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A study on minimization of injury and accidental causes in cutting, sewing and finishing units of RMG industries

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ABSTRACT

The primary objective of this study is firstly to investigate the industrial accident in readymade garments (RMG) industries and find out the ways how these risk of injuries and accidents can be mitigate by implementing safety rules and suggestions. The paper discusses in brief the risk of injury and accidental causes of workers in various sections like cutting, sewing and finishing units of RMG industries based upon the industrial environment and working conditions. The sample respondents were selected from the different industries in Tangail district. Purposive sampling technique was followed for data collection, where different level of respondents was interviewed for collecting information from two selective garments industry. After analyzing the collected data ,the major accidental causes and injuries faced by the workers in those selective units were indicated for which there have been noticed a massive fall down of workers efficiency. Indicating those problems, improvement proposals were given to those industries and were implemented over a course of three month. From the proposed improvement proposal, it has been found that the rate of injury and accidental risks have been decreased far better than before and almost all risks can be properly controlled if the managing as well as responsible parties try to follow the risk controlling technique properly.

Keywords: RMG, Industrial accident, Working environment, Health hazard, Safety measures.

1. Introduction

Accidents and injury in an industry endanger the safety of workers, adversely affect livelihood of their workers and their families, and those living in the vicinity of the industry. Thousands of people are killed and injured in industrial accidents every year. According to the ILO, occupational accidents and work-related diseases cause over 2.3 million fatalities annually, of which over 350,000 are caused by occupational accidents. These result in immeasurable human sufferings and major economic losses for entrepreneurs and economies as a whole; around 4 percent of the world's gross domestic product (GDP), or about US$2.8 trillion, is lost annually in direct and indirect costs. [1]

Different industrial hazards resulted in several initiatives worldwide to protect human life and reduce material damage from industrial accidents, both nationally and internationally without workplace safety compliance, it is almost impossible to ensure business sustainability and to survive in global Competitive market. Recent accidents around the world have highlighted the potential hazards inherent in many industrial operations.

In fact, all the garment factories of Bangladesh are located in the commercial area of Dhaka, Chittagong, Narayangonj, Gazipur, Savar etc. Besides, most of the garment factories hardly comply with safety rules. The occupational health and safety condition of the workers belonged to the industry, is getting more critical and complicated gradually.

Action should be undertaken to prevent the occurrence of such accidents through the introduction of safer process technologies, the improved performance of safety devices, and by the reduction of human error.

The most effective accident and disease prevention begins when work processes are still in the design stage, when safe conditions can be built into the work process. [2] In order to develop a successful health and safety program, there should be strong management commitment and worker participation in the effort to maintain a safe and healthy workplace.

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2. Material and methodology

2.1. Materials

In this project work, the usage of various types of materials like tools and machineries from different sections of the factory are briefly discussed below:

2.1.1. Cutting unit:

- Straight Knife Cutting Machine;
- Band Knife Cutting Machine;
- Round Knife Cutting Machine.

2.1.2. Sewing unit:

- Plain machine;
- Flat lock machine;
- Kansai machine;
- Bar tack machine;
- Button holing machine;
- Feed off the arm.

2.1.3. Finishing unit:

Different types of chemicals are used in the finishing unit such as acid, alkali, adhesives, cleaning solvents etc.

2.2. Method:

The legal requirement for risk evaluation or assessment applies to all employers. The process for carrying out a risk assessment can be broken down into a series of steps:

Conducting primary survey**:** This research is based on output from primary data from the respondents through a sample survey with the help of interview schedule. The data collection included questionnaire survey and focus group discussion.

Data collection: From the month of December to January 2017 the data were collected. The questionnaires were asked systematically and recorded directly on the schedule. The data has been monitored and reviewed at regular intervals.

Identifying hazards which are at risk: Risk assessment is the first step to successful risk management. Looking for the hazards and risks those have the potential to cause harm, and identifying workers who may be exposed to the hazards. Using workers' knowledge helps to ensure hazards are spotted and workable solutions implemented.

