

Scope of Injury Minimization in Garments Industry: An Analysis

Sadia Mehrin, Md. Razib Sheikh*, Md. Yousuf Ali, Mohammad Mahmudur Rahman Khan, Nurul Ebne Alam, Md. Mafizul Rahman

Department of Textile Engineering, Bangladesh University of Business and Technology, Dhaka, Bangladesh
Email: *razibsheikh@bubt.edu.bd

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Abstract

Injury and accidents have a lot of negative impacts in an organization, especially in a manufacturing industry. Injury is a hindrance to productivity as it harms the lead time of the production. Additionally, reputation and development of an industry get destroyed as it directly related to manpower and product or service. Previously in garments industry of Bangladesh, a lot of injury happened almost every year due to infrastructural problem as well as various hazards in the production floor. The number of these accidents has been reduced to a great extent at present. The injury must be minimized to provide safe working environment, to ensure compliance issues and to retain the orders in Readymade Garments (RMG) industry. In our paper, it was attempted to minimize the injury in some selective sections of a garments industry. The total number of injuries occurred in those sections for a specific month was collected. After analyzing the collected data, the major causes of accidents and injuries faced by the workers in those sections were pointed out. The possible causes were then solved by taking proper actions and the data against same criteria was analyzed for the consecutive month. Finally, after achieving positive results, related preventive recommendations were framed out and given to the industry for injury minimization in future.

Keywords

Injury, Minimization, Accidents, Section, Garments

1. Introduction

Accidents and injury severely jeopardize the safety and security of workers in an industry. Besides it negatively impacts the livelihood of the manpower and their families. Many people are killed and injured in industrial accidents each year. The occupational accidents and work-related diseases cause over 2.3 million fa-

talities annually, of which over 350,000 are caused by occupational accidents according to the information of the International Labor Organization (ILO), which results 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]. Workplace hazard not only reduces the productivity of an industry but also results in low quality production. Product cost is also increased for these hazards [2].

Without maintaining workplace safety compliance issues both nationally and internationally, it is quite impossible to secure the sustainability of any business and survive in global competitive market. It is necessary for employers and workers to be aware of the hazards associated with garment manufacturing industry and take precautions to safeguard against work-related illnesses and injuries.

A study revealed that the physical injuries in industrial workers were ranging from moderate to high in severity whereas injuries indicated that the fingers of the upper extremity accounted for highest number of accidents and the majority of accidents in case of lower extremity were on the foot, toe at first and then on leg.

Working in such places where everyday noise exposure is above 89 dB is significantly hazardous for those people who are suffering from mild noise induced hearing loss. Some common features of industries are inappropriate design of workplace, mismatch between job target and workers capabilities, unsuitable environment etc.

Background Study

Several studies have been done on the topic about minimization of injury and accident occurred in garments industry.

Here in this research work, it has been tried to know the safety of the workers through the risk analysis of the industries, try to determine why accidents and illnesses occur during staff work and try to find out if the production will increase if the injuries are minimized. If the injury can be minimized, then the loss of time will be less. Appropriate care should be taken so that the workers can work attentively without being anxious about their work.

It is possible to give full safety to the workers through injury minimization by risk analysis. Injury minimization through risk analysis will reduce workers illnesses and accidents, increase industry productivity and reduce time loss. Workers job satisfaction will be increased through injury minimization through risk analysis. Risk analysis will increase the quality of production by minimizing injury.

This study shows that female workers in the RMG sector face a high risk of health-related problems. Both government and NGO need to contribute for these women to protect them from the health risks [3].

The study is carried out within the framework of a project on analyzing the problems and providing recommendation for the development of the whole scenario. The total number of injuries of operators of various sections for different months was analyzed. The possible reasons for the injury and accidents were discussed with management to minimize the risk throughout the study [4].

This thesis aims to provide strong analysis for finding the reasons behind the injury and accidents, reducing the scope of injury and improving the working condition of the garment industry.

2. Literature Review

2.1. Injury

An injury is a general term that refers to harm caused by accidents, falls, hits, weapons, and many more. Wounds are injuries that break the skin or other body tissues [5].

2.1.1. Types of Injuries

Acute injury is defined as an injury that occurred during the last five days as a result of a single traumatic event. Overuse injuries are subtle and develop over time, making them difficult to diagnose and treat. Chronic is the state of presence of anything for at least three months [5].

