ergonomics knowledge (EK)	Ergonomics and safety attributes related to know-how in ergonomics, such as EK, OHS regulations

The ANOVA result revealed that there is no significant difference in problem areas and problems between both the companies, comparing with the Fcritical values as shown in Table 5. The results indicated that there was a significant difference among the problem areas and problems of different employee. In other words, the employee did not have the

same level of problems in terms of WH, WF, environment, and ergonomics, health and safety related attributes. The results also showed that there were highly relationship among WH, work and facilities, environment and ergonomics, health and safety related attributes.

Finally, it can be concluded that poor environmental conditions; especially dust was common in the working areas. 36% of the employees reported on dust while 28% reported on noisy conditions (>85 dBA) and 27% on insufficient lighting. There was a little influence of heat on environment as only 9% reported on this. These hostile environmental conditions would intensify employee's health hazards. Back pain and fatigue were two important concerns for the employees. 27% of the employees reported on back pain and 23% on fatigue while 17%, 16% and 17% complained about headache, eye strain and asthma respectively. These indicated that there were significant ergonomic absences in the work system. Poor workstation design and unsafe or improper machine condition are mostly responsible for task related hazards. 31% of the employees reported on poor workstation design and 33% on improper machine condition. 15% of the employees blamed manual material handling for task related problems while only 9% thought hand tool responsible as there was a limited use of hand tools in the participating garments industries. These evidenced that there were serious lacks in workstation design, layout, machine maintenance and material transports. 12% of the employees reported that there was a lack of workers facilities. They said that they were provided with unhealthy & insufficient foods, impure drinking water, low wage, no job security and long working hour so they struggled to lead their personal life. The rule of 8 hours working day was very often violated and overtime has become a trend. Sometimes the workers had to work for 12 to 14 hours. All of these showed that the management put less priority on workers facilities. Lack of hazard and task analysis was noticeable among the participating garments industries. 48% and 17% of the employees reported that there was lack of hazard and task analysis respectively. They mentioned the absence of wide fire doors, enough ventilation and personal protective equipment (PPE). Besides, there was no fire tracking system in both the industries.

During the conversations with the employees of the participating garments industries, it was evident that there was a clear lack of OHS and ergonomic knowledge among them. 35% of the employees reported that they had no OHS and ergonomic knowledge.

#### 4. RECOMMENDATIONS

##### (I) Recommendations for All Purpose:

Drawn from the research findings, following are the recommendations:

➤ Management should aware of OSH and the prevention of accident through safety standard design of work place. Information about hazard should be made available to industries.

➤ Occupational diseases and accidents should be reported to the higher level by the lower level instantly.

➤ The workplace and work design should be carried out using ergonomic guidelines, acts and recommendations considering the user population. The environment must be given adequate consideration.

➤ Safety supervision (SS) should be done. Supervisors could increase safety initiatives among employees by inspiring safety and improving PPE use, and they can also increase employees' safety compliance by using safety monitoring. It is necessary for higher-level managers to strengthen supervision and promote safe behaviour.

➤ Co-worker support (CS) is also an important dimension of safety climate. If an employee perceives that his/her co-workers are concerned about safety, the whole group tends to practice safe behaviour.

➤ Protective gloves should be used during fabric cutting.

➤ Length of working hours should be according to the labour law (8 hours).

➤ Overtimes should be minimized. Shift work could be a solution for this.

➤ According to OSHA, for 8 hours work shift noise level should be 85dB or below. Once the average noise level in the workplace exceeds 90 dB, the company is required to redesign the work area to minimize noise as much as possible.

➤ Proper use of ergonomics in working postures is needed.

➤ Self-acting machineries could be useful in order to minimize machine related injuries.

➤ All machines, tools and equipment need to be properly and regularly maintained.

➤ Precautions against dangerous fumes and gas need to be taken.

➤ Dust is the main cause of asthma in garment industries. Using dust protecting mask this health problem could be minimized.

➤ Excessive and inadequate lighting can result in eye strain and headaches. The workspace should be ergonomically arranged to avoid this health hazard.

➤ All emergency exit routes must be lightened so that an employee can see to exit. This lighting must function even if there is a power failure.

➤ Light switches must be well away from moving machinery or any other potential hazard.

➤ Cranes and other lifting machineries, such as pressure plant, hoist & lift, etc. are required to reduce manual material handling.

➤ Periodical medical examination is required for persons engaged in hazardous operations.

➤ The presence of Management Commitment (MC) is needed, because it has an indirect effect on occupational injury. When, top management is committed to safety, they would set goals for safe production, establish an occupational safety management organization, increase communication and response, and provide enough support and resources for safety activities. All of these measures help increase safety behaviour.