Evaluating and prioritizing risks: Evaluation of how likely the hazard will lead to harm or injury and how severe that injury is likely to be. Considering what control measures are in place and whether they are sufficient. The focus for sustainable risk management was on collective protection and preventative measures.

Deciding on preventive action: Identifying the appropriate measures to eliminate or control the risks. Making list of the preventive measures needed in order of priority, then taking action, involving the workers and their representatives in the process.

3. Data analysis and findings

3.1. Risk analysis in cutting unit

3.1.1 Sources of risk in cutting unit

Cutting unit in textile industry produces a lot of injuries to the operators. It is a dusty work place as during cutting dust is produced. In cutting unit the following things were found that may cause injury to the operator.

A. Relaxation rack

Cutting units is the first section in readymade garments sector. The fabrics are received from fabric store. Then fabrics are kept for relaxation in big rack according to buyer requirements. The rack is usually used by steel which is very hard metal. These racks are placed in cutting floor. As a result it causes inflexible movement of worker.

B. Scissor problem

Scissor has sharp blade which is so risky for hand. When worker become unconscious they may cause injury in hand or other body organism. Even many of workers were injured by scissor. There are another risk occurred by scissor during using handle of scissor. It creates dark spot on skin. During observation it was noticed that maximum worker were suffered from those injury.

C. Leg injury by rubbing of floor

In garments industry the working hour is minimum 10 hour. During this long working time, they work in standing without shoes. As a result, feet are rubbed by floor and causes leg injury. During long working period, the worker can't use shoes, because shoes are not allowed

for them, it is only permitted for the superior.

D. Straight knife risk

Straight knife are used in cutting for extremely sharpen and the rpm of knife is 3600.It is higher risky for cutter men .They are sometimes injured by knife. Straight knife are based on plate, sometimes causes falling of machine, which also may causes injury. It is used electrically, which may cause shock. So the worker should use a special type of steel gloves in their hand.

E. Cutting dust

Another dangerous risk in cutting unit is dust. It is not possible to work in cutting unit without mask. Huge amount of dust are created during cutting and causes asthma, respiratory problem, several skin diseases, eye irritation, visibility problem etc.

F. Band knife machine

This cutting machine is high risky for operator. It has open sharp knife for cutting. It may create accident at any time if the operator doesn't use steel hand globes. Some operator uses this machine without globes, for which they suffer from dangerous accident.

Table 1 Injury caused in cutting unit in January, 2018

S.L	Types of injury	Causes of injury	Number 0f injury occurred
1	Hand injury	Band knife	5
2	Hand injury	Straight knife	2
3	Leg injury	Straight knife	3
4	Hand injury	Scissor	7
5	Leg injury	Rack	4
6	Respiratory problem	Dust	10
8	Foot injury	Floor rubbing	15

3.1.2 Recommendation of Preventive action for minimizing risk in cutting unit:

- Danger areas should be clearly marked and access restricted by barriers, especially at cutting tables.
- Warning signals should be fitted to indicate when blade is in motion on motorized and automatic cutting tables.
- Trip guards or other devices in operation should be used to prevent access where lay- up machines is in use.
- Machines should be fitted with automatic adjustable guards to cover the exposed part of the cutting blade.
- Make sure those electrical conductors in good condition. Five-finger chain mail gloves should be available for use that fit all operators and worn at all times during cutting work and when handling blades.
- Regularly check the condition of the light, guard and table fittings.
- Put an effective cleaning system in operation that prevents buildup of fluff, fly and off cuts.
- Old blades should be disposed of in a safe manner that precludes their use as DIY hand.
- Documentation of a safe system of work for changing and disposing of cutter blades.

Table 2 Injury caused in cutting unit April, 2018

S.L	Types of injury	Causes of injury	Number 0f injury occurred
1	Hand injury	Band knife	3
2	Hand injury	Straight knife	0
3	Leg injury	Straight knife	1
4	Hand injury	Scissor	4
5	Leg injury	Rack	2
6	Respiratory problem	Dust	8
8	Foot injury	Floor rubbing	4

3.2. Risk analysis of sewing and finishing unit

3.2.1. Source of risk

A. Plain sewing machine

The needles used in plain machine can injure the worker's body or eye.