2.1.2. Causes of Injury

Burns (thermal or electrical), overuse and repetitive motion injuries, poisonings and chemical exposures, dust, ironing, and floor rubbing are all common causes of damage.

2.2. Hazards in Industry and Safety Measures

Various types of sewing machineries are used in the garment industry. Thus, it is very important to have a clear understanding about the health and safety measures during operating the sewing machines. The operators must be trained and guided for using all the tools, equipment and machines. Safety measures and precautions are needed to be maintained during duty hour. It should be mandatory for the operator to follow the basic instruction of using machines, tools and equipment. First-aid kits, safety symbols/signs, fire extinguishers, and alarms are the most important safety measures in the manufacturing units.

The purpose of Occupational Health and Safety in textile industry is to promote health and safety issues to the workers in the industry by minimizing the causes of risk. The hazards and risk involved in the textile industry is comparatively higher than the other manufacturing industries but least importance are maintained in this sector. Most of the workers of this sector are unaware of health & safety issues which is actually their right in workplace as a compliance issue. It a matter of regret that authority does not always practice OHS in Textile industry which becomes a barrier in minimizing the risk of injury and accident [6].

2.3. Type of Hazards

Various types of hazards and risks are posed in various sections for the operators in textile industry. These threats are detrimental to the health and safety of people at the workplace. These may be chemical hazards, physical hazards, biological hazards etc.

2.3.1. Physical Hazards

Occupational hearing loss, postural abnormalities, falls, accidents, and other dangers affect many operators at the workstation. Some issues at work are tied to the surrounding environment, such as: excessive dust causes lung issues, allergies, and skin disorders, among other things. Appropriate ventilation, exhaust fans, and other measures can assist keep the atmosphere clean and dust-free. Operators suffer from eye difficulties as a result of the low light environment at their workstation and a lack of eye protection glasses [7].

2.3.2. Fire Hazards

They're frequent in sectors like cotton, chemicals, and others that employ a lot of combustible materials. Last 22 years 94.2% of accidents in the RMG sector of Bangladesh have been furnace accidents [8]. In 2012, Tazreen Fashion fire incident took at least 117 people's life and at least 200 people were injured [9]. The major reason for furnace incidents is electric-powered short circuits. Other considerable reasons are boiler explosion, transformer explosion, overheating, storage of flammable materials, canteen kitchen, etc. [8]. Fire incidents additionally came about due to an unplanned work environment, erroneous electrical wiring, disorganized employees and smoking materials. This kind of accident turns into greater devastating when the only fireplace exit is not unlocked. In some cases, there are no longer adequate fireplace exit doors and air flow systems in the building, occasionally smoke alarms no longer work in garment factories, and even some garment factories no longer have any fire or smoke alarm systems [10]. The following are the summery of main causes of fire hazards: Many industries lack fire and smoke alarm systems; fire and smoke alarm bells in industries do not work properly; and there is no adequate exit path or emergency staircase to reach a safe location. Fire extinguishers should be kept in every industry as a safety precaution, as should improper maintenance of fire exits or emergency staircases [7].

2.3.3. Psychological Hazards

This hazard occurs when the status of mental health and emotional well-being of the operators in an organization is not maintained properly. Many factors are responsible for the hazards such as feeling of job insecurity, long working hours, lack of enthusiasm towards work, frustration about being unable to deliver quality product, harassment at workplace etc. Various behavioral therapies like continuous counseling, meditation, participation in recreation centers, occupational care is effective in reducing sick leave days and poor work efficiency at the workplace [7].

2.3.4. Electrical Hazards

There is a high risk of electric hazards as high volt machines and other fire-prone equipment are being dealt here in the textile industry. Electrical accidents mostly occur when the staffs are working around electrical apparatus unconsciously thinking it is dead. Using the equipment in wrong way without maintaining the proper caution is one of the major causes of accidents. Faulty electrical equipment also results in accidents [7].