➤ Strategies should be conveyed and implemented in order to introduce OSH systematically through safety programs in the garments' industry to improve worker productivity, safety and health and environment.

## **(II) Training:**

• Employees need to be trained properly in order to improve not only safety hazard condition but also employee's health. This would be beneficial to both employees and management.

• Develop and build up organizational capacity to provide education and training to the employees, related to OHS.

• Qualified OHS personnel, such as Occupational physicians, Occupational nurses, Safety officers and Industrial hygienist, should be produced.

• Training needs to be arranged to update knowledge on OHS and Ergonomics.

## **(III) Fire:**

Most of the fire accidents in garment industries are caused by unplanned work environment, disorganized workers, electric short circuit, faulty electrical wiring, smoking materials, etc. Some solutions for these are the following:

• Proper electric wires should be used in building wiring to avoid fire occurrence due to short circuit.

• Regular monitoring of electric wires and connections should be done in order to find out whether there is any possibility of accidents.

• Regular fire drills should be held, minimum twice in a year.

• Sufficient widen fire exit doors and enough ventilation with proper maintenance for air circulation should be designed for industry building.

• Proper exit sign and safety sign should be located in appropriate areas of the industry.

• All the buildings of garment industries should have proper announcement system or fire alarms in order to inform all the workers about any safety hazard while it happens and to instruct them what to do.

• Each company should have their own fire fighters to handle small fire problems, because small fire problems could turn into bigger fire hazards. These fire fighters get appointed as regular employees and along with serve as fire fighters as per necessity.

## **(IV) Worker Facilities**

➤ All employees should be provided with eating place, washing facilities, rest room, and child room.

➤ There should be adequate toilets and supply of pure drinking water for the workers.

➤ There should be a dispensary handled by a medical practitioner for each unit employing 500 or more workers.

➤ Sufficient first-aid facilities should be available.

## **(V) Recommendations to the factory owners**

**(VI)** Every factory owner should follow the Bangladesh National Building Code and fire safety guidelines properly in the construction of factory buildings. Form a participatory fire safety committee and implement Occupational Health and Safety (OHS) committee in each floor, give them proper training and keep it active.

**(VII)** Ensure availability of fire defence materials in each floor of the institution and use of these when are needed.

**(VIII)** Increase the number of safety inspectors.

**(IX)** Increase the frequency of inspections and ensure proper inspection, monitoring and observance in workplaces.

**(X)** Exit paths must be sufficient for the number of workers working in the factory and must remain unblocked all the time. Factory gates should be kept unlocked whenever workers are staying in the building.

**(XI)** Provide long-term compensation to the families of the workers who are killed or permanently disabled because of workplace accidents.

**(XII)** Provide free medication to the employees who are either injured or ill due to unhealthy and hazardous work environment.

**(XIII)** Fix the wages based on living standard.

## **(VI) Recommendations to the government:**

➤ Properly implement Bangladesh Labour Law and other relevant laws in all garment factories.

➤ Conduct a review of building and fire safety standards and rules for RMG industries, and develop benchmarks for compliance.

➤ Set up a high-level investigative committee to conduct inquiries into accidents at factories involving worker fatalities or multiple serious injuries.

➤ Force the owners and managements to follow labour laws and OHS standards.

➤ Pursue all applicable criminal charges against the employer in the case of negligence.

**(VII) Recommendations to BGMEA /BKMEA**

- Ensure that BGMEA/BKMEA members are fully informed in regard to safety standards.
- Publish, on a quarterly basis, a list of all factories that do not meet the standards and revoke the export license and BGMEA/BKMEA membership of each factory on this list until compliance is confirmed
- Cooperate with investigations into the root causes of the accident and push for any improvements recommended as a result.

**4. CONCLUSIONS**

The current study presented occupational health hazards and safety threats of RMG sector in Bangladesh. The paper developed different causes of health hazard and safety related problems and presented an empirical case study that explored the work and safety practices of RMG sector. The study found that back pain was the most threatening among the health related problems while dust, machine hazard and lack of hazard analysis were most threatening among environment, task & management and OHS & ergonomics related problems respectively. At management level the occupational health and safety awareness was not very high of RMG sector in Bangladesh. There was a clear lack of OHS and ergonomic knowledge among the worker as well as garments owner. The study also recommended a set of strategies that focused on preventing health and safety related problems. The findings indicated that the strategies used to prevent production errors also appear to reduce the likelihood of accidents those are important considerations for both productivity and safety. Finally, some recommendations were proposed to factory owners, government and BKMEA/BGMEA for improving awful conditions of RMG sector of Bangladesh.

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