B. Flat-lock and over-lock machine

If the worker do not use mask, the dust can enter into the lung and can cause diseases like asthma, lung cancer, bronchitis etc.

C. Button holing, button stitch, snap button, button attach machine

During working needle or button can be entered into the eye or body. Finger can be contused.

D. Other problems

If there is loose connection of electricity, fire accident may be occurred.

3.2.2. Risk in sewing and finishing unit

A. Hearing problem

In sewing unit, large number of machines is run together at a time that creates inflatable noise pollution. It is very difficult to sustain such places and this creates mentally disorder to the worker and causes headache, hearing problem. Most of the worker is suffering from varieties diseases such as brain disorder, nerve problem, mentally pressure etc.

B. Mentally disorder

Operators have a target of production per day if they can't fill up their target, their superior abuse them roughly. As a result they suffer from mentally disorder problem and misbehavior with their family. Due to lower space, the condition of sewing floor in our garment industry is very poor and critical. That is highly risky for everyone unhesitatingly.

C. Musculoskeletal disorders

Musculoskeletal disorders (MSDs) are the most common work-related health problem in Europe, with almost one in four workers reporting backache and one in five complaining of muscular pains. Manual handling, the lifting, holding, putting down, pushing, pulling, carrying or movement of a load, is the largest cause of injury in the textiles sector. Manual handling can cause either cumulative disorder from the gradual deterioration of the musculoskeletal system, such as lower back pain, or acute trauma such as cuts or fractures due to accidents.

In the textiles sector, risk factors for MSDs include:

- Working in awkward postures, such as during sewing, cutting, product control, and packaging.
- Repetitive movements, such as during turning, cutting, product control, and packaging.
- Fatigue from manual handling, during the storage, inspection, treatment, shipping, finishing, and checking of garments. [3]

D. Exposure to dusts and fibers

The exposure of workers to dusts from material such as silk, cotton, wool, flax, hemp, sisal, and polyester can occur during weaving, cutting, sewing, and packaging. Division of tasks along gender lines may mean that women are exposed to organic dusts more than men, with respiratory nasal or bladder cancer.

Table 3 Injury caused in sewing and finishing unit January, 2018

Types of injury		Causes of injury	Number of injury
1	Asthma	Dust	13
2	Bronchitis	Dust	1
3	Finger injury	Needle	16
4	Eye injury	Needle	1
5	Respiratory problem	Dust	17
6	Hand burn	Ironing	8
7	Eye irritation	Chemicals in spot removal	2
8	Hand burn	Chemicals in spot removal	1
9	Hearing problem	Noise	13
10	Mental problem	Abuse	10

3.2.3. Recommendation for minimizing risk in sewing and finishing unit:

- Use of needle guard and eye guard in working.
- Machine safety cover such as pulley cover and up and down belt cover should be used.
- Test the electric connection before starting work with machines.
- Use rubber mat & musk during checking electric tools.
- Minimum distance should be kept among operator for flexible working.
- The superior shouldn't abuse with worker and help worker to understand them.
- Measures must be taken to ensure that working areas do not pose a contamination risk to the rest of the side.
- There must be a planned preventive maintenance program that covers all

equipment critical to safety, legality and quality, which is fully implemented. [4]

- Repairs to or servicing of equipment must be completed by site mechanics, approved contractors or the equipment manufacturer.
- Risk assessments must be completed prior to work commencing to ensure a product and packaging is not put at risk.
- Tools and parts must be controlled. A system must highlight and initiate and investigation if a tool or part is missing.