2.3.5. Building Collapse Hazards

Nowadays, building collapse is the most dangerous aspect of occupational death or injury in the RMG area of Bangladesh. It is very uncommon but more hazardous than a fire incident. From the years 1990 to 2016, 65 fire incidents induced only 395 deaths, whereas the collapse of two buildings brought about nearly 1196 deaths [11]. In 2013, Rana Plaza building collapse incident tolled 1134 people's life and rescued 2500 injured people from the building [12]. So, building collapse is a more alarming problem for occupational death or injury than any other motives. Some magnificent motives for building collapse are the vulnerable foundations or basement, harsh materials, plan problems, and immoderate load [11]. Other motives that reason building collapse consist of building extra floors by violating constructing plans, preserving heavy turbines or generators on the rooftop, undeliberate heavy machinery installations and the lack of safety and security measures [13].

2.4. Benefit of Injury Minimization

As a result of injury reduction, we can achieve organizational benefits such as increased worker safety, reduced production loss due to accidents, illness, and so on. Product quality has improved; compensation for accidents and illnesses has decreased; and so on. Reduce the risk of asset damage as a result of an accident; Increased job satisfaction and less worker fatigue [14].

2.5. Health and Safety Measures for Cutting & Sewing Machine Operator

Workers must be adequately and safely trained to handle and operate the sewing machine. When sewing, always concentrate on the machine and the materials; always use shields and protections when working with the machine's open moving parts; always wear correct footwear to avoid leg and foot harm. While operating the machine, the footwear should be ideal; the equipment should be simple and comfortable to handle and use; Operators should be given personal time off to rest [7].

2.5.1. Cutting Section

One of the most significant areas in the garment manufacturing sector is the cutting department. For cutting various portions of clothes, different knives are utilized. Both band knife and straight knife cutting machines might cause problems here. Danger zones should be properly identified, and access should be re-

stricted by barriers, especially at cutting tables, to avoid these hazards. Ascertain that the electrical conductor is in proper functioning order. Operators should have five-finger chain mail gloves on hand and should wear them at all times while cutting. Check the condition of the light, guard, and table fittings on a regular basis. Old blades should be disposed of properly in accordance with safety regulations [15].

2.5.2. Sewing Section

Sewing machines might pose a risk during garment construction. Workers should therefore, Use safety equipment such as an eye guard, needle guard, finger guard, and pulley cover. Needle guards should be fitted appropriately and used; To eliminate cords on the floor, electrical wiring must be provided from above. To remove dust and waste, utilize safe cleaning methods.

2.5.3. Sewing Machine Safety-Tips to Avoid Injury

The operators should follow the safety guidelines below. They should keep their fingers a safe distance from the needle, keep their hair out of the way, maintain complete concentration on their jobs, ensure that their pins and needles are in good working order, and use the proper equipment while being careful of electricity [16].

3. Materials and Methodology

3.1. Materials

To accomplish the project, the recorded documents of injury occurred in various section were collected from the authority which acted here as our required material. The documents of February, 2022 and March, 2022 were collected to complete further activities.

3.2. Methodology

The method we followed to complete our project work is mentioned in the below **Figure 1**.

4. Data Analysis

The number of injuries occurred in various sections in two successive months of February, 2022 (P) and March, 2022 (Q) and minimized number of injuries (R) has been shown through table in this chapter.

4.1. Cutting Section

In cutting section lots of injury occurs due to cutting equipment. The document collected analyzing the operators facing the post possible injuries from this section for two consecutive months in regular working hours is shown in **Table 1**.

4.2. Printing Section

In printing section, injury of the operator is mainly occurred due to unconscious



Figure 1. Method used to complete the project.

Table 1. Injury occurred and injury minimized in cutting section.

S.L No.	Types of injury	P	Q	R
A	Hand injury by Band knife	5	3	2
B	Hand injury by Straight knife	1	0	1
C	Leg injury by Straight knife	3	2	1
D	Hand injury by Scissor	6	5	1
E	Leg injury by Rack	4	2	2
F	Respiratory problem by Dust	11	8	3
G	Foot injury by floor rubbing	14	11	3

use of the printing screen and by the chemicals used in printing process. The document collected reviewing the operators with various possible reasons of injury from the section for two consecutive months in regular working hours is shown in **Table 2**.

4.3. Sewing Section

Sewing section is a very risky area where operators are frequently exposed to major or minor injury due to various reasons. The operations of the sewing operators were observed and document against the most common types of injuries collected from the section for two consecutive months in regular working hours is shown in **Table 3**.

4.4. Finishing Section

In finishing section, most of the injuries occurred due to unconscious use of chemicals. The document collected by observing the activities of the workers in regular working hours for two consecutive months in this section is shown in **Table 4**.

Table 2. Injury occurred and injury minimized in printing section.

S.L No.	Causes of injury	P	Q	R
A	Hand injury by screen frame	5	3	2
B	Eye irritation by chemicals	4	2	2
C	Asthma by odor	7	5	2
D	Hand injury by chemicals	4	3	1

Table 3. Injury occurred and injury minimized in sewing section.

S.L No.	Causes of injury	P	Q	R
A	Asthma by dust	13	9	4
B	Bronchitis by dust	1	1	0
C	Finger injury by needle	16	12	4
D	Eye injury by needle	1	0	1
E	Respiratory problem by dust	17	13	4
F	Hearing problem by noise	13	9	4

Table 4. Injury occurred and injury minimized in finishing section.

S.L No.	Causes of injury	P	Q	R
A	Hand burn by ironing	8	5	3
B	Eye irritation by Chemicals in spot removal	2	1	1
C	Hand burn by Chemicals in spot removal	1	0	1
D	Harassment problem by Abuse	10	7	3

4.5. Safety Satisfaction Level

After the implementation of our suggestion, we conducted a direct survey by voting method to evaluate ourselves and to find out the satisfaction level. Total 50 workers out of 550 workers and 10 supervisors from above mentioned sections participated in this survey. The result of vote is given in the following **Table 5**.

5. Result and Discussion

The number of injuries occurred in various sections in two successive months of February, 2022 and March, 2022 and minimized number of injuries has been shown in **Figure 2** through graphical representation in this chapter. In the graph, Y-axis is representing the number of injuries and X-axis is representing the causes of injuries.

The graph indicates that most of the injuries occurred in cutting section was accompanied by cutting machines and others were for dust from cut panel, foot rubbing and from rack. After implementing our recommendation, a number of injuries were minimized for almost all causes.

Table 5. Safety satisfaction level of our implementation.

Criteria of level	Rating of level	Vote against each level
Highly Satisfied (K)	5	0
Satisfied (L)	4	37
Satisfied but need to improve (M)	3	14
Dissatisfied (N)	2	9
Highly dissatisfied (O)	1	0

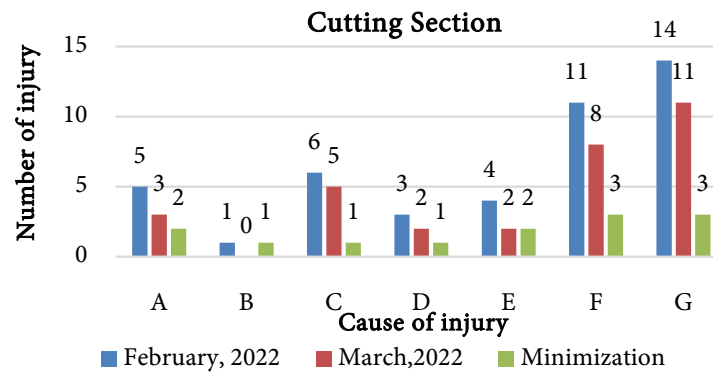


Figure 2. Injury occurred and injury minimized in cutting section.

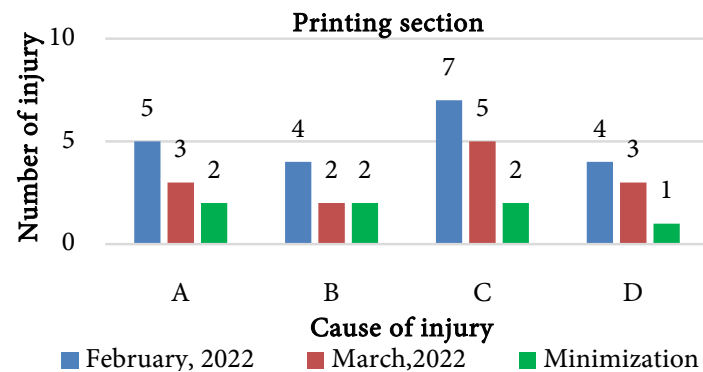


Figure 3. Injury occurred and injury minimized in printing section.

In **Figure 3**, the column chart implies that most of the injury causes in printing section is due to the chemicals and the screen used to complete the printing. After implementing our recommendation, injury minimized to a noticeable number.