Table 4 Injury caused in sewing and finishing unit April, 2018

Types of injury		Causes of injury	Number of injury
1	Asthma	Dust	9
2	Bronchitis	Dust	0
3	Finger injury	Needle	8
4	Eye injury	Needle	0
5	Respiratory problem	Dust	13
6	Hand burn	Ironing	5
7	Eye irritation	Chemicals in spot removal	0
8	Hand burn	Chemicals in spot removal	1
9	Hearing problem	Noise	13
10	Mental problem	Abuse	6

4. Results and discussion

4.1. Cutting unit

4.1.1 Injury occurred in cutting unit before implementation

In Southeast Limited, risk assessment was carried out on cutting unit. Before implementation, the injury level of the workers was collected, by monitoring and assessing the risk. The graphical representation of the injury occurred in the month of January, 2018 is shown below

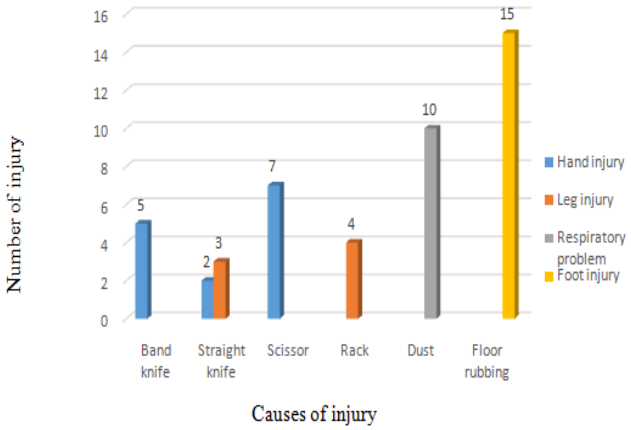

Fig.1 Injury of cutting unit in January, 2018

4.1.2 Injury minimization in cutting unit after implementation

After the injury assessment, suggestions were given to them to overcome these problems. The graphical representation of the injury in April, 2018 which shows a rapid change after implementation is given below:

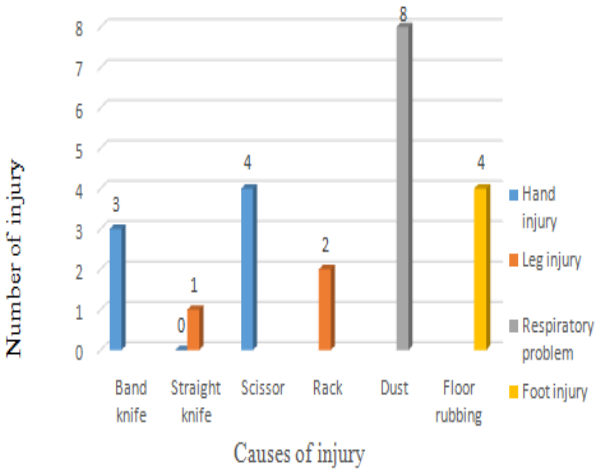

Fig.2 Injury minimization of cutting unit in April, 2018

4.1.3. Comparison of injuries among three months

Rapid change was found in result and the number of risk is dramatically reduced. Commencement of activities was firstly on cutting unit and satisfactory result was found. Here the reduction in injury is shown:

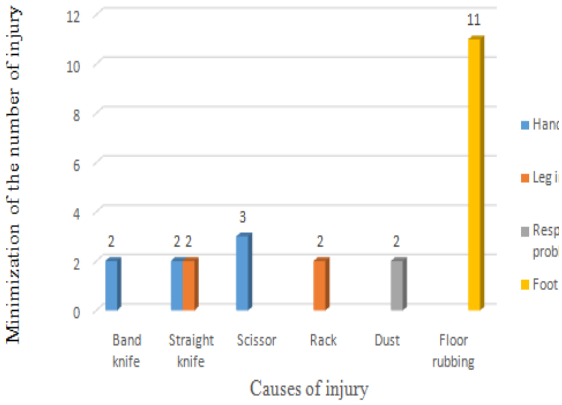

Fig.3 Injury minimized in cutting unit

4.2. Sewing and finishing unit

4.2.1 Injury occurred in sewing and finishing unit before implementation

In Southeast Limited, before implementation, the injury level of the workers were collected, by monitoring and assessing the risk .The graphical representation of the injury occurred in the month of January, 2018 is shown below:

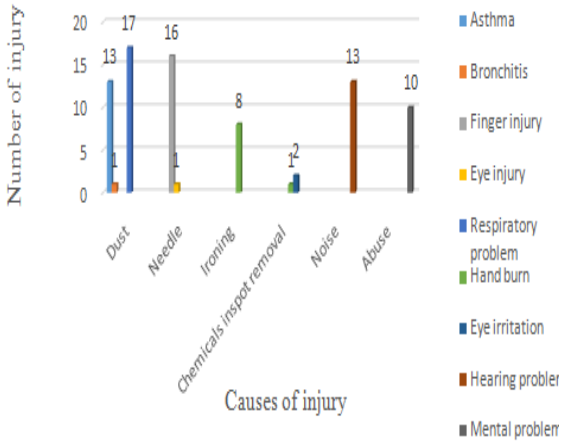

Fig.4 Injury of sewing and finishing unit in January, 2018

4.2.2. Injury minimization in sewing and finishing unit after implementation

After the injury assessment, suggestions were given to the selected industries to overcome these problems. The graphical representation of the injury in April, 2018 which shows a rapid change after implementation is given below:

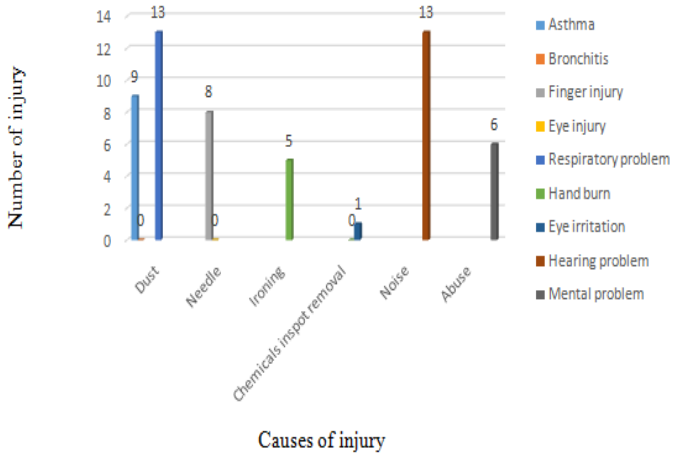

Fig.5 Injury of sewing and finishing unit in April, 2018

4.2.3. Comparison of injuries among three months

Rapid change was found in result and the number of risk is dramatically reduced. Commencement of activities was firstly on cutting unit and satisfactory result was found. Here the reduction in injury is shown:

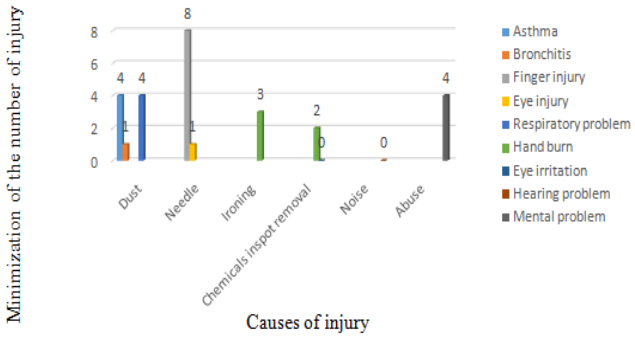

Fig. 6 Injury minimized in sewing and finishing unit

5. Conclusion

Risk of accidental causes and injury in readymade sectors are burning topic in the economy of Bangladesh from the last two decades. Being strength of national economy, still risk and accidental injuries are the main responsible hindrance for the development of fast growing RMG sectors in Bangladesh. In this study, the main purpose was to resolve the identified risks to increase company's productivity. The risk factors found should be controlled immediately in order to increase the

positive view and profitability. In order to fulfill the purpose of this study, risk management technique and regulation should be followed by the proper authority so that we can make a positive view of RMG industry to the buyer of foreign countries.

6. REFERENCES

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