The graphical representation of **Figure 4** shows the reasons of injury in the sewing section happen because of the needle, noise of the machine and the dust of the cut component. The number of injuries minimized to an extent after the implementation of provided recommendation.

From the graph of **Figure 5**, it can be noticed that in finishing section the possible causes of injury are ironing, chemical and abuse. Injury minimized to a notable amount after implying the recommendations.

From this graph of **Figure 6**, it can be noticed that no one was highly satisfied

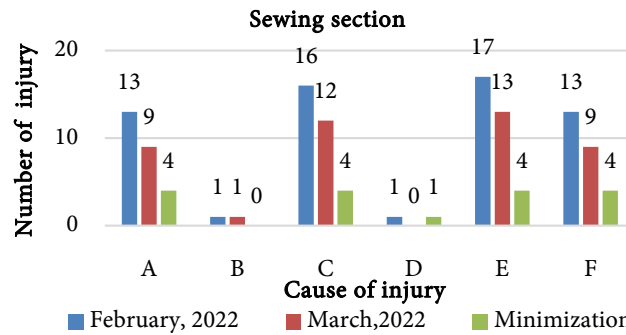


Figure 4. Injury occurred and injury minimized in sewing section.

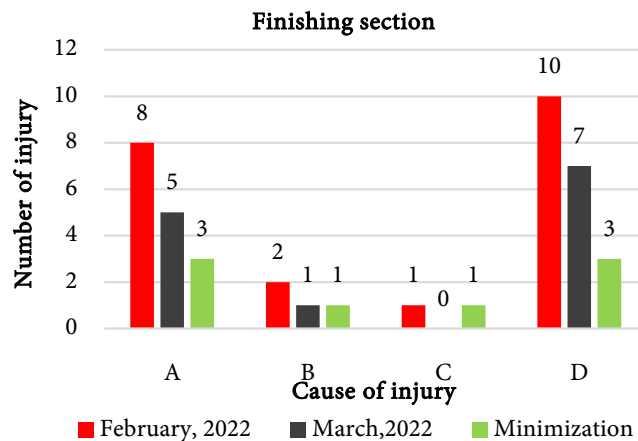


Figure 5. Injury occurred and injury minimized in finishing section.

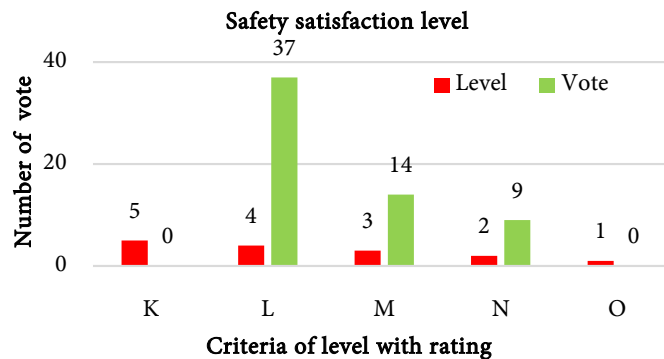


Figure 6. Safety satisfaction level of the work.

as well as dissatisfied with our work which was rated 5 and rated 1 respectively. 37 people were satisfied with our recommendation and the level was rated 4. At level 3, 14 people thought that our work was satisfactory but need further improvement. And 9 people were dissatisfied with our work which was rated 2. So, majority of the vote we received was 37 in number which expressed that most of the people were satisfied with our project work.

6. Conclusion

The paper mainly worked on risk analysis and injury minimization in the gar-

ment industry. There were level criteria including ratings are highly satisfied, dissatisfied, satisfied, highly dissatisfied, and satisfactory but need further improvement. Finding the risks and later working for injury minimization in each department, worker came to be the most satisfied. But data collection was limited due to lack of permission of authority and direct worker participation in limited time duration. RMG industry is the main strength of national economy but accidental injuries have great impact on the hindrance for the development of rapid growing readymade garments sectors in Bangladesh. The hazards and risk involved in the textile industry is much higher compared to other manufacturing industries but least importance is given here. Development of database and information system should be taken in account for minimizing the risk of injury and accidents. If a positive view of Readymade Garments industry to the whole world is wanted to be made, risk factors found must be controlled strictly and risk management techniques and regulations should be followed by the respective authority.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Parveen, I., Iqbal Mahmud, M., Kumar Mondol, A., Nelufa Akter, M. and Shil, S. (2019) A Study on Minimization of Injury and Accidental Causes in Different Operational Sections of RMG Industries in Bangladesh. *International Journal of Industrial and Manufacturing Systems Engineering*, **4**, 10-18.
<https://doi.org/10.11648/j.ijimse.20190401.13>
- [2] Khan, W.A., Mustaq, T. and Tabassum, A. (2014) Occupational Health, Safety and Risk Analysis. *International Journal of Scientific & Technology*, **3**, 1336-1346.
<https://www.ijset.net>
- [3] Akhter, S., Rutherford, S. and Chu, C. (2019) Exploring the System Capacity to Meet Occupational Health and Safety Needs: The Case of the Ready-Made Garment Industry in Bangladesh. *BMC Health Services Research*, **19**, Article No. 435.
<https://doi.org/10.1186/s12913-019-4291-y>
- [4] Ma, J.Y. (2014) Analysis on the Fire Risk Existing in the Storage of Textile Materials and Textile Goods. *Procedia Engineering*, **71**, 271-275.
<https://doi.org/10.1016/j.proeng.2014.04.039>
- [5] 3 Types of Athletic Injuries.
<https://ptandme.com/three-types-of-athletic-injuries-and-how-physical-therapy-helps>
- [6] Amin, Z., Mohammad, R., Abdul Aziz, S., Othman, N., Sultan Yahya Petra, J. and Lumpur, K. (2015) Workers' Safety Awareness Level on Hand Related Injury Accident in Metal Fabrication Industry. *Journal of Advanced Research in Applied Sciences and Engineering Technology*, **1**, 1-12.
- [7] Martinelli, K. (2019) Hazards in Industry and Safety Measures. National Council of Educational Research and Training, New Delhi, 3-6.
- [8] Hossain, M.F. (2016) Fire Hazard in Readymade Garment Factories and Its Impacts

- on Workers in Dhaka Metropolitan Area, Bangladesh. *Journal of the Asiatic Society of Bangladesh, Science*, **42**, 77-93. <https://doi.org/10.3329/jasbs.v42i1.31752>
- [9] Ahmed, F. (2012) At Least 117 Killed in Fire at Bangladeshi Clothing Factory. CNN.
- [10] Akhter, S., Salahuddin, A.F.M., Iqbal, M., Malek, A. and Jahan, N. (2010) Health and Occupational Safety for Female Workforce of Garment Industries in Bangladesh. *Journal of Mechanical Engineering*, **41**, 65-70. <https://doi.org/10.3329/jme.v41i1.5364>
- [11] Morshadul Hasan, M. and Mahmud, A. (2017) Risks Management of Ready-Made Garments Industry in Bangladesh. *International Research Journal of Business Studies*, **10**, 1-13. <https://doi.org/10.21632/irjbs.10.1.1-13>
- [12] Tansy, H. (2015) Reliving the Rana Plaza Factory Collapse: A History of Cities in 50 Buildings, Day 22. <https://www.theguardian.com/cities/2015/apr/23/rana-plaza-factory-collapse-history-cities-50-buildings>
- [13] Chowdhury, M.F. and Tanim, T.R. (2016) Industrial Accidents in Bangladesh Apparel Manufacturing Sector: An Analysis of the Two Most Deadliest Accidents in History. *Asian Journal of Social Sciences and Management Studies*, **3**, 115-126. <https://doi.org/10.20448/journal.500/2016.3.2/500.2.115.126>
- [14] Sobuj, K.M.M.R. (2015) Safety Problems of Garments Worker and Prevention. Department of Industrial & Production Engineering, Shahjalal University of Science & Technology, Sylhet, Vol. 1, 1-19. <https://doi.org/10.13140/RG.2.1.3753.8722>
- [15] Praveen Kumar, M., Mugundhan, K. and Visagavel, K. (2014) Occupational Health & Safety in Textile Industry. *International Journal of Research in Engineering and Technology*, **3**, 168-172. <https://doi.org/10.15623/ijret.2014.0323037>
- [16] Margaret 13 Comments (2018, May) Sewing Machine Safety: 10 Tips to Avoid Injury. <https://letslearntosew.com/10-safety-tips-sewing-machines>